

## GRSP INFORMAL GROUP ON PEDESTRIAN SAFETY

### 6<sup>th</sup> meeting

Paris, 24-26 February 2004

#### Draft detailed meeting minutes:

##### 1. Welcome

The chairman, Mr Mizuno opened the meeting and welcomed everyone. He thanked OICA for hosting the meeting. Mr Mizuno stressed that this meeting should draft the skeleton gtr. Therefore the discussions on the head protection should be finalised and a start should be made with discussions on the adult head test. Afterwards he has the intention to listen to the results of feasibility studies and re-evaluate the proposal. The draft skeleton gtr should be added to the report to next GRSP (May 04).

Mr Mizuno also welcomed the experts from Korea who attended the meeting for the first time.

Mr Van der Plas, reminded the group of the documents distributed prior to the meeting and relating to the agenda:

INF GR/PS/64 Rev 1	Draft meeting minutes 5th meeting
INF GR/PS/65 Rev 1	Provisional agenda for the 6th meeting
INF GR/PS/66	AUS-NCAP pedestrian data
INF GR/PS/67	Test-method - active hood / bonnet systems
INF GR/PS/68	Target population head injuries - US

##### 2. Adoption of the agenda INF GR / PS / 65 Rev 1

There was one amendment to the agenda:

- item 5 (draft gtr) would be dealt with under item 7 and replaced by a presentation from Korea about accident and research information.

The agenda including this amendment was adopted.

##### 3. Review of the minutes of the 4<sup>th</sup> meeting

INF GR / PS / 64 Rev 1 was adopted without comments.

##### 4. Report on GRSP/34

Mr Van der Plas reported on last GRSP (December 2003). Mr Mizuno presented informal document 2 of that meeting which corresponds to INF GR / PS / 62 (action plan of the 5<sup>th</sup> meeting). There were no questions asked but GRSP asked for a second status report to be presented to them in their May 2004 session. That report should include a draft gtr skeleton.

##### 5. Information from Korea

Mr Youn presented INF GR / PS / 70 including accident information, research activities and harmonisation activities. In 2002 Korea had about 3000 pedestrian fatalities which is about 44% of the total traffic accident fatality figure. Korea is planning to start in 2006 with K-NCAP head testing and in 2010 with legislation based on the gtr. Their aim is to share information and co-operate with GRSP / IHRA and they are looking into the possibility to join the 58 Agreement and ESV / IHRA.

Mr Frederiksson asked if the fatality figures included cyclists.

Mr Youn said this is not the case and he added that it does include about 500-600 children fatalities.

Mr Bilkhu asked if they had seen different dummy responses in their simulations with different speeds.

Mr Youn replied that for speeds from 30 up to 40-45 km/h the response is similar but once above 40-45 km/h the response is different.

## 6. Feasibility studies for head impact

### 6.1 Target population

Mr Saul presented INF GR / PS / 68 which is based on PCDS and FARS data looking specifically at head injuries and calculates the cost-benefit. It shows there are many impacts on the A-pillars and the windscreen. However the study does not deal with effectiveness and feasibility.

Mr Frederiksson asked which part of the windscreen is most presented.

Mr Saul answered that those cases where the head also hits the underlying structures probably have the highest AIS level.

Mr Mizuno asked about the difference between the total of 71000 and the total of 18000.

Mr Saul answered that it are 71000 injuries including all body parts and all sources (including ground contact) whilst 18000 is the total of head injuries in relation to car contact.

Mr Mizuno asked if pick-up trucks have really increased their market share in the US.

Mr Saul said that SUVs have definitely but pick-ups maybe not so much. It is difficult to estimate this since data combines SUV and pick-ups.

Mr Ries said that AIS3-6 also includes severe injuries.

Mr Saul said this is correct although an AIS 4 head injury has a very high probability of fatalities. PS / 68 is a preliminary type of assessment, the next step after feasibility and effectiveness studies would be to do more detailed analysis.

Mr Bilkhu stressed that 6% of serious injuries only relate to a 40% SUV share.

Mr Mizuno confirmed the paper is a good start for discussions.

Mr Bilkhu suggested to amend the text slightly to include serious injuries (and not only fatalities)

Mr Saul agreed to do this and added that if any other comments are to be made, he is willing to take them into account and issue a revised document.

### 6.2 Countermeasure effectiveness studies

Mr Doyle explained that the EU is carrying out a feasibility study for phase 2. The report is expected to be available late June.

Mr Mizuno added that it would be good to hear the results when they become available.

Mr Doyle underlined that the EU feasibility study also takes into account discussions in the INF GR and the contractor especially has a lot of contact with IHRA.

### 6.3 Repeatability / reproducibility testing

Mr Saul explained that this should be carefully checked before the gtr is finalised.

Mr Mizuno agreed to this.

Mr Saul said a procedure is needed which is specifically robust so that we have the same results in whatever region of the world the test is performed. He added that the Korean data showed the impact angle has a big influence on the test result and this should be looked at in relation to the repeatability and reproducibility issues.

Mr Youn confirmed that the test specifications have a tolerance of  $\pm 2^\circ$  and this can indeed have a big influence.

Mr Saul asked at what HIC levels these differences were seen.

Mr Youn said this was for an HIC average of  $1000 \pm 10\%$ .

Mr Mizuno added that Mr Ishikawa had already explained in previous meetings that a  $5^\circ$  difference results in a HIC difference of 100.

Mr Doyle said this is an important point. If the group would opt for a specific tool, how this tool is used and certified is a vital part of the gtr. We should not wait with these discussions / decisions until the last minute.

Mr Mizuno agreed to this.

Mr Saul said that when going through the draft gtr it will mean that many [ ] will need to be inserted in view of the to be performed feasibility / effectiveness / repeatability / reproducibility studies.

Mr Mizuno agreed and asked if following time schedule is acceptable:

- draft gtr (based on updated PS/69) to May 04 GRSP. To serve as basis for the feasibility / effectiveness / repeatability / reproducibility assessment and resulting in
- first official draft gtr to Dec 04 GRSP. To serve as basis for comments from all CPs and industry and resulting in
- official draft gtr to May 05 GRSP for final adoption at AC3 in November 05.

Mr Doyle agreed but added the group shouldn't rush to meet the time limit. The group should draft a good gtr and this could mean stretching the time schedule.

Mr Lukaszewicz agreed and added that all information needs to be taken into account, including the EU feasibility study. The aim is to make the gtr and EU phase 2 compatible.

## 7. Finalizing open issues on head protection test methods

### 7.1 Impact area

Mr Ries repeated the industries concerns expressed last meetings about the windscreen and A-pillars. He presented INF GR / PS / 71 which is a proposal for a test area that is feasible to fulfil. PS / 71 needs to be checked further based on more test data.

Mr Saul asked what this would mean for the current vehicle fleet.

Mr Ries said more tests are needed for that.

Mr Saul asked if this is part of the EU feasibility study.

Mr Doyle said that this test area is included in the EU directive under phase 1 but for monitoring only. For phase 2 however the windscreen is not included so it is not part of the feasibility study.

Mr Nishimoto said it is important to have test data for this proposed test area.

Mr Ries explained that the first results based on the EU phase 1 tests (which are comparable to the gtr proposed test) are shown in INF GR / PS / 72.

Mr Nishimoto said this is for today's vehicles. We have to think about vehicles for 2010.

Mr Ries agreed but replied that the starting point is today's vehicles and that other requirements which call for stiff structures (like roll-over) have to be taken into account as well.

Mr Langer added that also the field of vision is a requirement to be taken into account.

Mr Nishimoto said he can understand this for A-pillars but asks what the problem is for the design of the dashboard area.

Mr Pouget said that area needs to support the windscreen and needs stiffness to attach the steering column to cover for frontal impact.

Mr Saul said that looking at the target population in the US, the proposal would bring little benefit since the test area is already very friendly. The effectiveness would thus be very low.

Mr Pouget asked what would happen in FMVSS on roof strength.

Mr Saul replied that the NPRM will probably be out in Autumn.

Mr Youn said that Korea currently does not have enough information on these test areas.

Mr Mizuno asked if the test area can become bigger when the criteria are changed (HIC < 2000).

Mr Ries said that currently he has no idea since it also depends on the car model (SUV, sportscar, ...)

Mr Mizuno asked if it is possible to modify the frontal impact / rollover requirements to make pedestrian protection possible.

Mr Saul answered that for example the proposal to change side impact did not take pedestrian protection into account.

Mr Mizuno said governments cannot modify or weaken existing legislation to make pedestrian protection possible.

Mr Castaing added that for new to be developed legislation and amendments, pedestrian protection will be taken into account.

Mr Mizuno concluded that PS/71 is to be used as a starting point and that more test data is needed especially for the windscreen periphery.

Mr Nishimoto agreed to provide J-NCAP data and make a proposal.

Mr Saul asked how the impact points would be decided. Are these specific defined points or are they free to choose within the test area.

Mr Ries asked if Mr Saul is talking about some kind of grid.

Mr Saul said this is one possibility.

Mr Ries said it is necessary to further define this especially if we would have different HIC levels.

Mr Mizuno said that for the bonnet both EU and Japan have experience.

Mr Doyle explained that in the EU the test area is divided into 3 sections with a number of tests / section (all points at a minimum distance). The actual point selection is with agreement of the test house.

Mr Castaing said it is also important for repeatability and reproducibility. Specific impact points obviously improve this. Also in the EU we have to select the car type (different engines, ...)

Mr Nishimoto said that also in Japan the test points are selected by the test house and are not predefined.

Mr Castaing said that reproducibility can be a problem if different test houses select different impact points.

Mr Saul explained that in the US the test procedures are developed from the legislation. That's why legislation has to be very specific. Recommend test points, is one possibility but worst point in a selected zone is also an acceptable approach. It is necessary to have a minimally acceptable approach for a certificate to be acceptable globally.

Mr Nishimoto said that the requirements cover the complete test area so selected test points should not be used.

Mr Mizuno added that we also need definitions for different zones within the test area if we have different HIC limits.

Mr Saul suggests to start with all points in the test area. If feasibility later shows problems, this can be re-discussed.

Mr Lukaszewicz suggested one approach could be to define a certain number of mandatory test points with the remaining test points to be chosen by the test houses.

Mr Doyle said the test area is defined. Defining the impact points may be problematic (based on location or underlying structure or ...). He said it might be necessary to have an alternative for every region (US, EU, J, ...). Mr Langer said that a combination of both systems is not so difficult. The US can issue test procedures for selected test points whilst the EU and Japan can continue to use their worst case method. Mr Kinsky stressed that for industry this issue is less important since the complete test area has to comply anyway. What is important is that the number of witness tests can be limited because these witness tests are time and money consuming. Mr Saul asked confirmation if cars are designed such that every point will pass and the selection of the impact points is more a testing issue? Mr Kinsky confirmed this is the case. Mr Mizuno concluded that the proposal should include minimum requirements. The governments should make a recommendation based on their own approach.

### 7.2 Impact angle and speed

Mr Ries presented INF GR / PS / 73 in which OICA / JAMA / JARI tried to establish look-up graphs (speed and angle versus geometry). The results showed that there is no correlation so it is not possible to establish such graphs. Mr Ishikawa added that indeed JARI was asked to set up such graphs but as explained in PS/73 this is very difficult. So the values proposed in PS/73 should be used (these are the same as in PS/61 and PS/58). Mr Saul said that definitions for BL, BLE, ... are needed before any decision on the values can be made. Mr Ries explained that those parameters come from simulation and that it is ok to use them. Mr Doyle said he needs more time to study these figures because he wants to better understand the 0,8 speed ratio which appears for all cases. Mr Saul added that NHTSA is looking at the relationship car and speed ratio. He will check if there are any results to be shared. Mr Nishimoto said that taking into account the time schedule, we should use the proposed data. In the mean time we can continue other studies. Mr Mizuno agreed this proposal will be used as a basis for technical feasibility and as draft gtr to GRSP. Mr Ishikawa said if the vehicles are categorised in 3 groups, the simulations have some meaning. Otherwise it is difficult to make a look-up graph. The simulations used are state-of-the-art. Mr Mizuno clarified that the final text will not use the wording 'sedan, SUV, 1-box' but rather 'shape1,2, 3'. Mr Doyle said he can agree to use the proposed values for now if it includes a study reservation from the EU. Mr Lukaszewicz and Mr Saul also stated they have a study reservation. Mr Lukaszewicz added that the values should be re-considered after the EU feasibility study was finalised. Mr Saul said since the HIC is angle dependant and PS/73 shows an impact angle range of 50° to 90°, it is a strong incentive not to be an SUV. So it will be necessary to carefully look at the geometry definitions. Mr van der Straaten explained it is not the intention to classify the vehicles. The only intention is to reproduce how a shape should be tested.

### 7.3 Headform impactor specifications

Mr Ishikawa presented INF GR / PS / 74 which is the headform impact specifications as decided by IHRA. He added that with impacts performed against the windscreen there were problems with the non-damped accelerometer. NHTSA has experienced the same problems. The size of a damped accelerometer is big compared to a non-damped one so it is under consideration to change the GCS  $\pm 10$  mm to  $\pm 30$  mm. Mr Saul asked how many impactors have been produced and if the drawings have been shared. Mr Ishikawa said that in Japan more than 50 have been produced by 1 manufacturer. Mr Saul added that any data like a round robin test would be helpful for the gtr. Mr Mizuno said that the EU already has experience with the 3,5 kg headform. Mr Saul said it would be good to bring all data together (EU, J, ...). Mr Ishikawa said they are also looking into the ageing of the skin but they have no results yet. Mr Ries said the ACEA 3,5 kg impactor used in the EU Directive is very similar to the IHRA specifications. Mr Ishikawa added that he could provide information on the certification procedure of the J headform. Mr Doyle explained that the material used for the skin was defined as 13,9 mm and was originally PVC based. That gave repeatability problems so the EU impactor is now switched to a synthetic based definition. Mr Saul said the draft gtr says the headform needs to be re-certified after 20 impacts which means after every car. So the EU and J-NCAP should have a lot of certification information. Ms Martos volunteered that IDIADA could supply information on this for the EU headforms. Mr Saul said it would also be useful to know if parts were changed and some tracking of multiple headforms would be necessary as well. Mr Frederiksson asked if anyone had experience with the windscreen since he sees more damage because of the broken glass. Mr Castaing added they saw the same for all edges and rigid parts.

Mr Ishikawa added they have the same experience and that the skin needs changing after such a test.

Mr Mizuno asked if both the EU and Japan use the same certification test.

Mr Ishikawa confirmed they both use a drop test.

Mr Saul referred to PS/69 §6.4.1 which specifies the skin material and not the contact surface. He asked if the 165 mm diameter includes the 13,9 mm skin or not.

Mr Ishikawa said it includes the skin.

Mr Saul added this should be clarified in §6.4.1 and 6.4.2. He also asked if in §6.4.4 ISO6487 is the drop test.

Mr Ishikawa answered ISO6487 deals with instrumentation.

Mr Saul concluded that the current text does not include a certification test.

Mr van der Straaten said that still needs to be annexed but there was no information available so far.

Mr Mizuno said that IHRA can provide the certification test.

Mr Saul replied it is included in PS/49 so it can be added.

Mr Mizuno explained that IHRA does not specify the material and the skin thickness. The impactor has to meet the performance criteria.

Mr Doyle asked to go through PS/69 completely to have one document that clearly includes everything as a basis for future work.

Mr Saul agrees and says that at least the headform portion should be looked at.

Mr Mizuno agreed to check PS/69 completely under item 10 of the agenda.

Mr Doyle added that the IHRA proposal for the specifications is agreeable with [ ] because of the slight difference with the EU specifications that he would like to check. Additionally he requests to have [ ] around the weight of the adult headform.

Mr van der Straaten said during last meeting data was shown why 4,5 kg was better than 4,8 kg and that always the best available knowledge should be used.

Mr Doyle replied that the idea is to harmonise which means to have a common understanding. There is a difference of opinion on certain items. Mr Doyle quoted from the 98 Agreement which amongst others stresses to take into account the specificities of different countries and that alternative levels of stringency are allowed for developing countries. Alternatives should be allowed if someone has a good reason to want it.

Mr Castaing said that alternatives are possible but more on the requirements than on the test methodology. At least the test method should be aligned.

Mr Doyle fully agrees.

Mr van der Straaten supports Mr Castaing. Having the same test procedure is a must. An alternative level for stringency is for developing countries only.

Mr Mizuno agrees with Mr van der Straaten. Also IHRA includes EEVC experts and they agreed on 3,5 and 4,5 kg.

Mr Lukaszewicz also agrees but we should also look at the EU phase 2 values so for the moment the 4,5 kg should be in [ ].

#### 7.4 Test method – active bonnet systems

Mr Frederiksson presented INF GR / PS / 67 and PS / 75 on a test method for an active bonnet system.

Mr Casting asked how the leg impact was checked.

Mr Frederiksson replied it is done by a camera and an assessment of first contact with the bumper.

Mr Lukaszewicz asked if the sensor systems can distinguish between a pedestrian and objects.

Mr Frederiksson answered this test is about how it will fire when a pedestrian is hit. They are still working on the specific detection.

Mr Youn asked why a WAD = 1500 mm was chosen.

Mr Frederiksson said it is based on EU phase 1 but it can easily be changed to 1700 mm.

Mr Saul said the explanation makes sense conceptually and asked how sensitive the timing / shape is in real tests.

Mr Frederiksson replied that the timing may have to be shape dependant.

Mr Saul added that the MADYMO simulations of IHRA could be used to check this.

Mr Tanahashi added that the timing will also be affected if a manufacturer would decide for no activation up to 20 km/h.

Mr Kinsky remarked that he does not like to have a test procedure giving a test house unlimited testing possibilities. So there should not be requirements for testing at a higher or lower speed, this is not done in other regulations either. Also the test is specific for contact sensors and electrical signals and a test procedure should cover other systems as well.

Mr Frederiksson replied that a timing requirement is needed in the test because the system works time dependant.

Mr Ries agreed that these systems should be tested but they are too complicated to deal with in the context of the gtr. They should be discussed at a later stage.

Mr Frederiksson said the proposal is based on existing technology and can be changed later to cover new technology.

Mr Mizuno said the user would be OICA and he asked OICA for their study of this proposal and come back with a complete opinion including when such a test should be included in the gtr.

### 8. Discussion on the adult leg protection test method and tool

Mr Césari opened the discussion by referring to the existing EU impactor and the newly developed J impactor.

Mr Ishikawa presented INF GR / PS / 76 which is a review of the IHRA discussions. The final report, test procedure and impactor will be available end 2004 and will include evaluation of lower leg and knee injuries. He also presented INF GR / PS / 77 dealing with the proposed corridors for the lower leg as proposed by the University of Virginia and INF GR / PS / 78 explaining the Maltese bio rating method used by IHRA.

Mr Saul asked if the UVA data is based on old or new cadaver tests.

Mr Césari replied these are new tests and that the validity of the data was discussed by IHRA. The data is unquestionable for the leg but there are doubts about the test procedure for the knee. The Maltese method divides the leg into internal (bending angle, ...) and external biofidelity (how tool loads what it impacts). The bending moment needs to be calculated and not measured. It would also be better to use time-force for the external and time-displacement for the internal biofidelity. IHRA is working on this.

Mr Mizuno added that IHRA decided to use a 50% male anthropometry; that the lower leg needs to be deformable; and that IHRA will not select an impactor but recommend a method for the selection of the impactor (Maltese method).

Mr Césari added that the J impactor (FlexPLI) is validated if the impact is on or below the knee. IHRA still has to check if the use can be extended to impacts above the knee. If so, the upper part may need to be deformable as well.

Mr Ries said the impactor must be ready in time and have proven repeatability and reproducibility before inclusion in the gtr is possible.

Mr Césari agrees this is an important issue. In IHRA the task is to develop the best specification.

Mr Youn explained that the JARI / JAMA simulations use 3 pedestrian standing positions. Do these give different results?

Mr Césari clarified these simulations were used to determine the head impact angle and speed and not for the leg. The leg is a vertical impactor and does not represent a standing position.

Mr Frederiksson asked what tests were performed for validation of the leg.

Mr Césari mentioned the UVA tests and Kaizer tests including full body and cadaver leg tests.

Mr Frederiksson asked if they were used against a current car. With a stiff spoiler the response is not human like.

Mr Césari said that if the loading is on the lower part, the bending and shearing is limited.

Mr Frederiksson agreed because the impactor rotates very fast which a human can not do due to the upper body.

Mr Césari said that in an impact the leg wraps around the car whilst the body remains rather stable.

Mr Césari explained that the IHRA anthropometric proposal concluded on the values and these can be used.

This was agreed by the group.

Mr Frederiksson asked if the femur mass includes the effective mass of the upper body?

Mr Césari said this is not the case.

Mr Césari introduced INF GR / PS / 80 which is IHRA/PS/278. The upper part of the lower leg is not considered, only relevant if the impact is above the knee. The lower part includes tibia fracture hence the tibia impactor needs to be deformable.

Mr Ishikawa confirmed that a deformable tibia is necessary in order to have a biofidelic leg.

Mr Ries said there is no proof that it works (reliable, ...) so we cannot decide now. We may have to elect an impactor which is reliable but may not comply with what is being decided now like for example a deformable tibia.

Mr Mizuno repeated that IHRA only recommends how to select the impactor. The gtr group is free to select whatever impactor.

Mr Bilkhu confirmed that the IHRA specifications are set up for use by any impactor.

Mr Césari said there are theoretically 3 possibilities: EU impactor, J impactor and a combination of both.

Mr Tanahashi explained that JAMA asked JARI to develop a new impactor because the necessary countermeasures for the EU impactor would result in new problems for pedestrians. Industry should use the best impactor.

Mr Ishikawa agreed that a test tool should be used to improve safety. If the tool is not biofidelic it may mislead the car design. Also the two different tools lead to different countermeasures. He added it is possible to finalise the FlexPLI in time.

Mr Césari explained that a comparison between the EU impactor and the FlexPLI does not learn much about the difference between a deformable and non deformable tibia since both legforms have other parts which are different as well.

Mr Mizuno stated it is necessary to understand what should be considered for the impactor selection.

Mr Césari explained the complete document PS/80 adding that IHRA will decide upon one risk curve for every injury.

Mr Ries asked if a certification test is included in the feasibility.

Mr Césari confirmed this is the case and that it will be discussed next IHRA meeting.

Mr Ishikawa said that almost all items are on the table at IHRA and the remaining issues will be decided upon this year. If industry wants to study about feasibility, the gtr group should decide on the important issues of the test procedure.

Mr Césari explained that the car to pedestrian impact speed equals the test speed for the lower leg, so this should be 40 km/h.

Mr Nishimoto said that the IHRA message to the gtr group is that a flexible legform is necessary so that should be decided as well.

Mr Kinsky asked when the FlexPLI is available for the industry. Each manufacturer needs at least one leg. Taking into account a 4 year development time and a 7 year model life time, this adds up to 11 years. For the gtr we need time to design and expected entry into force is 2010 so industry needs FlexPLI today. If not, industry cannot comply with the gtr.

Mr Ries added that also all specifications are needed and these are not available so no decision can be taken.

Mr Césari agreed it is difficult to proceed since IHRA has not fully finished its work.

Mr Castaing reminded the group that we are in a regulatory process not in a research process. If the 2005 time limit has to be met, there is only 1 year time to check the repeatability / reproducibility so it is not possible to wait for a new impactor even if we know the new one will be better. Today we only have the EU impactor.

Mr Lukaszewicz added that evaluating the FlexPLI would take too long. The gtr should start with the EU impactor and the FlexPLI can be used for a second step.

Mr Ishikawa informed the group there are already almost 10 impactors available. The FlexPLI can also be bought. Order to delivery takes about 2 months.

Mr Césari summarised that IHRA will continue with the FlexPLI but for now the gtr should start with the EU impactor even if we know the impactor lacks biofidelity.

Mr Kinsky said that industry supports the IHRA work and that there is a need for a more biofidelic leg in the future. It is always possible to amend the gtr later once the FlexPLI is available.

Mr Saul asked what the biofidelity is of the EU impactor. The US wants the gtr to be based on the IHRA results. If IHRA is ready within 1 year, it is better to stretch the gtr timing and to have a good gtr. Also he added it would not be good to drive the designs in the wrong direction as was mentioned before.

Mr Castaing replied that the EU impactor comes from EEVC and the intention is to improve safety. It does not do bad things for the design but maybe it is not as good as the FlexPLI.

Mr Mizuno agreed it is necessary to check the biofidelity of the EU impactor.

Mr Castaing added that in the EU work is ongoing on repeatability / reproducibility.

Mr Doyle explained that the impactor used by the EU is the best one available today. A better leg is needed but the FlexPLI is not regulatory ready yet. We have to move forward with what we have with the intention that a better development will be considered as soon as it is ready.

Mr Youn explained that in Korea there are a lot of injuries to the lower leg. But if the legform misleads the car design, this could influence the head angle and speed.

Mr Ishikawa added that in Japan car manufacturers are starting to use the FlexPLI. He asked how long it takes to get experience. If the final decision is next year, we still have time to produce FlexPLI legs and all manufacturers to use it.

Mr Césari added that since IHRA has not agreed on corridors, the assessment is not based on international agreement. He further summarised that the EU impactor should be used temporarily including a commitment to substitute by a new more biofidelic impactor as soon as possible with IHRA continuing to work on this.

Mr Saul said there is nothing on the table that would allow us to make any decision. IHRA needs to agree on the corridors, we need repeatability experience with the EU impactor, and much more. If all information is available next meeting, then a decision can be made.

Mr Doyle added that the open issue is the tool to be used. In the draft gtr mention at this stage the option for 2 tools with its merits and de-merits and that a decision will be made later.

Mr Césari and Nishimoto stressed the need to have a procedure for decision.

Mr Ishikawa informed that he has been comparing the EU and J impactor and results can be shared next meeting.

Mr Yamagushi explained INF GR / PS / 81 which includes a proposal for a 5 year period where both impactors can be used as alternatives.

Mr Césari concludes that today it is not possible to choose an impactor.

Mr Van der Plas summarised the decisions taken so far about the lower leg (see INF GR / PS / 83 items 7-8-9).

Mr Castaing added that it is necessary to compare results of both impactors on the same car.

Mr Césari added that when IHRA issues the new biofidelity corridors, it is possible the EU impactor will be tuned to fit the new corridors.

Mr Ries asks what will be done if after 1 year no decision can be taken.

Mr Césari said that according to the data available next meeting an impactor will be selected. If information is lacking on one impactor, that impactor would have less chance of being chosen.

Mr Mizuno said that IHRA can not guarantee reproducibility because they don't make the impactor selection.

Mr Césari said that after the IHRA decisions, it is necessary to evaluate repeatability and so on which will take about 2 to 3 months. But some action items can already start now (repeatability of EU impactor). Biofidelity comparison should wait until IHRA has finalised the corridors.

Mr Ishikawa agrees but stresses it is still necessary to start already now.

Mr Césari asked all information to be made available by September. Biofidelity to include tibia, knee bending and shearing.

Mr Saul asked if certification procedures are needed for each impactor.

Mr Césari confirmed this would be necessary.

Mr Ries asked again what would be done if information is not available on time?

Mr Saul said there are 3 options: EU impactor, allow for additional time to have the FlexPLI and no leg test in the gtr.

Mr Rentschler said the EU decision for phase 2 is Summer 2004. If no choice of impactor for gtr, the EU cannot take it into account.

Mr Césari said that the July 1 date is not the decision date of the gtr.

#### 9. Adult leg feasibility studies: overview of ongoing work

Mr Nishimoto said it is necessary to start with the feasibility studies now. If we wait until September, it will be too late.

Mr Ishikawa explained that for the feasibility study, injury criteria and tentative thresholds are needed. It is necessary to tentatively decide on these for the FlexPLI.

Mr Césari said that IHRA plans to establish the risk curves.

Mr Ishikawa explained INF GR / PS / 82 which proposes a tibia bending moment of 350 Nm and a knee bending angle of 20°.

Mr Pouget asked about information on the transfer function from the human based graphs to the FlexPLI readings.

Mr Ishikawa said it is 1 on 1.

Mr Césari asked how to determine the bending moment for the EU impactor.

Mr Ishikawa said this should be done by a quasi-static assessment based on the bending angle. But the PS/82 proposal is only valid for the FlexPLI.

Mr Saul said that feasibility for OICA means if the cars can meet the requirements. He also wants to know how much the injuries are reduced.

Mr Kinsky said the ACEA study on feasibility will be available next meeting.

Mr Bilkhu said he would check with the Alliance if they have test data available.

Mr Tanahashi said that JAMA will check if Japanese manufacturers can supply data as well.

Mr Youn suggested he would check with KAMA.

#### 10. Report to GRSP/35 and draft gtr

The meeting went through INF GR / PS / 69 which is a working paper for the draft gtr prepared by OICA. The document is not an OICA proposal and was submitted only with the intention to facilitate the discussions in the gtr group.

##### Item A

Mr Mizuno asked what should be included in the preamble: accident study result, active safety, cost effectiveness.

Mr Saul added that it needs to refer to all documents used for the selection of the test tools, procedures, ...

Mr van der Straaten said the preamble will change over time as the draft gtr goes through changes.

Mr Castaing added that the preamble also has to clarify the gtr is the best possible compromise within the timescale.

Mr van der Straaten also added that any application dates and the matrix of regions applying tests could find their place in the gtr as well.

Mr Mizuno said we will also look at the preamble of the gtr on door locks to have some guidance.

##### §2.2

Mr Doyle explained there is still no final decision on the weight limit and if we want 'derived from'. It may also be necessary to combine §2.2 and 2.3 but we still are waiting for clarification from WP29 on that issue.

##### §2.4

Mr Saul asked what this means.

Mr van der Straaten replied that the 98 Agreement does not foresee anything on type approval or self certification. The gtr should only include technical requirements.

##### §3

Mr van der Straaten clarified that some §§ include the wording "to be completed". This only means the definitions have to be copied from IHRA and / or the EU directive.

##### §3.1

Mr Saul suggested to substitute the word "roof" by "windscreen header" since it was never the intention to test the roof.

Mr Ries said a new definition is needed for the agreed adult head test area of PS/71.

##### §3.9



- Mr Saul corrected some references.
- §3.11 Mr Ries asked if this definition is needed.
- §3.17 Mr Saul suggested inserting “point B on” just before “Figure 4”.
- §3.18 Mr Frederiksson asked if this definition is still needed.  
It was agreed to rephrase it in line with the PS/71 document and to change the reference from figure 6 to 5C.
- §3.19 to 3.21 Mr Ries said this should be aligned with the new IHRA wording.
- §3.23 Mr van der Straaten suggests only mentioning the mass and not a specific dummy, this was agreed.  
Mr Ries said it also needs to be aligned with the latest IHRA wording.  
Mr Castaing suggest the text should say “in theoretical ride attitude”.
- §3.24 Mr Saul corrected some references.
- §3.25 Need to check how to include the windscreen.
- §3.26 Should be brought in line with PS/71.
- §3.29 Mr Saul suggested to rephrase to “...means the intersection of the head form...”
- §3.32 Mr van der Straaten suggested to delete this, since a gtr does not deal with approval. This was agreed.
- §3.34 Mr van der Straaten said there is nowhere (in no regulation) a definition for a windscreen; So if there are better proposals than the proposed wording, they are welcome.
- §4 Mr Saul asked if we would want to include the upper leg test in the gtr.  
Mr Doyle said it was agreed before not to exclude it. The discussions are not advanced enough to in- or exclude it. So prefers to include some general wording in the gtr text. Also §4 needs to be renumbered to be consistent with the rest of the document.  
Mr van der Straaten said that accident data has shown that the upper leg test is not needed.  
Mr Nishimoto added that already in Barcelona it was decided that the upper leg is low priority.  
Mr Lukaszewicz agreed it is not the first priority but it is part of the directive and the gtr has to be in line with the Directive otherwise it will be difficult for the gtr to be adopted in the EU. So it is necessary to wait for the EU feasibility study before any decision on the upper leg test is made.  
Mr van der Straaten said that if that reasoning is followed, work should be stopped and the gtr group should just copy whatever the EU decides for its phase 2. The goal is to use the best available knowledge and worldwide data.  
Mr Doyle fully agreed to this last point but added that at this point we should keep the upper leg in our sight as well.  
Mr Luckaszewicz agreed and said a decision should be made later when EU information is available.  
Mr Castaing asked if there is any region that does not want to apply the upper leg test.  
Mr Nishimoto replied that the upper leg is not a top priority.  
Mr Ishikawa added that in NCAP all cars fail the upper leg test but still there are no injuries in accident data so the work in Japan was stopped. He asked what the validity of the upper leg test is.  
Mr Bilkhu added that the upper leg test may have a detrimental effect for child heads.  
Mr Youn said that their first priority is child and adult head and the second priority is the lower leg. They have not made any decision on the upper leg.  
Mr Saul said it is possible to wait until enough information is available. It is also necessary to be satisfied that an additional test brings more benefits.  
Mr Césari explained that EEVC is looking at the upper leg test on request of the EU feasibility study contractor. EEVC is checking if the test itself is representing what happens in real accidents.  
Mr Mizuno suggested not to include the test in the gtr now but to explain it in the report.  
Mr Doyle again stressed the need to have one complete document that deals with all issues and thus the upper leg needs to be mentioned in the gtr.  
Mr Van der Plas said that everyone wants the same. Using one comment in the text would satisfy everyone.  
The comment was rephrased by Mr van der Straaten and accepted.
- §5.1.1

Mr Césari said the limits need to have [ ] since they have not been finally decided.  
 Mr Ishikawa asked for the FlexPLI limits to be inserted.  
 Mr Van der Plas suggested to add an “or” in the paragraph and include the limits as proposed in PS/82.  
 This was agreed.

§5.1.2

All limits were [ ].

§5.2

Mr Doyle asked to separate this into two subparagraphs for adult and child head.  
 Mr Ries said the bonnet top should remain one part.  
 Mr Van der Plas reminded the meeting about the result of the 5<sup>th</sup> meeting: Injury levels: in principle HIC < 1000. After feasibility study this can be adapted to higher level or exemption for certain areas.  
 Mr Ries repeated that one criteria is needed for the complete bonnet top. The criteria has to relate to the test area.  
 Mr Doyle agrees but with HIC < [1000] and a footnote for feasibility. It is necessary to have consistency throughout the document so two paragraphs are necessary.  
 Mr Van der Plas added that all what can be written is what we have decided being HIC < [1000] + the intention to come back after the feasibility study.

§5.2.3

To be aligned with PS/71

§6.3.4

Mr Saul suggested this may have to move to §6.1 to also cover the upper and lower legform.

§6.3.4.1

Mr Langer suggested looking at the wording use in ECE 12 or 17 for the cut-body definition.

§6.3.4.3

Mr Frederiksson suggested adding something on active systems in this paragraph.

§6.3.5

Mr van der Straaten suggested deleting the reference to test authorities.

§6.4 and 6.5

The specifications of PS/74 have to be included.  
 Mr Saul suggested to correct §6.4.1 and 6.4.2 + 6.5.1 and 6.5.2 about the diameter dimension and the inclusion of the skin.

§6.5.4

Mr Saul suggested [ ] around the accelerometer position tolerance due to the damping problem.  
 Mr Mizuno volunteered to provide all years for the ISO standards (not only this paragraph).

§7.3.2

Mr Saul said this needs to reflect the selection method for the impact points and needs to be consistent with §6.3.7

Mr Yamagushi asked if there could be some indication on when the EU would decide on the contents of Phase 2.  
 Mr Doyle said that this is difficult to estimate exactly. The results of the feasibility study are expected to be made available to the Commission by July 1. However with the Summer period, changes in Parliament, possible changes in the Commission and the internal procedures required to review the outcome of the report, it is likely that some further delay could be expected. However, the Commission is aware that the entry into force of Phase 2 is already decided and that sufficient lead time is necessary for the industry to take account of any changes that may come about. This means that hopefully there will be more clarity late 2004/early 2005.

#### 11. Action items necessary to complete prior to next meeting.

Mr Van der Plas presented INF / GR / PS / 83 summarising all decided items and action items of this meeting.  
 The document also includes deadlines for circulation of the updated PS/69 draft gtr text.

#### 12. Next meeting

September 28 to October 1, at the OICA offices in Paris

If vital documents (e.g. the results of the EU feasibility study and the results of the ACEA industry study) are not available in time for the above dates, the meeting will be postponed.

List of new documents:

INF GR/PS/69	Working paper draft gtr
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INF GR/PS/70	Korean information
INF GR/PS/71	Head test area windscreen + A-pillar
INF GR/PS/72	Head test data on windscreen
INF GR/PS/73	Head impact angle / speed re-assessment based on vehicle geometry
INF GR/PS/74	IHRA/PS/270 headform impactor specification
INF GR/PS/75	Powerpoint explanation of PS/67
INF GR/PS/76	IHRA legform discussions
INF GR/PS/77	Corridors proposed by UVA (lower legform)
INF GR/PS/78	Bio rating method: Maltese
INF GR/PS/79	IHRA antropometric proposal
INF GR/PS/80	IHRA/PS/278
INF GR/PS/81	Schedule for legform impactor for gtr
INF GR/PS/82	Injury threshold for ped legform test
INF GR/PS/83	Decided items and action items of the 6th meeting
INF GR/PS/84	Draft meeting minutes of the 6th meeting
INF GR/PS/85	Attendance list of the 6th meeting