

## PART 4 SUMMARY OF BREAKOUT GROUP DISCUSSIONS

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### BREAKOUT GROUP 1

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#### Critical Differences in Test and Evaluation Philosophies

There are two different philosophies, testing for the average case, and testing for the practical worst case. A case can be made for using both philosophies and having two specifications. In the United States, the practical worst-case approach is preferred over the typical or average case, to avoid missing problems at either the low or the high end. The average-case approach focuses on the largest number of accidents, to make the greatest improvement in safety. For example, in Germany and Italy, guardrails are designed primarily to provide protection for cars rather than trucks because most of the accidents will involve cars. There was agreement that we should work on those things that have the greatest payoff. However, the continuum goes farther out, so we may want to use truck barriers at some sites. This decision can be worked out in the selection of warranting procedures. We could jointly establish a series of performance levels, but each country would not have to use all of the levels.

From the standpoint of physics, a lot is possible, but it is unaffordable. In the United States, the art of the practical is stressed and benefit-cost analyses are used in the selection procedures.

The United Kingdom uses "strong lawn furniture", such as nonbreakaway poles, to protect pedestrians. The innocent bystander has a right to protection. However, many of the accidents that would involve pedestrians occur at night when pedestrians are not present.

We would like to do the best we can for the truck driver, too, but we may not be able to do it.

Some surrogate test vehicles have been developed, and the use of computer simulation is coming on strongly in some countries, e.g., Holland and Italy. However, crash testing is still considered to be the decisive method for evaluation.

Experience has shown that designs based solely on analysis are not as effective as suggested by the analysis. Computer modeling must be looked at within its bounds. Unpredictable changes in failure modes can occur. Computer models can be used to fill in the gaps.

Surrogate vehicles are desirable, but too complicated. We have been overdoing it to get the perfect vehicle. For example, the cost of the FMVSS deformable barrier is considerably more than the cost of two test cars. We need to use simpler and more rugged vehicles. The surrogate vehicle has merit if we can decide on what

vehicle to model. However, it may become obsolete in the future, and it may be too expensive. The surrogate vehicle could be an excellent device at minimal cost for sign posts and poles, but will be too expensive for guardrails.

Containment and smooth redirection of the vehicle should be acceptable. However, we should have a qualitative evaluation of the pass or fail criteria in order to get a "level playing field." It is almost impossible to meet the lateral occupant velocity in NCHRP Report 230. Otherwise, in general, the limits of the evaluation criteria are so high now that it is not worth spending time to measure them. Exit trajectory is more critical.

Passenger airbags are not at all compatible with the flail space evaluation criteria. It takes a speed change of 10 mph (7.5 mph in the United States) in an impact with a rigid concrete barrier to activate the airbag. There have been cases where the airbag has deployed with disastrous results after the passenger has impacted the dashboard. The problem of compatibility of the flail space model with airbags should be addressed in the NCHRP Report 230 update study.

The United States is moving towards tests with 40-ton articulated vehicles. However, a 30-ton single-unit truck may be more critical because it will produce a greater impact force.

#### Specific National Conditions That May Affect Test and Evaluation Philosophies and Procedures

There is considerable disparity in the vehicle fleets (Australia is unique). However, there may be less disparity in the safety devices that are needed to handle these vehicles. At present, the smallest car in the United Kingdom weighs 750 kg. The cars in the United Kingdom are getting heavier. This trend has also been observed in the United States. If we could settle on an average weight of car, it may cover more countries than expected.

Pickup trucks are used as test vehicles in the United States. However, vans up to 1.5 tons are becoming common in Europe. Instead of looking at vehicle sizes, we should look at vehicle kinetic energy. The vehicle crush characteristics and geometrics would also have to be considered. It may be possible to show analytically that some tests are more critical than others from an acceptance standpoint.

In general, roadway characteristics are not an impediment to harmonization of testing and evaluation procedures. Hard shoulders are commonly used on roadways in Europe. Roadway characteristics are defined by the road design standards. The Autobahn and other new roads in Germany are designed to meet strict standards that take into account the German cars, traffic, and speed limits. Other roads are upgraded to these standards. To date, only 10 to 15 crash cushion units have been installed in Germany.

There was no discussion of in-service evaluation of safety devices.

Speed limits are the greatest source of lack of commonality. Speeds of 60 to 70 mph are common in Europe. Germany will ask for a speed greater than 120 km/hr (73 mph) as the impact test speed. This will affect the CEN talks. However, it is expected that a common speed will be established in Europe. Because speed limits may have some influence on performance levels and severity levels, if a standard speed is established in Europe, it may lead to a change in the test speed used in the United States.

Seat belt usage is mandatory in Germany and many other countries. At first, it would seem that mandatory seat belt usage would be a prerequisite to harmonization, but that is not the case. Seat belt usage is 90 percent in Europe, but 50 percent of the people involved in accidents are not wearing their seat belts. Tests could be conducted with unrestrained occupants. Then any actual usage of seat belts would only increase safety.

There were no problems with the list of devices that should be evaluated, i.e., longitudinal barriers, temporary barriers, work zone appurtenances, crash cushions, and sign and luminaire supports. Transitions from flexible barriers to rigid barriers should be added to the list. There is some merit in testing all of these devices. However, the degree of testing should differ in order to get the most return for the money spent on testing. Only those products that are still on the market after testing procedures have been established should be tested. Barriers should be separated into temporary and permanent types. The design objectives will have to be defined, i.e., decisions will have to be made on which devices are meant to contain vehicles, and which are meant to redirect them. For example, the issue of gating versus nongating crash cushions and terminals will have

to be addressed in Europe. The performance levels or severity levels that these devices should meet will have to be considered. In the CEN talks, Germany will propose that the criteria for crash cushions be different than for other types of barriers. At this time, only longitudinal barriers and crash cushions will be covered by CEN, TC 226, Working Group 1. All of these devices should be addressed by that group.

#### **Impediments to a Common Measurement Framework or Methods To Translate the Results for Comparison**

Only the United States needs to change to the metric system. No legislation is necessary, only leadership. It should be a "hard" conversion rather than a "soft" conversion.

It is possible to have a complete listing of all evaluation criteria in each test report. The test report could also contain the raw data. SAE J211B is universally used for filtering data. Several different injury scales have been used to code injuries in accident reports. We should stick to one scale. A test document that everyone uses as a standard can only be developed after additional discussions are held on the subject. We will not satisfy everybody. However, we should be able to standardize the minimum amount needed to be included in test documents.

#### **Steps Needed To Increase Harmonization**

It was found that there is quite a lot of commonality, but the amount hasn't been adequately discussed. CEN should be made aware of the work in progress in the United States. A committee should be proposed to provide a link between CEN and TRB. Meetings could be scheduled and developed, but someone has to take the lead.

Some research needs were also identified. There is a lack of field data on what we need to protect people from, e.g., trees and gore areas. There is also a lack of accident data on central reserves (medians) without guardrails or median barriers. This accident data is needed to develop warrants for median barriers.