

Automatically Commanded Steering Function

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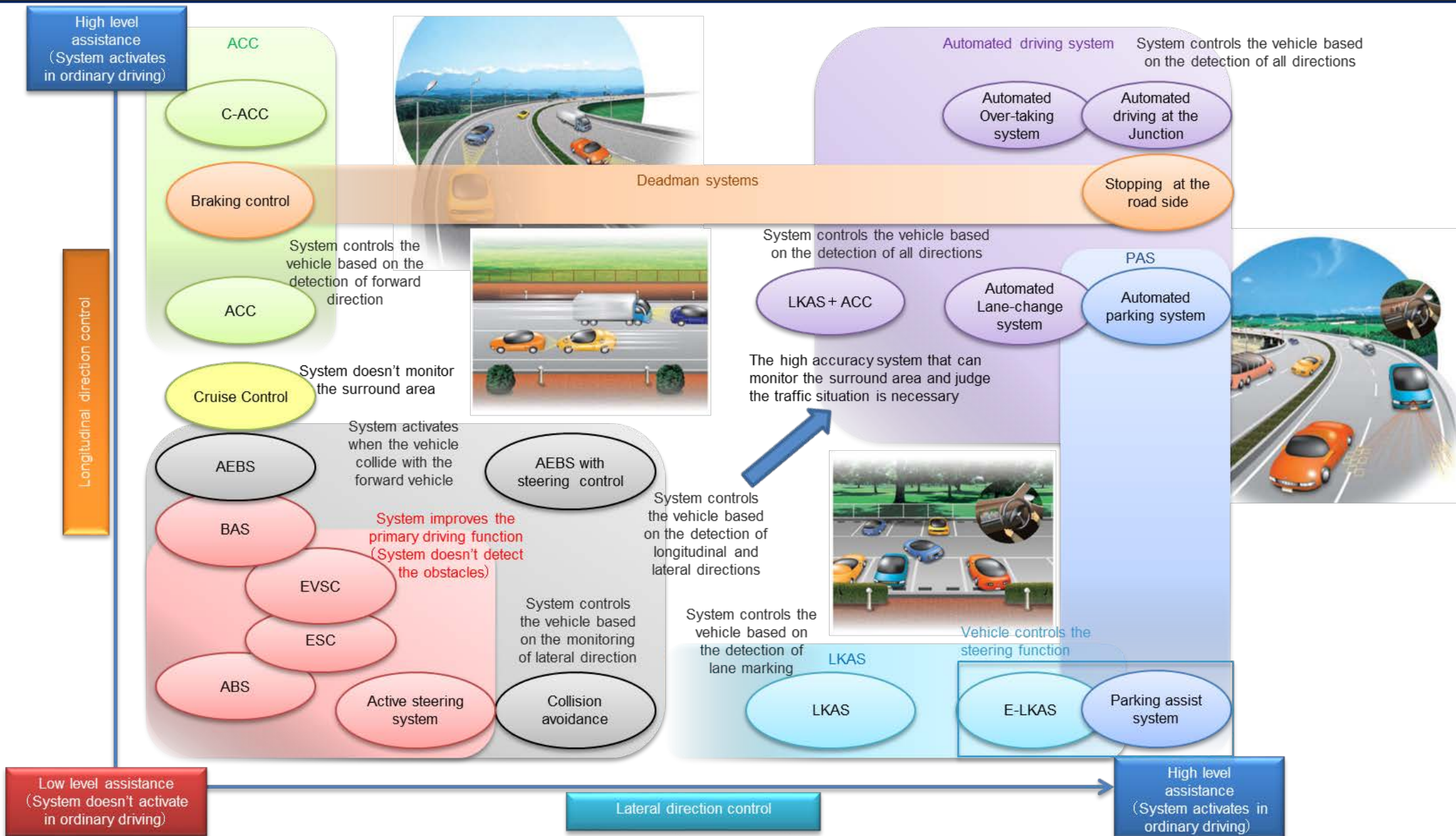
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1. Background

Examples of Automated Driving Technologies



Examples of the projects for Automated Driving vehicles



Highly Automated Vehicles for Intelligent Transport



Defense Advanced Research Projects Agency



The Japanese prime minister tested Automated Driving vehicles on public road.

Amendments to Article 8 of 1968 Convention on Road Traffic (Vienna Convention)

Amendment of Article 8:

A new paragraph (i.e., paragraph 5bis) is to be inserted into Article 8. The paragraph 5bis shall read as follows:

5bis. Vehicle systems which influence the way vehicles are driven shall be deemed to be in conformity with paragraph 5 of this Article and with paragraph 1 of Article 13, when they are in conformity with the conditions of construction, fitting and utilization according to international legal instruments concerning wheeled vehicles, equipment and parts which can be fitted and/or be used on wheeled vehicles*

Vehicle systems which influence the way vehicles are driven and are not in conformity with the aforementioned conditions of construction, fitting and utilization, shall be deemed to be in conformity with paragraph 5 of this Article and with paragraph 1 of Article 13, when such systems can be overridden or switched off by the driver.

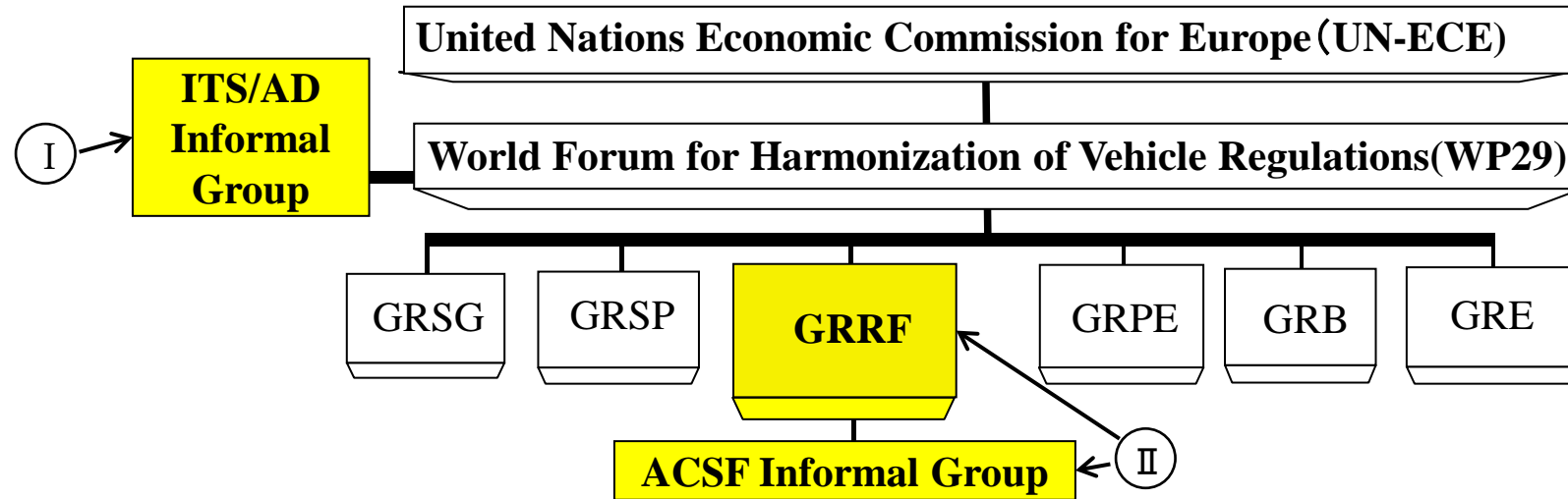
* The UN Regulations annexed to the "Agreement concerning the adoption of uniform technical prescriptions for wheeled vehicles, equipment and parts which can be fitted and/or be used on wheeled vehicles and the conditions for reciprocal recognition of approvals granted on the basis of these prescriptions" done at Geneva on 20 March 1958.

The UN Global Technical Regulations developed in the framework of the "Agreement concerning the establishing of global technical regulations for wheeled vehicles, equipment and parts which can be fitted and/or be used on wheeled vehicles" done at Geneva on 25 June 1998.

The past outcome regarding Automated Driving Technology in WP29

- ITS-IWG
 - ✓ Guidelines on establishing requirements for high-priority warning signals
 - ✓ Design principles for Control Systems of Advanced Driver Assistance System (ADAS)
- GRRF
 - ✓ Regulations for AEBS
 - ✓ Regulations for LDWS
 - ✓ Regulations for LKAS (still under the discussion)

Establishment of IG-ITS/AD



Meetings	Chairman	Progress of the meetings
① ITS/AD Informal Group	UK and Japan	Establishment of ITS/AD Informal Group in WP29 (Nov. 2014) (The 3rd meeting was held in Mar. 2015) <ul style="list-style-type: none"> • Investigation of Automated Driving Technologies (target : Mar. 2017) • Fully autonomous driving technologies (exchange of views and information)
② GRRF	UK	(1) Development of the draft regulations of Automated Driving Technologies (ex. Advanced Emergency Braking Systems) based on the agreement of Contracting Parties (2) Addition of Automated Driving Technologies in the agendas, proceeding discussion of Automated Driving Technologies from Feb 2015.
ACSF Informal Group	Germany and Japan	Feb. 2015 : Establishment of ACSF Informal Group was agreed. (The 1st meeting : from 29 th to 30 th of Apr. 2015) <ul style="list-style-type: none"> • Discussion of the amendment regarding the provision of automated steering which is prohibited of use over 10km/h in UN-ECE R79, Automatically Commanded Steering Function

2. IG-ITS/AD

Working items of ITS/AD

- Prepare a proposal with harmonized definition of Automated Driving Technologies
- Identify the main horizontal issues and legal obstacles to automated driving technologies even those not in the remit of WP.29.
- Determine discussion items for establishment of internationally harmonized regulations on Automated Driving Technologies enabling drivers to benefit from a higher degree of automation of the driving task ("Automated Driving Technologies" /ADT – term still to be defined, cp. No. 5 above).
- Prepare a proposal on harmonized general guidelines for eSecurity and eSafety in motor vehicles

eSecurity is the protection against unauthorized access from outside; eSafety is the protection against failures (e.g. system failures, redundancy in the system, event data recorders for failure tracking in case of an accident). Both, eSecurity and eSafety is important for electronic systems especially for systems with autonomous functionality.

Working items of ITS/AD

Others

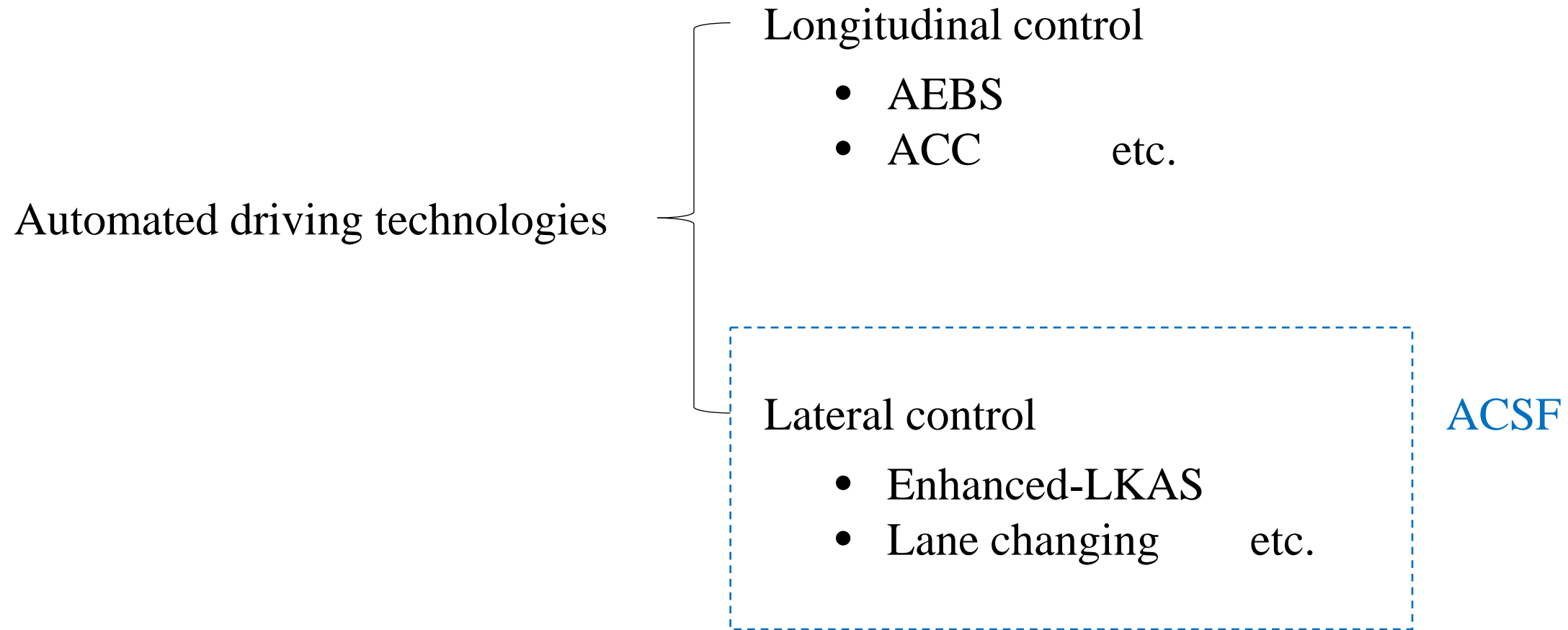
- (i) Consideration of guidance regarding ADT when requested to WP29 by GRs**
- (ii) Exchange of views and information from each Contracting Party about the most advanced technology including full autonomous driving technology (driverless vehicles), such as research results including field tests, information on the national legal system and measures, events, conventions, etc.
- (iii) Exchange of views and information on fully autonomous driving technologies (driverless vehicles) will also be taken forward. This latter activity might be concurrent with above discussion on ADT.
- (iv) Necessary discussion will be made at appropriate times.

Timeline of ITS/AD

Items	2014			2015												2016												2017														
	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.												
(a) Approval process	★ Submission of draft TOR of IG-AD to WP29 for consideration			★ Formal approval of TOR of IG-AD																																						
(b) Definition of Automated Driving Technology				★ Submission of outline												★ Submission of preliminary draft																										
																★ Submission of draft Definition and recommendation																										
(c) Identify the main horizontal issues and legal obstacles				★ Submission of outline												★ Submission of preliminary draft																										
																★ Submission of draft Definition and recommendation																										
(d) Recommendation ADT regulations with recommendation for GRs				★ Submission of outline												★ Submission of preliminary draft																										
																★ Submission of draft document																										
(e) Development of security guidelines																★ Submission of outline												★ Submission of preliminary draft												Submission of draft document ★		
(f) Other	Necessary discussion will be made at appropriate times.																																									

3. Technological requirements for ACSF

Automated Driving Technologies of longitudinal / lateral direction

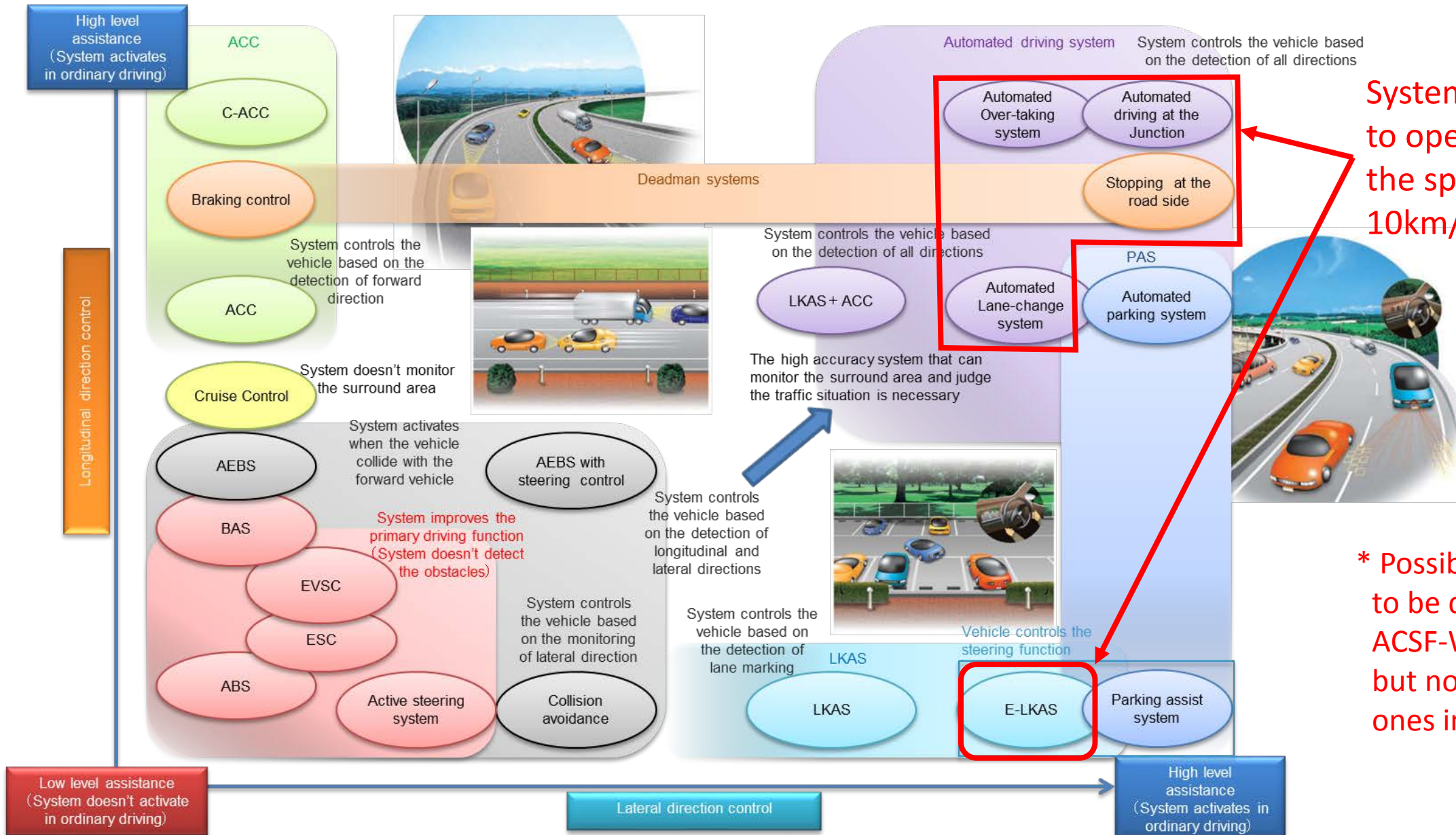


10km/h speed limitation of the current R79

Regulation No. 79

5.1.6.1. Whenever the Automatically Commanded Steering function becomes operational, this shall be indicated to the driver and the control action shall be automatically disabled if the vehicle speed exceeds the set limit of 10 km/h by more than 20 per cent or the signals to be evaluated are no longer being received. Any termination of control shall produce a short but distinctive driver warning by a visual signal and either an acoustic signal or by imposing a tactile warning signal on the steering control.

Technologies which can't be achieved under the speed limitation of 10km/h in the current R79



Systems which need to operate ACSF at the speed of over 10km/h*

* Possible technologies to be discussed at ACSF-WG including, but not limited to, ones in red frames

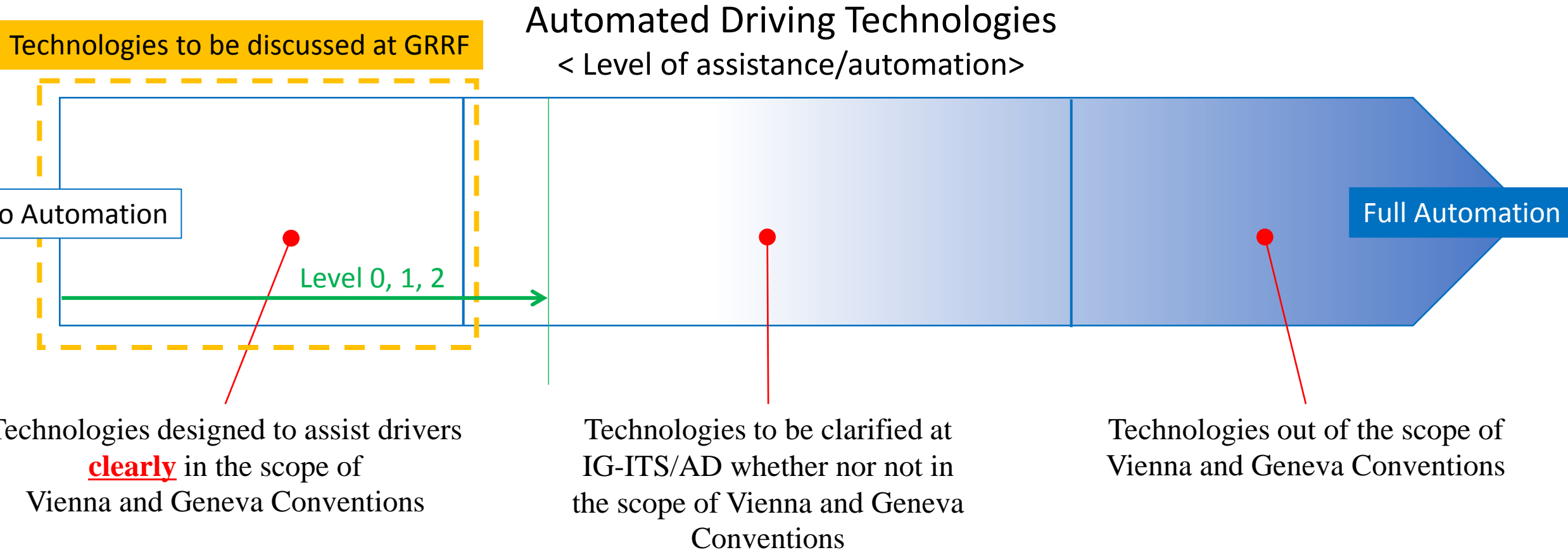
4. Guidance to GRRF

(Framework and points to be considered for establishing technical requirements for ACSF)

Guidance to GRRF (provisional draft)

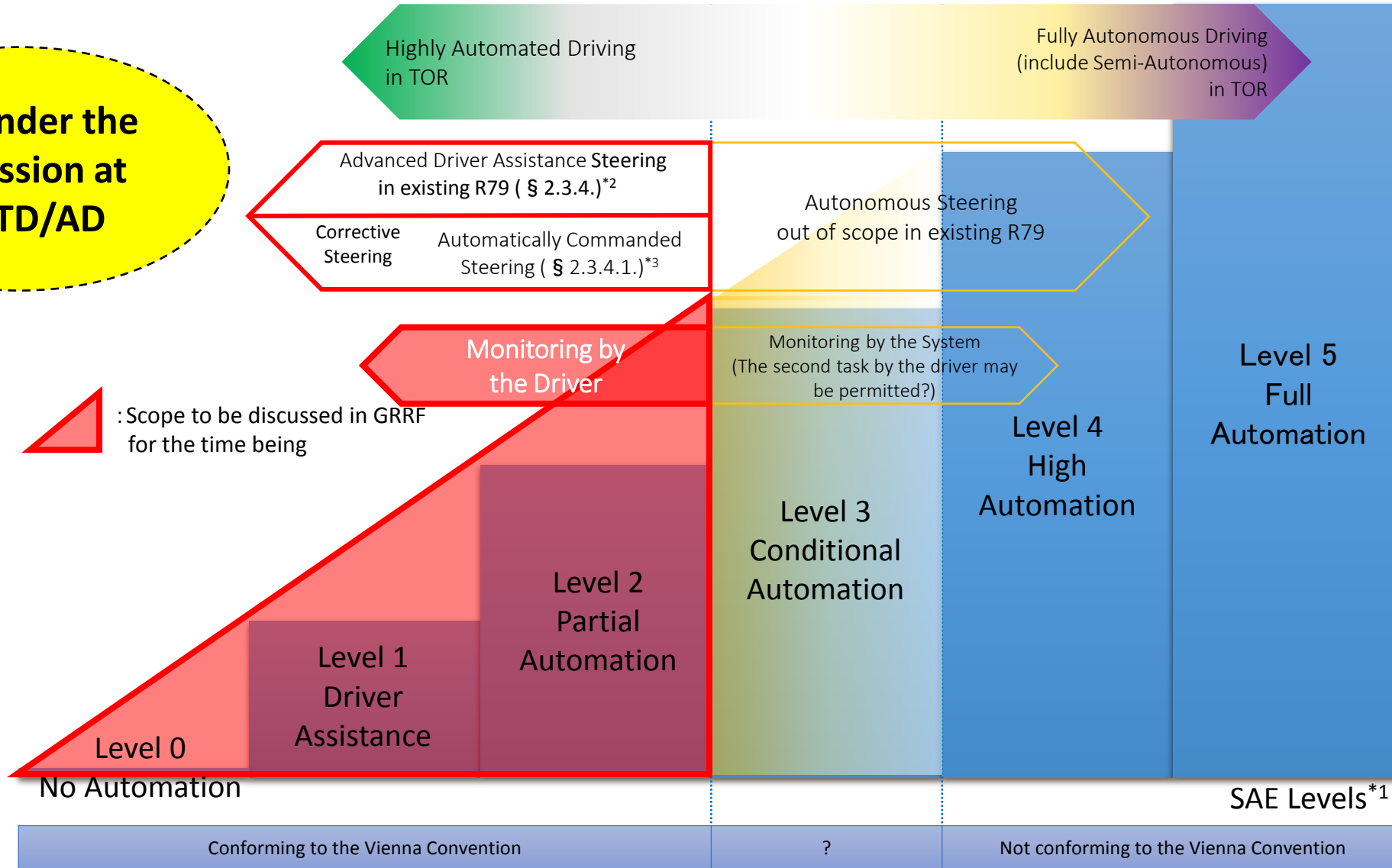
- Discussion in the relevant GRs on driver assistance technologies would be limited to technologies designed to assist drivers” on the basis of Vienna and Geneva Conventions, ITS/AD/03-04-rev1


- it would be clear that at least certain automated driving technology systems would be within the scope of the both conventions ITS/AD/03-04-rev1



Comparison between TOR of IG-ITS/AD and SAE Levels*1

Still under the discussion at IG-ITD/AD



 : Scope to be discussed in GRRF for the time being

*1: WP29 definition of Automated Driving Technology will be discussed by IG-AD from the point of view of the vehicle regulation.

*2: existing R79 2.3.4. "Advanced Driver Assistance Steering System" means a system, additional to the main steering system, that provides assistance to the driver in steering the vehicle but in which the driver remains at all times in primary control of the vehicle.

*3: existing R79 2.3.4.1. "Automatically commanded steering function" means the function within a complex electronic control system where actuation of the steering system can result from automatic evaluation of signals initiated on-board the vehicle, possibly in conjunction with passive infrastructure features, to generate continuous control action in order to assist the driver in following a particular path, in low speed manoeuvring or parking operations.

Technologies to be considered in the scope of Vienna and Geneva Conventions

Which technologies could be considered in the scope of Vienna and Geneva Conventions ??

- They provide a means to keep the driver engaged to ensure that he/she constantly supervise the dynamic driving task executed by an automation system or a function of that system,
- they deactivate immediately with request for immediate control by the driver
- the driver's intention at any time shall be reliably reflected and functions of the system that cause a change in the dynamic behaviour of the vehicle (e.g. lane change) cannot be fulfilled without the driver providing a positive input to instigate that particular function. Exceptions to this requirement may include functions designed for operation to avoid loss of control or collision

Concept of “designed to assist drivers”

ITS/AD/03-04-rev1

- [Partial automation systems shall be so designed as to provide a continuous integrity check, recording any faults, failures, implausible messages etc., and shall record such events in a non-volatile memory. These data shall be accessible for the purposes of roadworthiness and maintenance inspection through a standardised scan tool.
- The partial automation system shall provide the driver with timely, appropriate and understandable information concerning its status (engaged / dis-engaged) condition (plausibility checks, fault monitoring etc.).
- The system shall be designed such that in the event of a defect that renders the system unable to fulfil the full range of control that the driver may expect, it shall not engage on driver request and, if already engaged, will warn the driver that he/she must resume control.
- The system shall be designed to ensure the attentiveness of the driver during periods of use of the automated function.
- The driver’s intention at any moment in time shall be reliably reflected and systems shall be designed such that they deactivate immediately in response to a driver’s request for immediate control,
- Systems that are designed to provide automation of the lateral control of the vehicle shall ensure that the function (e.g. lane change) is preceded immediately by a positive input from the driver. This requirement shall not apply where the lateral manoeuvre is required as part of an emergency avoidance procedure.]

ITS/AD/03-04-rev1

Targeted systems

{ Targeted systems would be:

- a) Driver assistance systems functioning in normal condition where a driver can always override its control.
(Example: following steering operations)
 - lane keeping assistance “designed to assist drivers”
- b) Automated (Partial Automation) assistance systems functioning under the specific command of the driver
 - Lane keeping and lane changing operation “designed to assist drivers” in a restricted area which has multilane road sections with constructional separation of the two directions of traffic and no mixed traffic with pedestrians, cyclists and oncoming vehicles
- c) Autonomous (full automation) systems functioning without the need for a specific command from the driver
(beyond a general command permitting autonomous control)
 - This level of technology is not within the current scope of activity}

- 1) Definition of driver input required to provide stimulus for the control mode of an automated system
- 2) When the control mode makes a transition from a system to a driver, how to ensure the transition safe.
- 3) How to prevent adverse effects on other vehicles and other traffic.
- 4) The following should also be considered depending on the system;
a limited use in specific road environment where safety can be ensured. (e.g. the expressway/highway where the ongoing vehicle lanes are separated by a median from the oncoming vehicle lanes)
- 5) Adequate safety measure provision should be considered so as not to inhibit current development of such systems. These shall include, but not be limited to, HMI, system integrity monitoring, status recording.

5. Possible discussion points in the 1st meeting

Possible discussion points in the 1st meeting (draft)

1) Targeted technologies

1. Drafting at ACSF WG by the end of 2015

Operating on highways : Enhanced-Lane Keeping, Lane changing

***Driver attentiveness (see recommendation of IG AD)**

2. Systems discussed in the future

Operating on local roads,

Dead-man system, Collision avoidance across lanes by steering control

in an emergency situation

2) Regulation items to ensure the safety

Environment of the use, Safe transition, Driver monitoring, OBD/EDR,