GRRF-86-36 GRRF recommendations to the IWG on ACSF on the basis of GRRF-86-20-Rev.1			ACSF-16-11 Level 3 Reqs drafted by IWG ACSF (Tokyo-Jan '18)	ACSF-06-28 overview	ITS-AD Table of automation (L3) Extract	X-ref	Industry input to ACSF-17
1. General considerations / establish the limits of the system	**GRRF**	*** Which traffic situations does the system have to master?** - Highway conditions (as defined for ACSF of Category C) - Max operation speed? Consider opt.1 max[80 km/h] or traffic jam assist, opt.2 Vmax, Commonality to both: core set of performance requirements? Possibly: as defined in the ODD declared by OEM, with a minimum set. - 100% of normal situations within ODD then: initiate Transition Demand (TD) / minimum risk maneuver / emergency maneuver. - Consider activation only if system verified that it can manage the situation (within the ODD)	**General consideration:** - which traffic situations the system has to master - which kind of situations have to result in a transition demand (depending on the boundaries of the ODD) - which value of lead time is sufficient ODD (Operational Design Domain): Requirement in regulation: highway* up to the speed defined by the vehicle manufacturer, but not exceeding 130 km/h *: as declared in category C				* Which traffic situations does the system have to master? - Highway conditions (as defined for ACSF of Category C): one lane highways are OK. - Max operation speed? Consider opt.1 max[80 km/h] or traffic jam assist, opt.2 Vmax: industry is not willing to prioritize. Both should be developped. During the work, we'll see if there is a need to have two sets of requirements. - 100% of normal situations within ODD then: initiate Transition Demand (TD) / minimum risk maneuver / emergency maneuver. OK - Consider activation only if system verified that it can manage the situation (within the ODD): ok, this is in line with ACSF C approach. See 5.6.4.2.3 in series 03 (no need to deactivate if the classification of road type does not change).
		- **Traffic rules considerations**: system shall know which traffic rules apply and follow them (within its ODD). Examples: .Detection of relevant traffic signs and subsigns, incl. variable message signs etc. .Compliance with highway code: ACSF to develop methodology suitable for use in the context of Mutual Recognition to verify the vehicle capability to comply with traffic rules.					- Traffic rules considerations: system shall know which traffic rules apply and follow them (within its ODD). OK on principle, however, only "relevant" rules must be considered Examples: .Detection of relevant traffic signs and subsigns, incl. variable message signs etc. .Compliance with highway code: ACSF to develop methodology suitable for use in the context of Mutual Recognition to verify the vehicle capability to comply with traffic rules. **Suggestions:** - Copy the approach of UN R130 (certify in one country + declaration and evidence that it works in all other CPs + audit?) - The existing traffic rules relevant for ACSF-B2 are those related to: speed and distance with front vehicle (possibly lateral distance as well). - To be decided if speed could be left to the driver (as for ACC), and the system only assists (e.g. by applying maximum speed limits on mortorway, recognizing road sigs...). For example there are cases where speed limits changes with weather condition or with the "status" of the driver (young drivers with recent driving licence have lower speed limits during e.g. the first year).
		*** Which kind of situations result in a transition demand (depending on the boundaries of the operational design domain (ODD)?** Planned transition(s), unplanned transition(s), transition(s) when boundaries are exceeded, emergency transition(s) – considerations on Secondary Tasks (ST), see WP.1 discussions					
		*** Which value of lead time is sufficient?** Decision based on research necessary / consider human behavior issues. Vehicle performance impacts TD, lead time value and allowed ST.					
2. Operational design domain (ODD)	**GRRF**	*Slide not reviewed/commented in detail by GRRF. (See slide "1. General considerations").* **Highway* up to the speed defined by the vehicle manufacturer, but not exceeding 130 km/h.** * as declared in ACSF of Category C (UNECE/R79 → § 5.6.4.2.3): "Activation by the driver shall only be possible on roads, where pedestrians and cyclists are prohibited and which, by design, are equipped with a physical separation that divides the traffic moving in opposite directions and which have at least two lanes in the direction the vehicles are driving."		Road Type: Highway and roads with contructional separation (no pedestrians, cyclists)…			- **General approach**: the vehicle Manufacturer declares the ODD, and regulation may/will define a minimum domain. - The proposal in GRRF-86-36 is ok, apart from that one-lane highways should be ok. - Extract from SAE ODD definition: "... an ODD may include geographic, roadway, environmental, traffic, speed and/or temporal limitations..."
3. Dynamic driving tasks		**System can cope with all dynamic driving tasks within its ODD:** **Examples of possible situation**s, which have to be considered (Actually, not all situations can be detected by the system): - Construction area, - Narrow lane or curve, - Inclement weather, - Low friction coefficient of road surface, - Obstacles/ animals, - Other vehicle broken down, covering lane partly (pedestrian), - Detection of signs of police officers, - Detection of emergency vehicles, … - Accomodate easy access to motorway of other vehicles – [as well as other requirements from traffic code] - [Cope with platooning] – maybe at a later stage	The system can cope with all dynamic driving tasks within its ODD. The following examples give an overview about possible situation which have to be considered. Actually not all situations can be detected by the system. • Construction area, • Narrow lane, • Narrow curve, • Inclement weather, • Other vehicle cutting in, • Other vehicle cutting out with, obstacle in front, • Different kind and sizes of obstacles, • animals, • Other vehicle broken down and covering lane only partly (plus pedestian aside this car?), • Low mu, • Different kinds of failures • Detection of signs of policemen • Detection of emergency vehicles • Detection of contact with other object		The system is able to cope* with all dynamic driving tasks within its Operational Design Domain (ODD) or will otherwise transit to the driver offering sufficient lead time (driver is fallback). The system detects system limits and issues a transition demand if these are reached. *The Level 3 system is e.g. not expected to provide a corridor for emergency vehicle access or to follow hand signals given by traffic enforcement officers. The driver needs to remain sufficiently vigilant as to acknowledge and react on these situations (e. g. when he hears the sirens of an emergency vehicle in close vicinity).		**Main principles (extracted from OICA document ACSF-16-05):** - 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) - 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). **Comments about the "list of possible situations":** - The list cannot be exhaustive: there will always be situations which are not in the list - The list may be used in the regulation as an informative list of situations, to be used by the VM to describe the ODD, or by the TS during the CEL assessment - Vehicle manufacturer will declare situations which are not detected/handled by the system, e.g. construction area, specific weather conditions, friction coefficient of road surface, detection/interpretation of signs of police officers, detection of emergency vehicles.
a. Dynamic control or the vehicle (longitudinal control, ACC, emergency braking and steering; OEDR…)		**Regulatory provisions for longitudinal control** (accelerating, braking) and lateral control (steering) are necessary. Longitudinal control: ACC, (non-) emergency braking (throttle / brake).. (candidate for a structured (w/ agenda) webex meeting within 4 weeks) **Provisions for emergency braking measures** (incl. emergency steering measures [outside / within the lane]) by the system, if the time for a proper transition procedure is too short. (keep provisions consistent with UN Regulation No. 131) **The requirements shall define the performance of the dynamic driving task including object and event detection response (OEDR) (e.g. protective braking)**. [Considerations for provisions on: detection / sensor technology, max speed as function of sensor performance, deterioration, fog situation where sensor sees better than driver etc.] [Candidate for a structured webex meeting before the next ACSF meeting]	The system shall know which traffic rules applies and follow them (within the ODD); e.g. • Detection of traffic signs, and subsigns System performance has to correspond to the activities that are allowed for the driver during the ODD Regulatory provisions for longitudinal (accelerating, braking) and lateral control (steering) are necessary. Provisions for emergency braking (or even emergency steering) measures by the system if the time for a proper transition procedure is too short The requirements shall define the performance of the dynamic driving task including OEDR (e.g. protective braking)	Lateral control: 1 < aysmax < 3 m/s2 Monitor front and sides, to avoid or mitigate collisions: sFront > vACSF2 / (2*3.7m/s²) sside > 7 m Emergency manoeuver (protective braking)	1. Consider which regulatory provision for longitudinal (accelerating, braking) and lateral control (steering) are necessary including the monitoring of the driving environment.		**Relevant paragraphs in ACSF-06-28:** - 5.6.4.1.8. "front sensor range requirements" - 5.6.4.6. Emergency Manoeuvre - 5.6.4.7. Longitudinal control and protective deceleration **Comments on 5.6.4.6. Emergency Manoeuvre:** - Open issue: should the requirements applicable to the emergency steering manoeuver be defined in ESF section or in B2? **Comments on 5.6.4.7. Longitudinal control and protective deceleration** - The wording of 5.6.4.7.1.1 should be adjusted to reflect that it is necessary to detect critical situations, e.g. "~~If the activated system detects~~ the activated system shall detect if the distance to front vehicles is…" - In the same way as for ACSF C (in paragraphs 5.6.4.7 and 5.6.4.8 of R79-03),we should define what a "critical situation" is. The requirement should be that the vehicle must avoid a collision in this critical situation, by decelerating (by braking, using retarder, shifting down gear…)
b. Manual override			Override: Necessary (yet may differ from L2 requirements) Ensure that the system deactivates immediately upon request by the driver (or delays deactivation when immediate driver takeover could compromise safety)	Overriding: Operation by the driver shall have priority	2. Consider regulatory provision to ensure the system: i) Permits activation only under conditions for which it was designed, and ii) Deactivates immediately upon request by the driver. However the system may momentarily delay deactivation when immediate driver takeover could compromise safety.	item 6. on HMI	**Relevant paragraphs in ACSF-06-28**: 5.6.4.1.1, 5.6.4.1.2 and 5.6.4.1.3 **Comments:** - ACSF-16-11 seems to mix deactivation and overriding, which are two different things - deactivation by "off switch" must always be available (with immediate effect or smooth transition, depending the layout and the situation) - overriding by steering should always be possible for the driver; however the VM may take measures to prevent acidental overriding by driver or which may compromise safety in specific situations (including prohibiting any overiding by steering) - 5.6.4.1.3. to be improved based on the above comments

c. Transition procedure (and period), linked to driver monitoring			Transition period of at least 4 seconds (tbc by existing studies). The system shall detect its limits and finalize the transition periode before these are reached.	- Transition period > 4s (nominal and non-fault and single sensorfailure) - Distinctive warning - Transition demand - MRM	3. Consider regulatory provision to ensure the system automatically deactivates only after requesting the driver to take-over with a sufficient lead time; including – under certain, limited circumstances – transition (at least initiate) to minimal risk condition if the driver does not take over. It would be beneficial if the vehicle displays used for the secondary activities were also used to improve the human takeover process.	item 5. on MRM item 6. on HMI	**Relevant paragraphs in ACSF-06-28:** - (5.6.4.2.4. Driver availability recognition system) - 5.6.4.4. Transition demand and system operation during transition **Comments:** - The transition period of 4s is confirmed in the industry study (see ACSF-16-08) - A conclusion of the study is that the driving recovery time (by the driver) gets longer when more time is given for the transition, depending the criticality of the situation. This may explain long recovery time in some studies. - Work is ongoing within industry, to review the existing studies measuring the driving recovery time of drivers in different situations. Deadline tbc. - In the discussions, we should consider the "recovery time", i.e. when the driver has grabbed the steering wheel, uderstood the situation and is performing the right control to steer the vehicle - This item 3c is closely linked to item 7. Driver availability recognition / Driver monitoring. ACSF-06-28 draft is also mixing up these two items. Before drafting a text (or splitting the work in sub-groups), the limits between these two items should be
4. System reliability ("Annex 6" + testing + redundancy considerations)	**UK**		B2 level 3 has to be fail-operational, at least as long as the transition procedure is taking place. The functional safety of the system shall be considered in the context of CEL assessment.	Failures other than single sensor : failsafe strategy of Annex 6	System reliability Consideration shall be given to evaluation of the system reliability and redundancy as necessary.		**Annex 6**: industry is waiting for the UK to initiate the work on so called "CEL step 2", for example with a summary of the open items left for step 2 during step 1 discussions, e.g. functional safety. **Testing** seems to be a bit disconnected from this CEL step 2 discussion (testing should be worked in a sub-group, once the principle of the requirements will be defined) **Redundancy considerations**: - CEL Annex is already dealing with this type of strategies, from the angle of an assessment of the chosen "safety concept" by the manufacturer - Redundancy should not be described in all technical details, to avoid design specific requirements, but rather in terms of a required performance (which can be fulfilled with relevant technical solutions, **for example:** A system with an ODD limited to low speed traffic jam may not need any redundant steering actuator, since the vehicle can be stopped by emergency braking within a few meters. A system with an ODD aiming at cruise speed may need a redundant steering actuator (e.g. "steer by braking" or a "double coil actuator" etc.).
5. Minimal risk maneuver (once limits of system are established)			MRM shall start at the end of the transition period (which may be longer than the minimum required transition period).				**Relevant paragraphs in ACSF-06-28:** - 5.6.4.5. Minimal Risk Manœuvre **Principles:** - MRM shall start automatically between the transition demand (when driver is requested to resume control) and before the end of the specified transition period by the manufacturer - The specified value of the transition period by VM must be higher or equal than the minimum transition period required in the regulation MRM is a Manoeuvre carried out by the system to keep the vehicle in a minimum risk condition - The MRM may stop when the conditions for sending the transition demand are no longer present, or by deliberate action of the driver (MRM can be overridable by the driver), or when the vehicle comes at standstill - MRM shall not be specified in the regulation, since may differ depending on the actual situation (e.g. use of hazard lights, acoustic warning device, value of deceleration...)
6. Information to the driver			The driver must be informed that he shall at any time be able to respond to transition demands from the system. Give information to the driver, that any side task is permitted within the limits of the behavior law. The "infotainment" shall disengage as soon as a transition demand is sent. System shall inform the driver about the actual driving status: Information given to the driver has to be designed in a way that the driver always knows which part of the driving task is carried out by the system and which kind of behaviour is expected from him and which tasks are expected to be carried out by him.	Deactivating of infotainment content not relevant to driving when the TD is issued			- Series 02 and 03 to R79 are a good base to draft requirements for ACSF B2, regarding e.g. the indication of system status; indication of system failures etc. - What is new with ACSF B2 L3 is the possibility for the driver to have side activities. Below some proposals: 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.
7. Driver availability recognition / Driver monitoring			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 and/or head and/or eye movement	Driver in the seat. Seat belt fastened. Show activity every [3] minutes.	4. Consider regulatory provision for driver availability recognition is used to ensure the driver is in the position to take over when requested by the system. Potential technical solutions range from detecting the driver's manual operations to monitoring cameras to detect the driver's head position and eyelid movement.		**Relevant paragraphs in ACSF-06-28:** - 5.6.4.2.4. Driver availability recognition system - (5.6.4.4. Transition demand and system operation during transition) **General principle**: 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. **Proposal:** 1. ensure the driver is in the seat (e.g. seat belt fastened) 2. ensure the driver is not sleeping, e.g. - Driver is showing activity every [3] minutes * and/or - Detection of eyelid and/or - head position (* The 3 minutes proposal is coming from draft ACSF-06-28 and is justified in Japan study ACSF-06-25 - (J) Results of a Study on Reduced Awakeness in Drivers Using ACSF)
8. Recording of information / DSSA	**WP29**		Record the driver's operations and the system status (incl. system behavior) in the DSSA.	[DSSA proposal]	Recording of system status (inc. system behavior) (DSSA-Data Storage System for ACSF, EDR, etc.) The driver's operations and the system status (incl. system behavior).		Industry proposal is to take DSSAD OICA presentation to WP29 as a base Industry will prepare some simple requirements to be inserted in R79 for the 18th session of ACSF.
9. Cyber-security	**TF CS & OTA**		Depending on the outcome of the Cyber Security/Over the Air Update - Task Force of the IWG ITS/AD.		Necessary if the information communication in connected vehicles, etc. affects the vehicle control		Industry will prepare a short status of the CS&OTA TF, for ACSF-17 meeting Industry is aiming at drafting simple requirements to be added in R79 for ACSF B2 Level 3, this for ACSF-18 meeting. The group should not wait until a new CS regulation is available, to avoid delaying the whole ACSF B2 development.

10. Periodical technical inspection (PTI)	**SWE**		Consideration of PTI: Offering the possibility to carry out a beneficial periodical check of roadworthiness It has to be considered how to verification of correct operational status in a simple way to use a failure warning signal to use an electronic communication interface. How to do the confirmation of valid software version is depending on the outcome of the Cyber Security/Over the Air Update - Task Force of the IWG ITS/AD.	Not in ACSF-06-28 included, however some papers for ACSF-Type Approval Number have been proposed	Not considered in ITS-AD document		PTI provisions in R79 should rely on: - the warning signals available on dashboard, - a cross check of the system status ("system is operational" or "a failure is present") by using the electronic vehicle interface (e.g. to read the status of the warning signals) - the outcome from CS&OTA TF on SW ID validity