

## **Minutes**

### **2<sup>nd</sup> Workshop of the informal working group on Equitable Occupant Protection, EqOP**

Date: 23-25 October 2023.

Place: European Commission, Breydel building, Oudergemlaan 19, 1040 Brussels, Belgium.

Participants: 22 experts from contracting parties (Austria, France, Germany, Sweden, UK, USA), the EC, and the automotive industry (Audi, BMW, Renault, Stellantis, JLR of OICA and Autoliv, Joyson, ZF, Sony of CLEPA), Cellbond and Humanetics.

#### **1. Welcome words by the European Commission**

- a. Mark Nicklas (Head of Unit, Mobility).
- b. Mehdi Hocine (Head of Unit, Machinery & Equipment).
- c. Both addressed the importance of vehicle safety, and that regulations and standards should be inclusive in all possible aspects. They both wished us a productive workshop.

#### **2. Welcome words by the chair**

- a. Reminder about the long-term goals of our IWG, as well as the operational goal in focus for this workshop, namely, to present a map of diversity issues which should be addressed by regulatory upgrades directly vs gaps where more research is needed.

#### **3. Roll call and introductions**

- a. All participants introduced themselves and how they can contribute to the workshop.

#### **4. Introduction to the workshop by the co-chair**

- a. Presentation of our IWG EqOP Approach.
- b. We shall focus attention on field data and the worktable.
- c. We have a responsibility to publish our conclusions on the worktable.
- d. We have made an upgrade regarding the format; the new version was presented.
- e. Important studies are being published continually; thus, the worktable will have to be maintained; new versions will have to be released; yet we should reflect on if we have considered all relevant research publications now.
- f. Some studies are showing that there are interactions between different equity issues, for instance age and sex, or sex and weight.

- g. Studies can be removed from the detailed tabs in the table if there is a strong reason to do so. This should be indicated in the overview table then (e.g., bias from unbelted occupants).
- h. We can focus attention on potential recommendations but should not discuss actual changes to UN regulations.
- i. We should not go into details regarding virtual crash testing in this workshop, as it will be touched upon in the following workshop.
- j. We shall start drafting a report to GRSP.

**5. Workshop – Around-the-table discussion regarding the worktable in general, both format and content**

- a. It was stated that vehicle Model Year is an important parameter when studying field data, even the year of development of the vehicle model is wanted. However, in most in-depth databases, market introduction of upgraded safety performance or development year of vehicle models is simply not available.
- b. We discussed BMI, weight, and height, and that those variables are not always available. We discussed further whether we should include height and weight, only, instead of BMI as BMI is calculated from the two parameters; BMI should perhaps not stand alone as one very tall person can have the same BMI as a very short person. Nonetheless, BMI is a common anthropometric variable.
- c. We noted that load-cases (frontal crash, side crash, etc.) do determine the relevance of a several equity issues.
- d. We concluded that we must work with available research findings and available data, but we should consider whether we can influence the collection of crash statistics, for instance to support the development of strategies for using EDR data.
- e. EC explained that anthropometric studies are planned to quantify how the European population looks like. Also, in the US an update of the data collected in the 70s which was used to design today's ATDs is planned.
- f. The NHTSA presented a summary of the recently published study, looking at injury odds of females vs. males. He commented that, experimental studies and PMHS tests are starting; NHTSA focus research on older occupants and the female THOR 5th; moreover, to redefine injury curves, machine learning based methods to analyze large data sets, to understand unknown injury mechanisms, such as lower leg injuries with the support of case studies in CIREN and modelling work. There isn't anything regarding injuries below the knee in the US in regulations or rating programs today. Toe pan intrusion has been reduced, but in the NHTSA models lower legs are still injured. The NHTSA has commissioned UVA to investigate lower legs through case studies with CIREN to explore if it is a pedals issue. Are there differences between drivers and front passengers? Not explored yet and should be done. Injuries occur to both drivers and front passengers but there might be differences when making a deep dive into the issue. There seem to be a link between how well the pelvis is restrained, and BMI, and lower leg injury. Higher BMI seems to be a severe issue for women (according to IIHS).
- g. We stated generally that we will not see any positive results until countermeasures are rolled out in the vehicle fleet and have been out in road traffic some 15 years.

- h. The UK Department for Transportation mentioned the analysis of the UK's RAIDS data made by TRL, to contribute to the IWG's evidence base.
- i. The expert of CLEPA presented a summary of the German DRV study, also to contribute to the IWG's evidence base. However, it is difficult to draw any conclusion.
- j. We discussed Euro NCAP and other vehicle rating programs. We cannot formally address rating programs being a UN IWG, but our group cannot ignore the fact that the consumer metric testing may be the main area where equity can be addressed.
- k. We said that it is important to investigate and understand the purpose of different test requirements, for example the static strength test of seats, before suggesting changes. All current tests have a specific purpose.
- l. We finally discussed the future of the worktable. The NHTSA proposes to write a report instead of, or to complement the worktable. NHTSA volunteers to be part of the drafting team. We decided to do this, i.e., to write a report in parallel to the maintenance of the worktable.

#### **6. Workshop, cont. – Grouping of equity issues**

- a. We reviewed the table, corrected errors, and made updates to the table content.
- b. We worked on grouping the equity issues on body regions, which resulted in the following groupings:
  - i. Head injuries – different conclusions in different studies; further review also with simulation studies will be required (many interacting factors).
  - ii. Soft tissue neck injuries in rear-end impact.
  - iii. Extremity injuries in frontal crashes.
  - iv. Thoracic injuries in frontal and side crashes.
  - v. Abdominal injuries in frontal crashes - different conclusions in different studies; further review also with simulation studies required.

#### **7. Workshop, cont. – Mapping research gaps**

- a. We discussed research gaps and how to address them:
  - i. We concluded that we must focus on both less severe and fatal injuries.
  - ii. Differences in risk regarding fatal injuries seems to be due to a combination of equity parameters, for example sex and age, sex and BMI. Also, body shape has an influence on several injuries.
  - iii. The precautionary principle was mentioned (remark: has become a general principle of EU law).
  - iv. It will be important to try to focus attention on the equity issues when reporting to GRSP; is it a sex issue, is it a matter of age, BMI, height, body shape, or weight? We should aim to be as specific as possible.
  - v. Another research gap could be the regulatory effect, for example, the effects from recent changes in UN regulations due to the European GSR2 program.
  - vi. It was mentioned that the preamble of GTR 14 contains relevant justification of a side pole impact test.
  - vii. We discussed the issue of the limited amount of EU field data, compared to the USA. Datasets are currently often too small to

- analyze the parameters interacting with each other. EDR data might help with this in the future, but it is currently unclear how this will be available for such research purposes.
- viii. One recommendation regarding Europe could be to agree on a Pan-European Strategy regarding the use of EDR data, now being mandatory equipment of new vehicle models in EU, to be used in accidentology.
  - ix. We mentioned that it will also be important to get research findings from Asian countries.
  - x. We discussed the topics of positioning test dummies, for instance positioning the feet.
  - xi. We noted that belt fit is an important safety aspect. In fact, the whole belt system and how it distribute loads on the body to protect should be considered as a field where even more research will be useful.
  - xii. Compatibility (or lack of compatibility) was mentioned as an issue with an impact on equity regarding for example sex as we have seen that women drive smaller cars than men in general. We concluded that compatibility is not a topic within our current mandate.
- b. Agreed research gaps to bring forward to GRSP:
- i. Interaction of sex with other parameters, i.e., age and anthropometry
    - 1. Age
    - 2. Anthropometry
      - a. Height
      - b. Weight
      - c. BMI
      - d. The Waist-to-Hip Ratio (WHR)
      - e. Shoulder Height Sitting (SHS)
  - ii. Equity issues regarding different head injury mechanisms in different load-cases.
  - iii. How will the upgraded UN R94 and the relatively new UN R137 affect thoracic injury risk (HIII chest injury threshold adjusted to represent 65yo) for the older population in frontal impacts?
  - iv. Side impact; how effective have GTR14/UN R135 and US/FMVSS 214 been in reducing injuries to a diverse population?
  - v. Understand the injury mechanisms causing equity issues for leg injuries, in particular lower leg & ankle.
  - vi. Missing tools for injuries and sizes which have not been in focus before (e.g., not clear if ankle injury can be assessed with THOR, no criterion now)
  - vii. Missing injury criteria for ankle.
  - viii. No consensus on brain injury criteria.
  - ix. Pregnant females.

## 8. Workshop, cont. – Task Forces for further review of studies and regulations

- a. The consequence for the IWG is to structure the work ahead of us into task forces. Task forces will be responsible for further review of studies and regulations within their respective field.
- b. Note that an increase of robustness of safety performance assessment in general, in the UN regulations, shall be a theme and goal of each task force.
- c. Agreed task forces:

1. TF on Virtual Crash Testing (was already initiated before, and its first workshop will take place on the 14<sup>th</sup> of November in Munich).
  2. TF on rear impact seat assessment – presentations of NL and CLEPA at next GRSP.
  3. TF on restraint system requirements.
    - a. geometric requirements,
    - b. dynamic requirements / system performance.
  4. TF on extension of assessments towards currently not considered body regions with high frequency and risk of PMI.
    - a. Lower extremities,
    - b. Upper extremities,
    - c. Brain.
  5. TF Drafting Team for the Report on equity issues: continue to work on the worktable and draft written report.
- d. All participants expressed their interest and commitment to participate in the task forces (through their respective organizations) as relevant and possible, which will be determined after the upcoming GRSP.

#### **9. Workshop, cont. – Further conclusions and next steps**

- a. The minutes from the workshop should be distributed as soon as possible.
- b. The report to GRSP in December should be a presentation only.
- c. We will invite the whole GRSP to a discussion about the Task Forces.
- d. Next steps for the worktable
  - i. Feedback and further input to the worktable on 2 November 2023 at the latest. Note that it shall be on the latest version.
  - ii. New revision of the worktable will be released on 8 November 2023 (including input and comments received until 2 November 2023).
  - iii. Preamble in the table file directly (README tab)
    1. “The table represents an overview of the key studies identified by the IWG equitable occupant protection. Studies include different inclusion criteria and parameters in their statistical models affecting the findings. “
    2. We will need to agree on inclusion criteria, terminology, and certain definitions.
- e. Upcoming in-person workshops and meetings
  - i. Next scheduled IWG Meetings before GRSP in December 2023:
    1. 6 November and 9 November 2023 (Follow-up meetings regarding the second workshop; on-line meetings).
    2. Next IWG Plenary on 22 November 2023; on-line meeting.
  - ii. Next workshop will be on 14 November 2023 and focus virtual crash testing.
  - iii. On-line meetings in Q1-Q2 2024 to prepare for GRSP in May 2024.
  - iv. Workshop in conjunction with the IRCOB in Stockholm (on 11-13 September 2024), preliminary on 9-11 September 2024.
  - v. Potentially an IWG in-person meeting in January 2025 in conjunction with the GIM 2025 in Washington DC, USA – tbc.