

**Draft minutes of the 10th Session
GRSG informal group on
awareness of Vulnerable Road Users proximity
in low speed manoeuvres (VRU-Proxi)**

Dates: 17-19 June 2019
Venue: German Association of the Automotive Industry (VDA)
Behrenstraße 35
10117 Berlin

Contact (host): Mr. Pfeifer (VDA)

Chairs: Mr. Matsui (Japan) and Mr. Broertjes (EC)
Secretary: Mr. Broeders (OICA)

0. Opening of the meeting

The participants were welcomed by the Chairs for the 10th meeting in offices of VDA. Mr. Pfeifer (VDA) also welcomed the group to Berlin and gave a brief introduction to VDA which is the German Association for Automotive Industry (automotive manufacturers, suppliers and trailer manufacturers). VDA is member of OICA, CLEPA and CLCCR.

The Chairs thanked Mr. Pfeifer for the outstanding organization and hospitality at VDA.

1. Adoption of the agenda

Document: VRU-Proxi-10-01 (Chair)

The Chairs explained the agenda and running order of the discussion topics. The proposed agenda was adopted by the group.

2. Adoption of the report of the 9th VRU-Proxi session (Brussel, Belgium)

Document: VRU-Proxi-09-07 (Chair)

The Chair proposed to wait until the end of the meeting for any possible written submissions with comments to the draft report of the 9th VRU-Proxi session. As there were no comments received at the end of the meeting the report of the 9th session has been adopted.

3. State of play of close-proximity vision and detection rulemaking in the contracting parties

The European Commission (EC) explained the status of the General Safety Regulation (GSR) and its different implementation phases. All deliverables of the UNECE IWG VRU-Proxi are part of the GSR. Given the political agreement in the EU, we now also have the task to look

carefully to the scope of the (new) regulations. For example BSIS will also be required for N2/M2. In terms of final adoption of the GSR, the newly elected European Parliament will do this, without any further discussions. Regarding finalisation of the GSR, a linguistic check by lawyers was to be finalised. However, any changes will be linguistic and not concerning the content of the GSR, which is now closed and cannot be re-opened again. The final vote is expected in October 2019 and the Member States will also have to adopt it, probably by the end of October / beginning of November 2019. Subsequently the entry-into-force will be by the end of November 2019. First package of GSR content will be mandatory 30 months later (May 2022) for new vehicle types and 2 years thereafter for all vehicle registrations. The requirements shall be available 15 months before the application dates.

OICA questioned to what date the 15 months is linked. EC explained that it is related to the mandatory dates. So the requirements for the first package shall in principle be available at the latest 15 months before May 2022.

Rulemaking in other contracting parties:

UK: The intention of the UK is to follow all EU regulations and to continue participation in UN regulations.

J: No news on rulemaking, Chair asked what Japan is planning to do with the VRU-Proxi regulations (mandate for all or exempt) and to give an update in next meeting (**action J**).

4. Accidentology

Documents: VRU-Proxi-10-10 (UK)
VRU-Proxi-10-04 (TRL)

UK presented results of Health and Safety Executive of Work-related fatal accidents due to being struck by a reversing vehicle. This report showed around 8 fatalities per year in Great-Britain due to reversing vehicles in work-related accidents. Regarding articulated vehicles UK argued for mandating a detection system on the trailer as well (not in scope of GSR).

TRL presented a study about reversing accidents with VRUs based on German Insurers Accident Database (GDV):

- Not included are accidents on private roads/properties and accidents involving refuse collection trucks;
- Elderly pedestrians are dominating in reversing accidents;
- No accidents with lying casualties occurring in this analysis except for a few cases where people were lying drunk on the road or after being hit by another car. However these accidents occurred while driving forward, not reversing.
- Some reversing accidents with N vehicles and VRUs: 20 out of 9000 in 7 year time frame and mainly pedestrians as casualties. Mostly vehicle categories N1 and N2 (both 7), 3 accidents with N3 (2 articulated).

5. Status and developments of detection and vision technologies

Document: VRU-Proxi-08-07 (CLEPA)

This topic was not discussed during the meeting.

6. Reversing motion

Documents: VRU-Proxi-10-06 (Japan)
VRU-Proxi-10-08 (Japan)
VRU-Proxi-10-11 (OICA)

J presented an update of the proposed regulation for Reversing Motion as discussed by the Taskforce including additional comments made by OICA. Below the paragraphs of this document that needed discussion, agreements or additional actions are pointed out.

1.4 Exemptions proposed by OICA:

- *Vehicle that cannot meet reversing safety requirements due to incompatibility with its use (with agreement of Technical Service).*
- *Vehicles fitted with an active system (like reversing AEB)*
- *Solo tractor units (N3)*

Discussion:

- Currently regulations for reversing AEB do not exist, so compliance (testing conditions) cannot be checked. Maybe as future extension if regulation for reversing AEB is available.
- Reversing sound (“beep”) not considered as a replacement for reversing safety. For solo tractors this maybe an alternative (wait for regulation on reversing sound) but shall not be switched off when a trailer is coupled to the vehicle (UK statement).
- Switching off reversing safety system in principle not allowed (only if really not possible).
- **VRU-Proxi members** to think about exemption for solo tractors (driving mainly with trailer coupled) or switching off when a trailer is coupled. **OICA** to check what can be seen behind a solo tractor by using the conventional mirrors.

1.5 Group agreed to add: “Manufacturer can designate the system that shall meet the requirements, however a general description shall be provided for the other devices that are not designated” (*this means just a general description without details*).

2.1.1 Request from the Chair: **CPs** to react if they accept periscope or not (D is against).

2.1.8 Group agreed to remove “on ground level”.

2.1.12 Group agreed to remove “both audible and optical”. Proposal to define information signal: “2 out of 3 ways of signaling (audible, visible and haptic) shall be selected”. To be added in paragraph 17.

2.3 Group agreed to delete this paragraph.

2.4 Group agreed to remove definitions for “Class I to VII” and to remove Class VIII naming; this shall be “Close proximity rear-view device”.

6.1 Group agreed to rename “Class VIII” to “Close proximity rear-view device”.

6.2.1.2 Group agreed to move latency requirements to Part II of the regulation.

6.2.2.2 TRL questioned why CMS requirements have been taken over from CMS for Class V and VI and not from CMS for Class I-IV. OICA answered that CMS Class I-IV requirements are based on high speed and long range view, while CMS Class V and VI requirements are based on low speed and short range view which is more comparable to the close proximity rear view.

6.2.2.2.1 Group agreed to delete this paragraph.

6.2.2.3 Group agreed to delete this paragraph and define only response time (in other section).

6.3.1 & 6.3.1.1 The Chair raised the question if an impact test is really needed for reversing safety components (cameras, sensors) mounted at the back-end of a vehicle (only below 2m installation height and more than 100 mm protrusion). FR in favor of keeping impact test considering vehicles parked perpendicular to the driving lane. Opinion from J, EC, UK is to delete impact test. D has no strong opinion but possibly delete it.

Conclusion: proposal to remove impact test but keep it for now within brackets. Report to GRSG about diverging views, ask GRSG to confirm or re-consider.

12.7 Chair remarked that the sub-bullets a) until d) are requirements instead of definition. Requirements of backing event (a, b, c and d) to be moved to new paragraph 15.1.3.

15.2.3.1.2 Relation to Regulation No. 46 to be added to “Classes of devices for indirect vision” in first paragraph.

15.2.3.1.2 & 15.2.3.1.3 “can be perceived” shall be “can be perceived fully”.

OICA proposed to allow a combination of the Close proximity rear-view device and direct vision as the driver will look for these observations in the same direction. In the first proposal by J the combination between a device and direct vision was accepted. FR reminded that NL had concerns in previous meeting as the view of the driver may be obstructed by passengers or goods on the rear seats. EC, FR, UK and D may support but no final opinion. Feedback from CPs to be given to GRSG.

The following section of 15.2.3.1.2 shall be reworded: *“This requirement is also fulfilled if the vehicle is equipped with a Class VIII close proximity rear view mirror installed at the rear end of the vehicle supporting this direct view.”*

15.2.3.1.5 Test shall be performed row by row. This may be a 1-by-1 test approach but all 3 poles on a row have to be seen at the same time by 1 device (so mirror adjustment is not allowed during the test). This condition shall be implemented in testing paragraph.

15.2.4.3.1 Proposal to delete this paragraph as it is difficult to determine 10% of a 3D image.

16.1.1.4 Driver de-activation shall be defined; EC suggested asking clarification from NHTSA regarding definition of driver de-activation in FMVSS111. Position of EC and J is no activation allowed. D and F have no strong position. UK needs more time.

16.1.1.5 Automatic change of view: possibly a distinction has to be made between automated change of view (increased safety for reverse maneuvering) and change of view activated by the driver. Automatic change of view for safety reasons related to maneuvering is accepted.

16.1.1.6 Automatic screen change shall only be allowed for failure messages of the reversing camera system, not allowed for other safety related messages or information (like eCall) but an overlay could be considered.

16.1.2.1 Response time of 2 seconds seems to be acceptable but depends on initial condition and the definition of the start of the measurement (engine running or not, key-on time etc.). Possibly within 6 seconds according FMVSS111 after starting up of the vehicle. Further investigation needed.

17.1 Switching-off the detection system by the driver only allowed for the audible warning, optical warning shall not be switched off. Requirements for optical warning to be added.

17.3 Paragraph to be moved to testing paragraph.

17.4.2 Response time of 2 seconds not acceptable for detection system as the driver is not informed whether the detection system is functioning properly or not. If initialization time is needed there shall be an additional requirement.

Annex 12 Proposed pole height of 0.8 m instead of 1.0 m would result in similar field of view as FMVSS 111 requires. This is accepted by the group.

In general all wordings “should” need to be replaced by wordings “shall” as these are requirements instead of recommendations.

J will work on working document for GRSG October 2019 session. In 11th VRU-Proxi (September 2019) an informal document can be discussed.

7. Forward motion Vehicle turning - Blind Spot Information System (BSIS)

Documents: VRU-Proxi-10-02 (Germany)
VRU-Proxi-10-03 (Germany)

The ECE R151 (BSIS regulation) is expected to be adopted in October 2019.

BSIS requirements

D has found conflicting requirements in the current BSIS regulation. The proposed amendments have been presented by D to the group. Initial corrections were made prior to the meeting in the distributed document VRU-Proxi-10-02 and the final agreed amendments after the discussions were implemented in document VRU-Proxi-10-03. Below the agreements as implemented in VRU-Proxi10-03 are listed:

Paragraph 0.7 (addition to introduction):

- Adding 0.7 as explanation for the proposed amendments to the document.

Paragraph 5.3.1.4:

- No information signal required at a longitudinal distance more than 30m to rear and 7m to the front relative to the front right corner of the vehicle. According D this is still in line with the parameters as defined in the original test cases and it will always be clear for the detection systems (by calculation and algorithms) what the worst case is based on possible impact positions and turning radii.
- OICA preferred to put the values 30m and 7m between square brackets in the formal document as further discussion on these values might be needed prior to the next GRSG (by means of informal documents). D accepted and asked OICA for evidence if the values need to be changed. OICA may come with data or simulations in VRU-Proxi session in September 2019 session. In that case an explanation has to be written in the justification and introduction.

Paragraph 6.5.9:

- “*additional*” added before “*test cases*” as Technical Service may select other test cases in addition to the test cases as defined in Table 1 of Appendix 1.
- Last section added: *The criterium “first point of information” is deemed to be complied with when test cases other than those from table 1 in appendix 1 to this regulation are carried out.*

Paragraph 6.5.10:

- Reference to line D added and included in the tests (in original text there was no reference to line D). With this addition the worst case situation regarding the possible combinations of line C and line D will be assured.
- In accordance with section 5.4.1 the zone for the mandatory information signal has been reduced to [30] m to the rear and [7] m to the front relative to the front right corner of the vehicle.
- Definition of d_c for vehicle speeds between 5 and 10 km/h has been deleted as this is covered by the limitation of information signal to [30] m to the rear.
- The wording “Conflicting requirements” shall not be used, it shall be removed or changed into e.g. conflicting FPI and LPI.

Appendix 1:

- Corridor width taken into account in Figure 1 and Table 1 (tolerance of 1m of the corridor in relation to the truck width).
- Values for d_d are adapted for test case 2 and 7 according the proposed changes in the specification and testing paragraphs.

Annex 3:

- Explanation for calculation of d_d deleted, this is not necessary anymore as first point of information is not needed to be calculated by the Technical Services.

D will adapt the proposed amendments according the agreements and consolidate them in a concept working document by the end of the week. Comments to the working document shall be given to D up to 1 week later. Deadline for GRSG is 12th of July 2019.

External projection:

- In order to be able to fulfill the requirements the Industry demands allowance for an external projection of BSIS components beyond the width of the vehicle to be implemented in ECE R151. As a first step an external projection of 100 mm additional to the vehicle width seems a good condition for meeting the required detection zone.

- EU W&D legislation 1230/2012 allows for 100 mm for “watching and detection aids including radars”. As this is an EU regulation it may not be applicable for other (non-EU) contracting parties.
- First idea of the Chair is to follow the R46 requirements like impact tests etc. except when mounted above 2 m.
- EC verified if proposal from OICA (width exemption in ECE R151) would be a possibility. Feedback was given that it could be included in the UN Regulation but no obligation to put it in national or regional legislation. National legislation could take it over, so could be considered to implement it in ECE R151.
- EC proposed to think about good robust wording for next session, to be included for discussion in next GRSG. Because of the importance OICA suggested to add this into the amendment proposal from D. The group agreed, **OICA** to prepare a wording (as neutral as possible) to be added to the working document of D.

8. Forward motion Vehicle driving straight or taking off from standstill

Documents: VRU-Proxi-10-05 (TRL)
VRU-Proxi-10-09 (Japan)

TRL presented an overview of regulatory approaches for Forward Motion: Moving-Off Information System (MOIS).

- Typical accident scenarios while moving forward:
 - VRU crossing in front of moving ahead vehicle;
 - VRU standing in front of vehicle and vehicle moving off from standstill.
- 2 main causes found for VRU accidents at the front:
 - VRU in blind spot of driver;
 - Driver failed to look properly.
- 2 possible ways forward for regulation:
 - Information signal (for both blind spot and driver failed to look properly);
 - Moving-off motion inhibit (for blind spot with possible driver override, but seems inappropriate for driver failed to look properly).
- Key questions:
 - Scope of regulation (GSR: M2/M3/N2/N3; possible to extend to M1/N1?), VRUs: pedestrians and cyclists?
 - What functionalities to be regulated: information signal, warning signal or moving off inhibitor?
 - Vehicle movement straight ahead: moving-off from rest / moving ahead with low speed?
 - Regulation principles:
 - Test approaches for true positive and false positives / HMI?
 - Near/far, crossing/stationary, pedestrians/cyclists, clutter/hidden etc.?

Plenary discussion on key questions:

- It was questioned if focus will only be on driving straight? EC responded that according to the GSR all scenarios in the front area of a cab shall be taken into account, so not neglecting steering input. Regular scenario's including turning should be considered. However, the test protocol could be simple like the BSIS test scenarios without turning. OICA stated that there might be an overlap with static tests of BSIS. EC added that also AEB-VRU for passenger cars might be overlapping. As BSIS is

under the IWG VRU-Proxi umbrella an incorporation of Moving off information system (MOIS) into BSIS could be considered.

- Proposed functionality consists of enabling an information signal and possibly an additional warning signal if a VRU is in the collision path or area of the vehicle. Fundamental question is if a moving-off inhibit should be considered. The Chair asked the opinion of the Industry (OICA, CLEPA). UK proposed to look what GRVA is doing on this subject. The Chair stated that motion inhibit would in this stage probably a step too far and there is probably no proof of concept yet. **Industry** to reflect and give feedback in next session. The Chair asked **TRL** to study on the effectiveness of different functionalities (info/warning/moving inhibit).
- Proposed test approaches on true/false positives performances. Regarding HMI OICA stated to stay in line with current BSIS and AEBS to avoid complexity and misunderstanding for the driver.
- Scope may be pedestrians for M2/M3/N2/N3. In case of M1/N1 both pedestrians and cyclists shall be considered. The Chair EC stated that for M1/N1 this is AEB domain and it is recommended to bring this info in the AEB group at GRVA. TRL remarked that AEB is focusing on high speed and the viewing angle of current AEB sensors may be too small, probably significant changes to current systems needed for this.
- Regulatory precedents as discussed:
 - AEB for M1/N1, pedestrians (cyclist req's moved to next step), proposal for consideration: harmonize with draft AEB with only collision warning signal, scope, speed range and test scenarios, to think about by AEB working group.
 - Harmonize or combine MOIS with BSIS regulation? Driving with crossing cyclists/pedestrian probably not blind spot issues but driver not looking properly. However, BSIS is also covering side of the truck.
 - Consider the TfL Blind Spot Warning Standards for detection of pedestrians during forward motion with M3/N3 vehicles (including motion inhibit). **TRL** will provide information to be uploaded to the UNECE website.
- UK: how and who will contact GRVA? EC will talk with the EC representative for GRVA but this is probably too early to task GRVA before having more info. It was agreed to keep them informed to avoid any kind of overlaps.

J presented Class IX field of view mirror

It is already domestically regulated in Japan and other CPs are apparently not interested. The chair proposed that the target should be decided based on real-world accident situation.

9. Direct Vision

Document: VRU-Proxi-10-07

Presentation LDS / TfL Direct Vision Standard: Pushing the Blind Spot Agenda.

1) Real world test for determining DVS scores:

- TfL is on schedule to introduce the HGV Safety Permit Scheme in 2020 (≥ 1 star) and 2024 (≥ 3 stars). The Scheme will “go-live” and operators can request a permit as from October 2019.
- TfL remain fully committed to, and supportive of, the current GSR proposals.

Reducing blind spots to the “greatest possible extent” requires an ambitious minimum star rating for all categories of vehicles.

- LDS made progress to the physical test to supplement the virtual DVS method:
 - Real world test to be used for on the spot checks
 - Real world test for DVS determination is being prototyped by using the seat to support an eye rig (own build, not according SAE) that can support 3 small wireless cameras. Computer algorithms are used to process the images and generate a DVS score
 - Example test method (wall with markers / QR codes) has been tested on a Nissan van, will be tested on a truck in short term.
 - Test seems to work but further validation needed (only manual work to remove distortion produced by camera), it was questioned whether this will be accepted by Technical Services.
- Next steps:
 - Validate results from physical test against digital calculation
 - Test the rig in a truck cab
 - Demonstrate test method to end users
- LDS is still considering more basic systems like the “average VRU distance” approach with sticks around the cab (length of smallest Italian female), but probably many sticks needed (30 instead of 13) to achieve acceptable correlation. To be considered as a back-up plan.
- It was questioned why the definition of the eye point was not taken over from other regulations as ECE R125. LDS explained that they found a big variance in R-point definitions by different manufacturers within the H-envelope. Therefore a commonly agreed eye point definition referred to the accelerator heel point (AHP) was used. The Chair confirmed that the R-point may be declared by manufacturers to comply with regulations. The LDS eye point approach could be considered for other vehicle categories as well.
- The Chair proposed the following ways forward for method:
 1. CAD assessment (theoretical);
 2. Wall assessment (physical);
 3. Average VRU-distance (physical).
- Opinion of CPS was asked:
 - D: to be checked;
 - F: both vehicle test and validation tool CAD in regulation;
 - J: need to discuss further, but in principle the physical test.
- Chair proposed to implement both options in regulation. The direct vision to be demonstrated by TfL CAD process or by physical test.
 - Development of physical tests to be continued. Further analysis needed on tolerances, repeatability and reproducibility;
 - Also stick method to be studied on further (correlation issue);
 - Final tool must be available and useable for all Technical Services.
- Concerns raised by the Chair:
 - Feasibility of eye point test rig looking to complexity in the past to put the 3D H-tool in the regulation.
 - Implementation of software models in regulation (CAD assessment). UK: in TfL expert panel meeting discussed with several manufacturers and final agreement achieved (DVS protocol).
 - Difficulties for type approval based on CAD assessment. UTAC: virtual testing already in regulation including requirements on correlation between virtual

model and physical tests. Chair: in this case different as here it is started with virtual testing without a physical object. Worst case vehicle shall be determined and type approved.

LDS recommendations for DVS limits to category N3 and N2 vehicles:

- Meaning of star rating according LDS:
 - 0 stars: “poor” visibility
 - 3 stars: “good” visibility
 - 5 stars: “excellent” visibility
- 1 star means that average VRU distance for an array of VRUs (smallest Italian female) can be seen with head and shoulders at near side at 4.5m, to the front at 2m and at the off-side at 0.6 m. Areas closer to the vehicle are covered with mirrors (near side and front) or head movement (off-side). A zero star vehicle has blind spots.
- The effect of 800 mm additional length in front of the cab (aero feature as allowed by the new EU Weights & Dimensions legislation) on the DVS scores has been analyzed on some truck models:
 - Some zero star vehicles will get 1 star or even 2 stars;
 - Some zero star vehicles are close to achieving 1 star;
 - Some zero star vehicles require considerable improvements to achieve 1 star.
- As truck manufacturers will get the opportunity for the EU market to elongate the cab (+ 800 mm) in the near future LDS recommends to regulate direct vision depending on vehicle category:
 - Category N3: TfL DVS \geq 2 stars
 - Category N2: TfL DVS \geq 4.5 stars
- TRL remarked that new blind spot zones may be resulting at the edges, adaptation of pedestrian behavior is questioned.
- The following feedback was given by the Industry (OICA):
 - Truck manufacturers are looking to what is feasible in sense of lowering vision lines, CMS and additional windows
 - It’s a huge challenge to achieve 1 star level for high vehicles that are driving typically on the highway. High seating position provides a good direct vision and situational awareness to anticipate on the traffic situation.
 - Trucks with lower cab floors have certainly better visibilities.
- LDS and the Chair requested **OICA** to give feedback on the LDS proposal for direct vision regulation in next VRU-Proxi meeting.
- The topic differentiation was discussed:
 - VECTO (i.e. EU simulation tool for truck road use classification - https://ec.europa.eu/clima/policies/transport/vehicles/vecto_en) cannot be used as this is based on application and not on vehicle/cab type
 - EC stated that according the GSR agreement differentiation shall only be based on vehicle category (N3 versus N2), EC sees no option for classification like VECTO as this is basically impossible for type approval.
- OICA statements:
 - For type approval the worst case vehicle (within the family) shall be used but locally good vision vehicles were requested (like London). Improvements for redesign shall be reasonable looking to cab life cycle.
 - For highway trucks we will not achieve much more than 1 star even with redesign.
 - The maximum elongation of 800 mm will most likely not be applied by the truck manufacturers. This will be substantially lower even much below 400

- mm. Cab elongation for aero shall be disconnected from direct vision legislation (EC: confirmed that it is not connected, but this can be studied).
- Proposal to invest in active safety systems to compensate direct vision as TfL is mandating for London. EC understood but GSR demands also for direct vision, so we have to come with something and obviously 5 stars is too ambitious, 1 star is probably too low.
- LDS: **Industry** to come back with what is possible to achieve and / or propose a way to differentiate.
- The Chair remarked that anyone may start to work on regulation for direct vision.

10. Evaluation of Pedestrian and Cyclist Warning Systems for Trucks

This subject has not been discussed as CA and/or Mobileye were not attending the meeting.

11. Next meeting

11th meeting: [proposal: 24-26 September 2019, London TBC, United Kingdom]

12th meeting: [proposal: 18-20 November 2019, Brussels Belgium]

13th meeting: [proposal: 4-6 February 2020, location TBD, Japan]

12. Any Other Item

The Chair explained that GRBP installed a TF regarding a reversing sound alert for VRUs behind vehicles. This TF is basically considering to allow a deactivation of the sound alert if a vehicle activates a Reversing Motion system as discussed in the VRU-Proxi IWG.

In last GRSG in April 2019, the VRU-Proxi IWG was recommended to supply basic related information on current Reversing Motion to the TF under GRBP. The next GRBP TF will take place at OICA during 1-2 July 2019.

J, Chair of TF of Reversing Motion of VRU-Proxi IWG, will provide materials describing current situation to GRBP TF as initial information. After the 10th VRU-Proxi meeting, GRBP TF will take information from VRU-Proxi IWG meeting minutes.