Report

19th meeting of the GRRF informal working group on

Automatically Commanded Steering Function (ACSF)

Venues: Paris (France) – for details see ACSF-19-01
Chairman: Mr. Hiroshi Morimoto (Japan) and Mr. Christian Theis (Germany)
Secretariat: Mr. Rudolf Gerlach (TÜV Rheinland)
Duration of the sessions:
Wednesday, 05. September 2018: starting at 10:00
Friday, 07. September 2018: ending at 12:00

Note: Any comments or documents relating to this meeting should be sent to the secretariat (gerlach@de.tuv.com) in e-format, so that meeting documents can be made available to the UNECE secretariat for publication on the website of WP29.

1. Welcome and Introduction

GRRF Chair:
ITC requested GRVA
- Close cooperation between WP29 and WP1 since AD affects both WPs.
- Re-structure of GRRF as GRVA for adapting to AVs

Poll within the Contracting Parties to check the priorities for GRVA results in 45 items, which could be reduced to about 35. But there will be a need to create new informal groups. There could be 6 “permanent” informal groups working under GRVA to deliver the work.

First two days of GRVA dedicated to subject of automated driving. Anticipate 6 subgroups (ACSF, AutoVeh, SG1 & 2, Cyber Security, PTI, etc.).

Groups should work on creating always a Part A and a Part B of every draft proposal to enable a regulation under 1958 and 1998 Agreement.

2. Approval of the agenda

Document: ACSF-19-02 (Chair) Draft Agenda of the 19th session

Agenda adopted

3. Adoption of the report of the 17th and 18th meeting of the ACSF IWG

Document: ACSF-17-11-Rev.1 - (Secretary) Report 17th session
ACSF-18-11-Rev 1 - (Secretary) Report 17th session

Report of the 17th session, adopted.

Report of the 18th session, not adopted yet. Group needs more time to review. Participants are asked to send comments until end of next week to the secretary.

Remark:
Secretary received comments from NL, Republic of Korea and from Japan and published the final report on the ACSF website.

The chairs committed to produce the reports asap, for permitting necessary comments. Industry stressed the necessity of having some way to trace the decisions of the group, such to make sure that the orientation is conform to the decisions of the previous meetings.

4. Discussion on requirements for an automated lane keeping system

The group will discuss homework distributed during the 18th meeting and other key issues as appropriate.

Documents:
- ACSF-19-03 - (OICA-CLEPA) B2 provisions on headway control etc. V1.1
- ACSF-19-04 - (OICA-CLEPA) Driver Monitoring Interior Camera V2
- ACSF-19-05 - (Germany) Proposal for technical requirements of an ALKS
- ACSF-19-06 - (Republic of Korea) Safety Distance to the front
- ACSF-19-08 - (OICA-CLEPA) Concept TD_MRM_DAR - industry V3.1
- ACSF-19-09 - (Secretary) working document - proposal for technical requirements of an ALKS
- ACSF-19-10 - (Secretary) System behaviour

Discussion on system behaviour

Starting the discussion with ACSF-19-05 about the topic of transition demand.

A Visualisation of ACSF-19-05 was presented by Germany (see a during the 19th meeting modified version of the presentation in ACSF-19-10).

Germany - presented their understanding of the system behaviour in cases of expected and unexpected events.
Principle:

- No driver could only be in case of:
  - Misuse
  - “sleeping”
  - Medical problem
- an automated lane keeping system (ALK) then shall
  - If fitted with lane change (LC), operate LC toward rescue lane
  - If not fitted with LC, then slow down until standstill.

Unexpected event without imminent danger

The requirement is, the system has to be able to work properly within the 10 sec transition time! The MRM has to start only after the Transition Time is over!

The item to be clarified is whether the system must decelerate as from the beginning of the transition demand, or whether the text can state that the system can decelerate the vehicle before the transition demand started.

At latest after [4] s during the transition Period, a haptic waring (brake jerk) shall be issued, to alert the driver, to take back control again! A haptic warning (e.g. by brake jerks) (latest) after 4 sec. is absolutely mandatory for Germany, without any doubts.

Industry - pointed out, there is no big difference in understanding. Imminent Danger should be defined!

Japan – proposal, imminent danger is, when the situation cannot be managed with a deceleration less than 3.7 m/s².

European Commission - "imminent danger" means "imminent danger to collide", i.e. the collision is not avoidable (as in informal group on AEBS).

Industry – deceleration of the vehicle is not always necessary for an expected event.
Germany – transition demand is for when the driver needs to takeover, there is nothing to prevent the vehicle from notifying the driver earlier without a transition demand (e.g. 2km away from the exit). If the driver does not takeover before MRM, reactivation of the function is not permitted until a new ignition cycle.
Industry – agree to the principle, but not sure about allowing deceleration during the start of the transition demand.
Germany – for an emergency manoeuvre, the system performs full braking. The driver can override the steering if there is a free lane, but the system continues to brake depending on what it sees in front.
Industry – driver override is tricky, as if steering could avoid, you may wish to release the brakes to make the vehicle more stable. Would want to be able to manage the braking based on the calculated trajectory following the driver's steering input.
EC – imminent danger means that a collision cannot be avoid, and so full braking is required.
Industry – full braking may not needed depending on the criticality of the situation. What about the situation where the system knows better than the driver how to avoid the danger? Full braking performance should be applied if necessary.
UK – vehicle must normally leave sufficient gap to allow it to stop. Also, the vehicle needs to calculate if it has sufficient time for a transition demand. If not, may need to then move into emergency braking.

Industry presented document ACSF-19-08, planned transitions using the scenario of a lane ending. The transition demand is issued in advance of the end of the lane. However, the MRM has to start during the transition demand (rather than after) to ensure that the vehicle can be brought to a stop in advance of the lane ending.
Germany – we have a different understand of transition period / demand. System should allow time for full transition followed by MRM in case the driver does not takeover.
Industry – issue is that the speed of the vehicle is variable changing when you need to issue a transition demand. This also means that the duration of the MRM is unknown.
UK – MRM is an exceptional event, not routine. Vehicle should automatically be slowing down in advance and should also issue the transition demand in sufficient time for the driver to take back control. UK has deep concern about MRM stopping in the lane, MRM should not be part of the routine performance of the system. If the number of occasions is more frequently than group sought (assumed to be very, very rare events), if stopping in lane is happening more often, then CP might ask the OEM to make the lane change on the hard shoulder mandatory.

Germany – the vehicle can only drive as fast as it can see to ensure it can still stop (e.g. reducing speed when approaching a crest in the road).
Industry – sees any braking (e.g. during the risk mitigation period) as part of the MRM.

Germany – in the situation where the lane markings end and the vehicle does not have time to issue a transition demand, this would be an emergency scenario.
Industry – during the MRM, a transition demand should still be issued.
Industry – if, for example, the vehicle detects a need to transition control only 1.5 seconds in advance, then the vehicle has to start the MRM much earlier.
Germany – such situation is an emergency case. There are other means to maintain safe operation during a transition demand with missing lane markings (e.g. maps, following a lead vehicle). Besides that, usually missing lane markings are announced by traffic signs and a speed limitation pretty much in advance.
Sweden – surely if something is detected less than 10 seconds in advance then this is an emergency situation.
Germany – disagree, this is a typical situation so a transition demand should be issued and the vehicle must be capable of managing the situation during the 10 seconds.
NL – the vehicle should have some redundancy and issue a transition demand if one of these is not available.
UK - was keen that the vehicles are designed such that they react as soon as an information is missing (lane marking, blindness, etc.). Systems with only one sensor cannot be approved. A blindness of one sensor shall not lead the system to fall back into MRM.
Debate over when escalated takeover demand can occur.
Germany – cannot come to a standstill during the transition demand.
Industry – cannot define a set time during which there are no aggressive takeover requests, as may have to start this earlier.
UK – where you do not have time to bring the driver back into the loop, this is an emergency manoeuvre.

Discussion on time period for driver to take over prior to any speed reduction and more aggressive alerts, i.e. whether the 4 s is a defined value, a minimum value, or other. In addition a debate took place on the reason for the “haptic” warning in an escalation.

Industry –asked for clarification:
When is the transition demand required to start? How to use the 4s:
Germany - the transition demand is the reference point when the complete process starts. Then starts the transition period, followed by the MRM. The start of the transition demand is defined according to the performance of the system, hence defined by the manufacturer. However, the transition period is divided in 2 phases, the [4] secs with no other HMI, and the remaining [6] seconds, starting by a mandatory haptic warning. The key is that the system should put all possible resource in bringing the driver back in control.
France – agreed to the German proposal in principle, but need time to reflect.
Industry – what about allowing systems that adapt to the driver? For example, finding that the driver does not respond until the first haptic alert and so changing the system to introduce this earlier.
UK – the value of 4s is in brackets and can be discussed at another time. Need to mandate some form of alert that will work assuming that the driver is doing a secondary task with hands off the steering.
Industry – not completely aligned on having to use a haptic warning as developing some systems that can project a visual warning directly where the driver is looking.
France – favour the 4s transition time as a maximum, so haptic warnings could be issued earlier.
Germany – concern about expected behaviour for the driver if the haptic warnings can come in at different times. Can allow up to 4 seconds in the regulation, but it must be a regular interval.

<u>Unexpected event with imminent danger</u>

The chairman found that unexpected event together with danger to collide is a rare event.

No driver detected and imminent danger to collide → emergency event:
System behaviour:

- full braking, or
- evasive manoeuvre

Industry – pointed out:

- Full braking: might not be relevant, depending on the criticality of the event.
- Problem of balance between the steering and the braking.

Discussion starts:

- At that time, should a driver action be allowed, and if so, should a manual steering input be allowed and a manual breaking only be tolerated if hands on is detected?

The driver controls the main behaviour, but this is correct provided that the system can still assist the driver and in cases, when the system knows better than the system what to do, because the driver is not aware of the situation.
The chair requested Industry to draft a proposal along that lines.
Industry confirmed the approach. Critical points:

- Sometimes the braking is even not necessary
- Sometimes there is steering input is the better choice, sometimes not

Industry deleted unexpected event from their proposal, since the system must always react adequate, whatever the origin of the event may be.

Sweden – need to explicitly state that operation of the accelerator or brake pedal without holding the steering wheel does not deactivate the system. There should be limitations of overriding the system by using the accelerator.
OICA – should differentiate between accelerating and braking. Product liability means I cannot offer a product that does not allow the driver to brake when they press the pedal.
Sweden – should request a takeover if you press the brake pedal (clarify what is meant by deactivation).

UK - the border is when the system cannot guarantee to bring back the driver in the loop.

Industry presented their approach per the slides 7 and 8 of ACSF-19-08.

Germany - proposed “planned event” rather than “planned transition demand” since a demand is always planned. In addition, the transition demand should be called a transition information.
The experts explained the necessity to take the end of the lane as the reference point. Making the start of the transition demand the reference point would add difficulties since the vehicle does not know at the time of transition demand, its speed at the time of the MRM.

Debate on the definitions of transition demand, MRM, etc.
Germany - tried to clarify the definitions of phases, events, etc.
Industry - stressed the paragraph 5.6.3.4.3 of their proposal ACSF-19-03.

All agreed that the debate is based on the fact that the definitions are not clear enough.

Group agrees on the principle to put forward for Expected & Unexpected event w/o imminent danger.

<u>Discussion on classes of system</u>

Germany - presented a visualisation of the classes of the AV solutions. according to the use-case, highway, interurban, urban, and parking. In addition subclasses proposed, e.q. Highway Class IA1 (0-60 km/h), IA2 (0-130 km/h). The intention is to harmonise systems on the market with fixed, defined speed ranges (0-60 km/h and 60 – 130 km/h).

A debate took place on the necessity of the creation of the sub-categories, and the fixed speed classes:
Industry – concern that vehicles shall meet the 130km/h even if planning is to sell vehicles in markets with a lower maximum speed. Requirements up 130 km/h might be very difficult to reach at the moment with current sensor technology. Different Classes for different use cases are necessary, without any doubt (Highway, Interurban, Urban, Parking).The Question is, if subclasses for different speed ranges are also needed.
Proposal:
Class IA2 must not be 130 km/h but should be possible at max 110 or 115 +/-15 km/h.
Germany – but the approval is valid in Germany, and so this is why the function must be capable up to 130km/h to get an approval. Classes are also used to ensure consistent behaviour for the customer between different manufacturer vehicles.
Industry – what about a system up to 100km/h only in the slow lane in Germany?
UK – struggle to see the German argument that prevents systems with a lower maximum speed given that such systems could be used in the slow lane.
NL – we should restrict the number of classes to clarify to the customer the system capability.
Industry – suggest minimum 100km/h for the high-speed class with a limitation of 130km/h.
UK – do not believe that variations in the upper speed for the high-speed class will be a big problem, as the consumer can quickly understand this restriction when they try to use the system at a higher speed.
Germany – could accept a lower maximum speed limit if the system can detect if it is travelling slowly in the middle lane whilst the slow lane is unoccupied.
Industry – there would a benefit to having a traffic jam system that operates up to 70, 80, or 90.
UK – sensor performance needs to be guaranteed over the life to satisfy the required operating speed. There is a need for the classes as the requirements for a traffic jam pilot system will be different to those for open highway driving.
Industry - keen to have the possibility to declare a max speed < 130 km/h, if we would look at two different scenarios, perhaps there does not need to be an upper speed limit threshold for the high-speed class.
Chair - proposed: limit to a speed adapted to the state of the technology, then keep the door open for amending the max speed when the technology is ready.
Industry - questioned the necessity of having classes at all, since this could be solved by making the requirements according to the speeds.
UK – found, that the classes are necessary, rather their definitions should be clarified.

Issue is not finally settled, further discussion between Germany and Industry needed.

It was noted, that the scheme covers the N2/N3 vehicles when equipped e.g. with a AV Class IA1.

Industry - claimed, that they had to prepare their homework for the 19th session, but now the discussion take only place on the German proposal.

The group then decided to work in parallel on both documents, ACSF-19-03 and ACSF-19-05

Paragraph 5.6.3.1.2.: “the system shall cope with …”

Industry - stressed the need to clarify the meaning of “cope”, e.g. in the rain

The system must still function under rain, or
The system must detect rain and the limits of its proper functioning, and release a transition demand. “operate under all conditions” include transitioning back to the driver?
UK – we need to ensure a basic level of performance that all systems are able to cope with and not just allow the manufacturers freedom to hand back control to the driver all the time.
OICA – the system can either handle driving in rain or issues a transition demand.
UK – we may need to consider a different transition demand if it is raining. Need to consider how the regulation allows certain scenarios to be handled. For example, if the vehicle cannot handle low mu conditions, the function is not available at low temperatures.
EC – can the industry define the minimum capability of the system?
OICA – the key is that the systems operate in a safe way, which includes safely transitioning to the driver in conditions where the system cannot cope. It is in manufacturer’s interest to deliver systems that customers want to use, but this is not for the regulation to determine. Industry can bring a proposal on the list of what the system should be expected to cope with in the next week.
Germany – the situations that the system can cope with may be different for different classes (e.g. handling rain may be easier for a traffic jam system).
Germany – looking to industry to understand the situations where you expect to issue a transition demand.
OICA – an easy example is missing lane markings or too many (e.g. road construction area).
UK – unsure how the systems could be politically acceptable given all the situations we keep hearing about that cannot be dealt with. Need a smaller group to understand what the system can do.
OICA – we need to define a safe transition (i.e. how does the system allow a transition during conditions it cannot cope with longer term).
UK – not concerned about frequency of transition demands (industry will manage this for customer acceptance). It is more about how the system transitions to a driver that is not situationally aware in a safe manner. The transition should not be instant.

Some list or criteria should be established to regulate the cases where the system cannot work.

The European Commission - struggled with the definition of “B2” since it should also affect the longitudinal control.

Industry - informed having created a list of the situations where the system is/is not able to operate.
Industry - is not yet ready with the list. Industry committed to provide material, and confirmed that a transition demand can be done is a safe way.
UK - was concerned about the number of situations that cannot be coped with the AVs. The more the discussions go on, the more we discover situations with problems, even in the simple environment of highways. There is in addition a mandate to regulate the urban driving situation, currently based on the manufacturer’s declaration of functional safety. UK found it difficult to defend AVs at political level in this context. UK was ready to discuss these situations once

UK - was concerned about the ability of the driver to cover the a situation “on the spot” that the AV cannot handle, while the driver was e.g. watching a movie. The human is capable to perceive a hazard, looking at the sky, anticipating the rain etc.
Industry - recalled that the driver is assumed to be the back-up, hence attentive.
UK - was concerned that the system does not warn the driver sufficiently in advance to permit him to evaluate the situation that the AV cannot handle.
Industry - clarified that a task-force should address e.g. all information that humans are able to capture and that the system is assumed not to be able must be the focus, e.g. compensate the colour of the sky by a reduced maximum speed.

The group continued reviewing the documents.

Driver priority

Debate on paragraphs 2.4.3., 2.4.4. and 2.4.5. of ACSF-19-05.
Industry - explained having followed the document ACSF-17-03-Rev.1.
Industry - had the concern that paragraph 2.4.5. also applies in case of emergency.
Germany - agreed to except the emergency situations.

Paragraph 2.4.7.:
Germany - explained that the background is to ensure that the driver has control on both the longitudinal and lateral position of the vehicle. This was challenged by Sweden and the Industry.
UK - was generally supportive of the Industry proposed paragraph 5.6.3.3., and was only struggling with the paragraph 5.6.3.3.4. that permits the driver to still accelerate beyond the boundaries of the system, during the 4 s of transition demand.

UK - presented proposed new text to allow the driver to temporarily increase the speed using the accelerator. Any traffic law contravention would be the responsibility of the driver and this will need to be logged in data.

Question about whether assistance systems remain active after the automated function is deactivated (assuming the assistance system was activated prior).

EC – recommend that any manual action by the driver fully deactivates the function rather than having any partial deactivation.
Germany – can a B1 system be activated independently of the "B2" system?
NL – suggest off means all automated or driver assistance functions are deactivated.
Industry – need to consider that some markets will be mandating LKA in the future.
Sweden – concern that the text in 2.4.7. does not account for other system limitations, such as the safety distance.
France/EC – there is no definition of "set speed".

After, the group resumed consideration of paragraphs 2.4.5., 2.4.6. and 2.4.7. Japan had the concern that the proposed wording does not make clear whether the LKAS feature remains active after the driver has manually braked.
➔ Conclusion: paragraphs between [ ]

Headway control (paragraph 5.6.3.2 ACSF-19-03 or 2.5.1. in ACSF-19-05.)
Germany - presented their proposal, with declaration by the manufacturer.
Industry - challenged the declaration of all "situations", and proposed that the categories or types of situation be declared.
Conclusion: "type of situation".

Paragraph 2.5.4.
Debate on "able" initiated by Sweden. Industry clarified that the system must be able to .., but when activated, the system must do… . an editorial task-force might review this throughout the document at the end of the exercise.
Industry - found it necessary to add an exemption for the case of overriding.
Conclusion: addition of a reference to the relevant paragraphs.

Paragraph 2.5.5.

Industry - stressed the link to new paragraph 2.4.7.
Conclusion: reminder in paragraph 2.4.7.

Paragraph 2.5.6.
Debate on the formula.
Sweden - "leading vehicles" covers motorcycles?
Industry - confirmed this understanding.
Germany - was keen that the system "continuously" detects the preceding vehicle. The expert wondered whether the system would only focus on the ego lane, or would also detect vehicles in adjacent lanes.
Industry - replied that the manufacturers offer different systems with different capabilities.

Germany – concern about why this functionality is needed. Can see a need for a momentary change (e.g. seeing a vehicle approaching quickly from the rear).
Industry – The current text addresses the concern you raise by allowing the driver to temporarily accelerate.
Text left in square brackets for further discussion at the next meeting.
Industry – any situation where a transition demand occurs could be an endless list.
ROK – no range specified for how far to the side the system must detect vehicles.
Industry – only need to detect from the vehicle front to rear if there is another vehicle beside.
UK - committed to produce a draft new text for detecting traffic in front for anticipating the possible cases.

Conclusion:
See working document ACSF-19-09 prepared by the secretary on base of ACSF 19-03 and ACSF-19-05 and the modifications made during the 19. Session of the IWG on ACSF.

Industry stated that the way of working of the informal group should be improved toward more efficiency: when there is a homework the group should base their discussions on the base of the homework rather than starting from scratch again.

The group decided to identify the Homework for the next meeting:

HOMEWORK:

Industry - to provide details on what a strategy could look like for phase two of the transition demand (after 4 s) for next meeting (e.q. risk mitigation strategy during the transition period, by a warning cascade!)

Germany - to coordinate a smaller group to further develop the document for the next meeting considering how the system will safely transition.

OICA - to provide example of where the system is likely to face difficulty and the strategies they could employ to safely manage them.

CPs - to draft regulatory text based on the agreed principles of this meeting.

Germany & Industry - to develop the operating range / speed requirements.
Decision to be done on the approach:
- base the requirements on a fixed speed value of 130, or
- the manufacturer to declare the speed they find relevant.

Other remarks

Germany – concerned about that there is no safety increase as keep hearing that the system will transition back to the driver in challenging scenarios (adverse weather, low sunlight, etc).
Industry - stressed the paragraph 5.6.3.2.4. stating that the system must adapt its speed to the conditions. In addition, an AV will always respect the safety distance, while a human driver does not, provoking accidents (whose cause cannot be found in the statistics).

UK – Note that self-diagnostics capability is a topic to be discussed at GRVA.

Driver monitoring

CLEPA - presented their presentation on driver monitoring ACSF-19-04.

Levels shown are not related to the SAE levels (just used for illustration). Cabin monitoring systems under development. These could be mounted in the roof to monitor secondary activities (e.g. reading a newspaper).

The group welcomed the presentation.

Safe distance to the vehicle in front

ROK - presented document ACSF-19-06.

Assessment of human driving data on safe distance to the vehicle in front. Shows that a time gap of 2.3s covers 95% of the data and is more than the required gap for braking to avoid a collision at 130km/h.
ROK - proposes a target of 2.3 sec as a time gap to the preceding vehicle.
Industry – 2.3s is very large, especially for a traffic jam system, where other vehicles will likely cut in front.
Japan – deceleration of the front vehicle also needs to be considered.
Industry – the 2.3s gap has been calculated assuming the vehicle in front suddenly becomes stationary. Industry questioned a constant value of 2.3s while the value could vary on the speed difference.
ROK - replied that they favoured a simple solution.

5. Other business

ACSF-19-07 (Japan) Revised ToR of the IWG on ACSF

Japan - presented revised ToR of the IWG on ACSF to be presented at GRVA, which were agreed by the group.
The group reviewed the document ACSF-19-07 for modification of the terms of reference.
The secretary will send the document o the secretary of the GRVA

Germany - presented just for the information of the IWG an outline document for a new regulation, showing the intended structure, based on the OICA document presented at AutoVeh.

6. List of action items

Adoption of the report of the 18th Session (comments to be provided at latest one week after the end of the 19th Session).

Proceed with the discussion of paragraphs 2.6. to 2.10. because they were not discussed in 19th ACSF meeting.

7. Schedule for further meetings

20. ACSF IWG Meeting: 06.11.-08.11.2018, Liverpool UK, (Flight to Manchester Airport)

21. ACSF IWG Meeting: t.b.d.
    proposal, Week of 14 January 2019 (before 2. GRVA) in Japan, Tokyo,
    or same week and venue as AutoVeh Subgroup