Submitted by the experts of OICA

Informal Document: ACSF-16-05

ACSF B2

SAE Level 2 and/or Level 3

Industry input to ACSF IG

16th meeting

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v1.2

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Background

- WP29 has requested GRRF to work on SAE level 3 and 4.
- WP29 has prolonged the mandate of ACSF IG until March 2019, e.g. to deliver B2 “hands-off lane keeping on motorway”.
- No formal decision was made at WP29 nor at GRRF, regarding the level of automation of ACSF B2.
- The question is then whether ACSF B2 should be considered by the ACSF IG in the context of a level 2 and/or level 3 system.
- Level 2 hands-off systems in terms of B2 have already been introduced on some markets. First level 3 Hands-off systems are in development and are expected to be on the market soon.
- Industry sees the urgency to develop requirements and enable the approval of B2 systems of level 2 and 3, within the defined mandate of the ACSF IG.

Different options to regulate ACSF B2

Industry has considered 3 different options regarding the scope of R79:

- Option 1: R79 covers level 2 only
- Option 2: R79 covers level 3 only
- Option 3: R79 covers level 2 and level 3
  (with different sets of requirements)

Different options to regulate ACSF B2

Option 1 R79 covers level 2 only

	R79	Use of the system
Level 2	Set of requirements for level 2	Cannot be used as a level 3

This option does not cover short term market / industry needs,
nor WP29 request to work on SAE level 3 and 4.
Not recommended

Different options to regulate ACSF B2

Option 2 R79 covers level 3 only

	R79	Use of the system
Level 3	Set of requirements for level 3	May be used as a level 2 */

*/ Extract from ITS-AD-13-03: "The functions of Category B2 and Category E of ACSF are allowed in the range of level 3, but if national traffic law prohibits secondary activities, these functions will be used as level 2."

This option burdens Level 2 systems with requirements applicable to Level 3.
Not recommended

Different options to regulate ACSF B2

Option 3 **R79 covers level 2 and 3** (with different sets of requirements)

	R79	Use of the system
Level 2	Set of requirements for level 2	Cannot be used as a level 3
Level 3	Set of requirements for level 3 */	May be used as a level 2

**/ alternative text: "Set of requirements applicable to systems with which the driver may perform secondary activities". This would avoid using SAE terminology in R79.*

This option covers market / industry short term needs, while compatible with ACSF IG mandate.

What happens if the driver has wrong perception of the system installed in the vehicle ?

→ See next slide

The “Mode confusion” issue

What happens if the driver has wrong perception of the system installed in the vehicle ?

The driver believes to have

The vehicle is equipped with		Level 2	Level 3
	Level 2	**OK**	**Technical measures and driver information to prevent misuse of the system as a level 3 (e.g. driver monitoring).**
	Level 3	**No safety Issue**	**OK**

This option covers short term market / industry needs, while compatible with ACSF IG mandate.
Technical measures ensures the driver won’t misuse level 2 systems as a level 3.
→ Option 3 is recommended by industry

Industry proposal

- **Rationale**:
  - Industry is concerned to regulate ACSF B2 under the scope and premises of Level 2, but with technical requirements of a Level 3.

    For that reason, industry recommends to regulate B2 under Level 2, provided the premises of level 2 systems (including the role of the driver) can be agreed as a basis for drafting the requirements.
  - Level 2 hands-off systems in terms of B2 are on some markets today.
  - First level 3 Hands-off systems are expected to be on the market soon.
  - WP29 has requested GRRF to work on SAE level 3 and 4.

- **Proposal:**
  - Define in R79 different sets of requirements for B2 Level 2 and for B2 Level 3.
  - Follow the “general principles for developing a UN regulation on automated vehicles”, defined in WP29 document ECE-TRANS-WP29-2017-145 /*

*/ further work of ITS-AD to finalize the table of automation should also be considered, e.g. see document ITS-AD-13-03.

What if B2 was a Level 2 ?

Premises Level 2:

- L2 = Driver Assistance
- Monitoring by the driver is necessary because the system is not able to detect all the situations in the Operational Design Domain → no transition demand !
- Therefore the driver shall be able to intervene at any times
- The driver monitors constantly the driving environment (no side activities), while the system ensures his involvement in the monitoring task and ability to intervene immediately.

Consequences when regulating B2 – Level 2:

- Requirements to focus on driver's involvement in the monitoring task and ability to intervene immediately.
  (e.g. monitoring cameras to detect the driver's head position and eyelid movement)
- Requirements not to focus on system performance.
  (e.g. object and event detection and response)

What if B2 was a Level 3 ?

Premises Level 3: (excerpt ITS-AD-13-03)

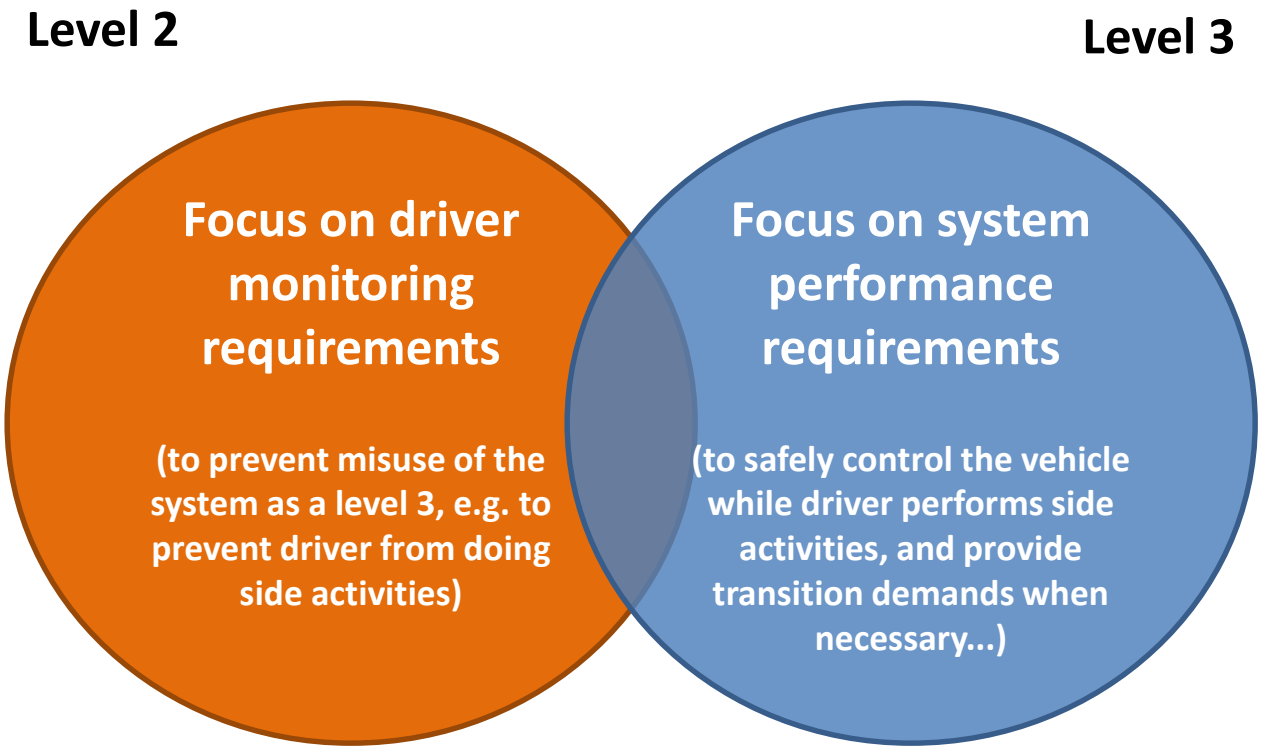
- The system is able to cope with all dynamic driving tasks within its Operational Design Domain (ODD) or will otherwise transition to the driver offering sufficient lead time (driver is fall-back).
- The system drives and monitors (specific to the ODD) the environment.
- The system detects system limits and issues a transition demand if these are reached.

Consequence when regulating B2 – Level 3:

- Requirements to focus on system‘s capabilities to perform the dynamic driving task including Object and Event Detection and Response (OEDR), transition demand, failure mitigation strategy / minimal risk condition.
- Requirements not to focus on driver monitoring, rather on driver availability recognition to ensure that the driver is in a position to take-over when requested by the system.

What if B2 could be Level 2 or 3 ?

2 sets of requirements would be needed, with different focus:



items	ACSF-06 status	ITS-AD-13-03		Industry preliminary input	
	Requirements	**L2**	**L3**	**L2**	**L3**
Override function by the driver	Operation by the driver shall have priority	Necessary	Necessary	***Necessary***	***Necessary (yet may differ from L2 requirements)***
Driver Monitoring **Aspects of arrangement that ensures the driver's involvement in dynamic driving tasks (driver monitoring, etc.)**	• Driver in the seat. • Seat belt fastened. • Show activity every [3] minutes.	Detection of driver involvement in monitoring task and ability to intervene immediately, e.g. head and/or eye movement and/or input to control element of the vehicle	Detection of driver availability to take over driving task: e.g. driver seated / unseated, head and/or eye movement and/or input to any control element of the vehicle	***Provide technical means to detect that the driver is monitoring the driving environment (e.g. head and/or eye movement).***	***Provide technical means to detect that the driver is in a position to take over control within the transition demand period, e.g. by checking the driver is in the seat and is additionally showing regular activities / interactions.***
Transition demand **Aspects of arrangement that ensures the driver's resumption of dynamic driving tasks (transition periods to the driver, etc.)** **Aspect of transition demand procedure.**	• Transition period > 4s (non-fault and single sensor failure) • Failures other than single sensor : failsafe strategy of Annex 6 • Distinctive warning • Transition demand • MRM	NA	Reengage driver following system request: MRM, cognitive stimulation, deactivate infotainment after TD…	• ***No transition period required, the driver shall intervene immediately.*** • ***If driver is detected not to be monitoring the driving environment, then warning must be given (e.g. by the same strategy as for B1).***	• ***Transition period of at least 4 seconds (tbc by existing studies).*** • ***The system shall detect its limits and issue a transition demand if these are reached.*** • ***MRM shall start at the end of the transition period (which may be longer than the minimum required transition period).***
System performance **Comprehensive recognition of surrounding environment (system performance)**	• 1 < aysmax < 3 m/s2 • Monitor front and sides, to avoid or mitigate collisions: sFront > v_{ACSF}^2 / (2*3.7m/s²) sside > 7 m • Emergency manoeuver (protective braking)	• Monitor necessary area for the function. • It is the task of the driver to perform OEDR. Additionally the system may perform OEDR.	• Monitor necessary area for the function. • It is the task of the system to perform OEDR.	***Equivalent to B1 performance***	• ***The system can cope with all dynamic driving tasks within its ODD.*** • ***The requirements shall define the performance of the dynamic driving task including OEDR (e.g. protective braking)***

OEDR = Object and Event Detection and Response / ODD = Operational Design Domain

items	ACSF-06 status	ITS-AD-13-03		Industry preliminary input	
	Requirements	**L2**	**L3**	**L2**	**L3**
Compatibility with traffic law (WP.1)	-	The use of L2 systems is not in contradiction to the UN Conventions on Road Traffic.	The use of L3 systems is not in contradiction to the UN Conventions on Road Traffic	***No requirement on the system, it is driver's responsibility to respect traffic law.***	***The system shall know which traffic rules applies and follow them (within the ODD).***
Side activities	-	NA	The driver can engage in activities other than driving as long as: • Principle 1: these activities do not prevent the driver from responding to demands from the vehicle systems for taking over the driving task, and • Principle 2: these activities are consistent with the prescribed use of the vehicle systems and their defined functions.	***The driver must be informed that he shall not perform secondary activities.***	• ***The driver must be informed that he shall at any time be able to respond to transition demands from the system*** • ***The "infotainment" must disengage as soon as a transition demand is sent.***
Type of road	Detect motorway	Roads exclusively for motor vehicles with physical separation from oncoming traffic (e. g. motorway)		***Same requirements as for ACSF C***	***Same requirements as for ACSF C***
DSSA		NA / Driver's operations and system status (incl. system behaviour)	Driver's operations and system status (incl. system behaviour)	***NA for L2 systems, since driver needs to be able to intervene at all times.***	***Driver's operations and system status***