



## SECTION 5 FUTURE VEHICLE SAFETY RESEARCH AND DEVELOPMENT



Dr. LUIGI MASSIMO  
First Secretary, Scientific Affairs  
Delegation of the Commission of  
European Communities

I would like to thank you for your invitation to the Conference and for giving the Commission the opportunity to participate in the panel discussion.

As you are no doubt aware, the initial objective of the Commission's regulatory activities was to create a common market where goods would circulate freely without regard as to whether they are made by national manufacturers or are imported, provided they satisfy certain requirements.

In the motor vehicle sector, this has been achieved by the creation of the European Economic Community (EEC) type-approval system. In creating this system, the Commission has never confined itself to harmonizing the existing national standards, but has always tried to improve safety and reduce air pollution and noise, as far as this was acceptable to the member states. Now that this type-approval procedure is nearly completed, the Commission is already studying the evolution of regulations concerning motor vehicle construction. It is quite clear that these future regulations should reflect the most up-to-date scientific knowledge. In this context, the Commission has always appreciated the most valuable information provided by the delegates to all the Experimental Safety Vehicle (ESV) Conferences.

In December 1975, the Commission organized its last European Symposium based on

the trends in the regulations concerning motor vehicle design. All interested circles, such as government, industry, and research and consumer groups were represented. I would like to take this opportunity to quote some of the conclusions of the Symposium that are of special interest for this Conference:

- There is a need to improve the safety, not only of car occupants, but also of the unprotected road users, especially pedestrians, who are frequently struck by cars.
- Impact test methods for cars must be developed that truly reflect the reality of road accident situations and that lead to greater safety in relation to the desired future vehicle population. For example, the safety of large-car users should not be improved at the expense of the occupants of the small cars that are widely used in Europe.
- It is desirable, over the long term, that any safety regulations be set out in the form of performance standards. These standards should be specified in terms of acceptable injury tolerance levels to be measured in realistic standard tests. Therefore, it is necessary to switch from specifying design rules for the different car components (such as safety belts, steering assemblies, and windscreens) to defining comprehensive performance standards in which injury criteria for given improved test conditions are examined on dummies or similar appropriate test devices.

However, as far as injury criteria are con-

cerned, the scientific and biomechanical knowledge still needs to be improved, and, in order to define the appropriate types of crash tests to be used, the state of accident analysis must be reconsidered. Finally, a concerted effort in research and development is needed to develop suitable test choices—dummies that adequately reflect human response to collision forces, and at the same time provide

reasonable reproducible performance.

Mr. Chairman, these are the general lines of future research and development in Europe in the field of motor vehicles, and it seems to me that they correspond largely to the results of the present conference. This shows quite clearly the great interest in an exchange of information between the United States and Europe.

## Japan

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Mr. TAKEAKI KOYANAGI  
Deputy Director, Automobile Division  
Machinery and Information Industries Bureau  
Ministry of International Trade and Industry

A recent review of traffic accidents in Japan indicates that the number of fatalities has been decreasing year after year since 1970 when it was at its peak. The number of fatalities this year shows a further decrease from that of last year. The downward trend is especially remarkable in Tokyo. Thus the number of traffic fatalities this year so far has been reduced to a rate comparable to that of the early 1930's.

The contributions to this reduction include vehicular safety, tightening of police control, improvement in road traffic safety equipment, and promotion of drivers' safety consciousness.

In this downward tendency of the total number of fatalities, however, the accidents involving pedestrians have marked only a slight decrease in number, and they account for a high percentage of the total fatalities. Pedestrian protection will be considered as an important question hereafter.

An analysis of pedestrian fatalities by age has disclosed that the largest number of cases involve children. This fact suggests that children are not so careful in their daily activities, and that successful safety training for them can hardly be expected.

As a measure for reducing pedestrian accidents, improvement in road conditions is considered to be the primary necessity. Of course, effective improvement of the motor

vehicles themselves is desirable, but it will inevitably involve great difficulty.

The first step in vehicle design from the viewpoint of pedestrian accident prevention should be an improvement in visibility to permit the driver to operate his vehicle while avoiding contact with the pedestrian. A reduction in pedestrian fatalities in collisions is also a matter of extreme difficulty.

Head injuries caused by hitting the road surface are responsible for most of the pedestrian fatalities in traffic accidents in Japan. An effective measure for the prevention of such accidents is extremely difficult to find.

In Japan, several years ago, various vehicle front constructions were researched and tested with dummies. Because of the differences in the dummies' behavior, however, useful data were not obtained.

The pedestrian dummy, which requires very complicated manipulation by strings, is a measuring instrument with less repeatability than the occupant dummy. Even occupant dummies currently available have some problems to be solved, such as inaccuracy in repeatability as a measuring instrument and behavior patterns deviating from their human models.

The development of an air cushion as an occupant protection system has been going on. In our country, however, there has been no public opinion supporting the use of air cushions in motor vehicles. On the other hand, the air cushion has not yet undergone a sufficient examination of its reliability. Especially in the case of small vehicles, this occupant protection system requires a change in the construction of the instrument panel

and reveals some shortcomings that should be eliminated before practical use.

As an occupant restraint system, the seatbelt is considered most desirable for practical results. In Japan, however, the seatbelt-wearing population is still very low. It is necessary to carry out a belt-wearing promotion campaign side by side with the development of a seatbelt that would be easier to use.

In Japan today, traffic accidents are investi-

gated by the police in the minutest detail. Furthermore, under the auspices of the Ministry of Transportation, a close analysis of traffic accidents that have occurred in designated areas is jointly conducted on a periodic basis by the police, university professors, doctors, and engineers. The further evidence accumulated in such investigations is expected to present what are really essential items for development in the future.

## The United Kingdom

J. W. FURNESS

Chief Mechanical Engineer

Department of the Environment

The U.S. Department of Transportation is to be congratulated on yet another successful Experimental Safety Vehicle (ESV) Conference. The technical presentations have been to a high standard, and the papers will no doubt be given further consideration later.

Now that the safety arguments have been set out and balanced against costs and benefits and the limits of natural resources, it seems appropriate to consider the future activities in the ESV/Research Safety Vehicle field. In my opinion, sufficient data are now available for us to formulate standards for cars in the 1980's. My tentative suggestions, which are intended to supplement the requirements set out in various regulations published by the U.N. Economic Commission for Europe (ECE), are as follows:

### Primary Safety:

1. Braking and tyre tests to be carried out on both wet and dry road surface conditions at speeds up to 110 km/h (70 mi/h) to ensure good road adhesion and directional stability under different conditions of loading.
2. Forward and rearward vision standards to ensure good visibility both in dry and adverse weather conditions.

### Secondary Safety:

1. Occupant protection requirements to be assessed from crash tests incorporating

two instrumented dummies representing the 50th-percentile male. The dummies would be restrained by correctly fitted lap and diagonal belts. The tests would include:

- a. Partial frontal tests possibly at 55 km/h (35 mi/h) to simulate a 40-percent overlapping vehicle-to-vehicle crash.
- b. 90-degree side impact test at 40 km/h (25 mi/h) conducted with a mobile barrier fitted with a deformable front end intended to simulate a standard front end of a car. A special side-impact dummy may be necessary for measuring purposes.
- c. A compatibility test representing a car-to-car crash using the mobile barrier referred to above and impacting both the front and rear of the vehicle at 45 km/h (28 mi/h).

During these impact tests, the forces imposed on different limbs and body positions of the dummies must not exceed acceptable levels of human tolerance as proposed in the European Experimental Vehicles Committee paper on biomechanics.

The mobile barrier would incorporate a low-level bumper, the top of which does not exceed 380 mm (15 inches) from the ground.

Front bumpers of cars would be required to be standardised at a similar height to door sills, that is, 380 mm (15 inches) to the top of the bumper and at least 30 mm (3 inches) deep. This could result in reductions of injuries in car-to-pedestrian accidents.

In all the impact tests, belted dummies would be used, and the mandatory wearing of seatbelts seems essential if injuries are to be minimised or avoided. It is unreasonable to expect cars to be designed to provide unrestrained occupants with the same level of protection as restrained occupants.

In some countries, injuries to pedestrians impacted by cars account for 40 percent of all injuries caused by these vehicles. This proportion will increase as car occupants become better protected. Clearly, further work needs to be done on the design of the front end of cars to reduce:

- Injuries to pedestrians including children
- Aggressivity in side impacts
- Property damage

The above objectives could probably be met by soft nose sections on cars that incorporate a structural member or bumper at a standardised height aligned more closely with the height of door sills and floor frames that have high structural strength. The purpose of this low bumper would be to align itself with the more usual heights of door sills and floor pans that have high structural strength and that, if fully utilised, could be very beneficial in reducing injuries to occupants of cars that have been impacted from the side. If fully utilised, this approach could be very beneficial in reducing injuries to both pedestrians and the occupants of cars impacted from the side.

## ECONOMY

In the United Kingdom, low-weight cars have been in popular demand for many years. The need to conserve materials is well recognised as a means of minimising manufacturing costs. Progressive reductions in vehicle weight are being achieved by the wider use of lighter materials such as aluminum and plastics.

## ENERGY

Three-quarters of the vehicles in use in the United Kingdom are below 1 120 kg (2 500 lb), the bulk of these being between 800 and

1 120 kg (1 750-2 500 lb). Engine capacities range in the main from 1 000 to 2 000 cc and give an overall fuel consumption on the order of 38 to 33 mi/gal, which is in line with the U.S. targets.

Economic pressures, in particular the high cost of fuel, have encouraged vehicle users to be more economy conscious. However, it has been recognised that cost has little effect on the actual demand for fuel. Since 1973 the cost of petrol in the United Kingdom has trebled, but the demand is only marginally reduced. Economic pressures are also affected by means of taxation. Fuel taxes have now led to an equalization of the prices of petrol and diesel.

Energy consumption by road vehicles can be reduced by improved aerodynamics, improving vehicle maintenance, and by encouraging improved driving habits. It is estimated that such measures could save 5-10 percent of road fuel consumed. A mandatory requirement for the publication of fuel consumption data is likely to be introduced in the United Kingdom in the near future.

Other means of reducing the total demand for transport fuel are also being studied, that is, better utilisation of public road and rail transport.

The use of alternative types of fuel is being studied including diesel, methanol, hydrogen and battery electric. Diesel engines are extensively used in the United Kingdom in heavy goods vehicles and public service vehicles and could be used more widely in light delivery vehicles, taxis, and fleet cars travelling high annual mileages. Battery electric vehicles are used widely for local delivery goods vehicles but are not likely to be readily acceptable for cars because of battery design limitations and the poor overall energy conversion of these vehicles, which (when power station efficiency is included) is only 10-16 percent compared with 25 percent for petrol engines and up to 35 percent for diesel engines.

## ENVIRONMENT

The United Kingdom's policy is to prevent total vehicle emissions from rising above 1971 levels. To achieve this, cars and vans are

required to conform with the ECE Regulation 15 concerning gaseous emission of pollutants. This limits the amounts of hydrocarbon and carbon monoxide emitted. Nitrogen oxide control will soon be added. The levels have recently been reduced and will be further reduced by about 1980. Petrol lead levels are also being reduced. Currently the limit is 0.55 g/l, but this is being reduced to 0.50 g by 30 November 1976 and to 0.45 g by 1 January 1978. A further large reduction will be necessary in 1980 to maintain 1971 standards for total emissions.

Regulations are currently in force regarding smoke emission from diesel engines. Air pollution from motorcycles and mopeds is likely to be controlled in the near future (about 1980). Gaseous emissions from diesel engines are being kept under review.

## CONCLUSIONS

The extent to which the above safety and environmental criteria will eventually be

adopted is yet to be decided. It is desirable for performance standards to be agreed upon internationally. It is hoped that in the next 2 or 3 years great progress will be made to harmonise international regulations. If this is done, improvements in safety and environmental standards, together with better use of energy and material resources, should be achieved.

In Britain we will continue to strive for harmonisation of vehicle legislation through the U.N. ECE and the European Economic Community. Much progress has already been made in the U.N. forum where all the major vehicle-producing countries are represented. Worldwide standards for vehicles could be agreed upon and harmonised given the spirit of cooperation that has been at these ESV Conferences (if the United States, Europe, and Japan can resolve the problem of regional differences). The harmonisation of test methods is probably the area that will pay the quickest dividends. This applies equally to vehicle safety, air pollution, and the control of noise.

## France

MARC HALPERN-HERLA

Directeur

Organisme National de Sécurité Routière (ONSER)

The papers presented in plenary session and in the special seminars have given us a better insight into current vehicle safety research orientations. We are now wondering about the orientation of future research.

With regard to France, we can recapitulate the guidelines on which research policy in this field has been and will continue to be based. We will begin with some general principles:

First, vehicle safety research is not an end in itself. Its purpose is to attempt to reduce, at a reasonable cost, the losses entailed by highway accidents. It should accordingly result, inter alia, in improved vehicle regulations. It would be hard to understand if the results achieved by virtue of painstaking effort on the national level and by interna-

tional cooperation were not sooner or later—and the sooner the better—reflected in terms of regulations.

It must also be mentioned that safety is not the only goal of vehicle design. The other areas for improvement and of community concern are well known: air pollution, noise, and energy consumption. Research must be oriented, therefore, towards solutions for improvement of these areas together or, in any case, for improvement of some of them without detriment to the others.

Finally, research in France is done in cooperation with the other European countries. Whenever possible, we try to identify a consensus among the experts so as to facilitate decision making in vehicle regulations at the European Economic Community level.

More concretely, what are the paths along which we anticipate that research in France will be directed? These paths are in no way novel, and most of the countries actively

engaged in a research program seem to be taking them.

First, better knowledge of the conditions under which accidents happen is indispensable. It is thus a question of developing what is designated in French by the neologism "accidentology." This necessitates the maintenance and even the extension of a system for accident and traffic observation at various levels of precision and depth. It is necessary to supplement the national statistics that necessarily include only a slight amount of technical data.

It is also indispensable to advance knowledge in collision biomechanics regarding human tolerances and their translation into terms of performance measured on a dummy. In this regard, the report of the European Experimental Vehicles Committee (EEVC) specialist biomechanics groups has demonstrated the priority research areas. Those recommendations will be followed by France.

In the field of vehicle technology, the first step is to improve the safety of car occupants as well as that of the other victims involved (primarily, injured two-wheel riders and pedestrians). We believe that the subsystem studies are sufficiently advanced to go forward with the manufacture of a lightweight (7 to 900 kg) prototype vehicle demonstrating the feasibility of ensuring the safety of adult occupants under the conditions recommended by the EEVC at acceptable additional costs. Research still needs to be done on effective and acceptable means of protection for small children (ages 5 to 9) in cars, as well as for injured pedestrians (adults and children), and for unbelted occupants in low-speed collisions, like those in urban areas. Beyond these safety concerns on the 1980 horizon, we further believe that it is necessary for the research centers to explore the feasibility of protection of occupants against impact levels appreciably higher than those now being given

consideration. Safety studies on two-wheeled vehicles must be undertaken with greater scope, but this field does not fall within the concerns of this conference.

Along with research aimed at enhancing secondary safety by alterations of the passenger car, it would be of interest to try to reduce the violence of collisions by action relative to obstacles hit that are not cars. These are either fixed obstacles or very heavy vehicles such as trucks. As to fixed obstacles that can be either insulated by crash barriers or weakened, research should be oriented towards optimization of means of absorption of energy between the vehicle and the obstacle hit. In the case of trucks, research should aim at limiting their aggressiveness particularly in cases of head-on collisions.

Finally, a substantial program should embark on accident prevention, a field neglected in recent years. This program should begin with detailed surveys of primary safety, such as those done since 1970 with secondary safety. The goal of these surveys will be to better assess the advantages of various possible prevention measures affecting vehicles. It now seems profitable to seek various means of driving aids, especially for speed, vigilance, and alcoholism. The relations between vehicle dynamics and highway safety should also form the subject of in-depth research.

Concurrently, it seems indispensable to schedule a substantial set of studies devoted to an assessment of the various safety improvements recommended or decided on. The purpose of such an assessment is to verify that the proposed goals are attained, or, if not, to enable poorly treated problems to be examined anew.

We believe that this coordinated aggregate of research work should make it possible to pave the way for the development of an even safer vehicle, following the generation of cars of the 1980's.

## The Republic of Germany

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Prof. Dr. HEINRICH PAXENTHALER  
President  
Federal Highway Research Institute

We have met for three days here in Washington, and we have absorbed a wealth of scientific knowledge; two new models—Research Safety Vehicle (RSV) prototypes—were presented to us. In the name of the German delegation, I would first like to thank our American friends for the superb organization and for an exceedingly friendly reception. We have come to take for granted that the results of research and experimentation will be communicated and publicly disclosed. But if we think back to the time of the first conference, we are reminded that such generous exchange was not always the order of the day. We must remain committed to this present spirit as we look into the future.

I do not intend to deal with any specific subject matter here; we feel we are in complete agreement with almost all other nations on the objectives governing our research. What I would rather do is discuss the direction for our future efforts.

The sixth Experimental Safety Vehicle (ESV) Conference has vividly demonstrated that, in addition to striving for safety, we must also give consideration to the environment, to energy consumption, and to the economy, and presumably these objectives will also determine the future of the American automobile. We have noted with the greatest interest the clear recognition given here to conflicts between stated goals: the conflict between the desire to reduce noxious emissions and the need to cut energy consumption, and primarily the conflict between the wish to reduce weight and the requirements of increased safety.

A great number of findings presented during this conference have shown the protective value of the restraining devices—and, in particular, that of the safety belt system. It is quite indisputable that vehicle modifications can be successful only to the extent that restraining

devices are also made effective. In the Federal Republic, this has strengthened our conviction that we are moving in the right direction by making compulsory the use of the safety belt.

The two RSV's exhibited here for the first time should meet with favourable public response. All of us have noted the encouraging progress achieved between the early first-generation ESV's and the present RSV's; this is particularly true in regard to new environment and economy factors, but not least in regard to reduced collisions between vehicles and pedestrians.

Where should future development lead from our point of view? We feel that the knowledge gained should, as before, be applied in practice; more specifically, this knowledge should guide administrative procedures. This is where the importance of the task goes beyond research and development. We must exert all our efforts toward general agreement on new findings and, at the same time, strive to bring existing laws and regulations into harmony. I want to emphasize again what was said in the report submitted by German industry: We are particularly pleased that the Government of the United States has urged before the Economic Commission for Europe that testing procedures and technical requirements be gradually brought in line, and we hope very much that this will soon lead to the urgently needed coordination between European and American rules and regulations.

Regarding the future growth of these conferences, we naturally assume that objectives will have to expand—an expansion aimed at the automobile of the decade of the 1980's. We proposed annual informal meetings of a limited number of experts in the fields of legislation, research, and industrial production. The object of such meetings would be to present the latest state of the art, to discuss contemplated measures, and to bring combined action to bear on these measures. These meetings can also determine when it would be best to call the next general conference.

And, if a suggestion is in order, we propose closer coordination with other, similar conferences.

Proceeding in this manner, we are con-

vinced that past successful activities can properly be exploited and that, together with new exigencies, they will point to the proper directions for the future.

## Italy

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Dr. GAETANO DANESE  
Ministry of Transport

As you have noticed in the course of this Sixth Experimental Safety Vehicle (ESV) Conference, Italy, and specifically its Government, its industry, and its motor vehicle world are looking with interest to the development of study and research set in motion as a consequence of bilateral and multilateral agreements signed with the United States and with some European countries.

Nobody can deny that the Italian contribution was a valuable one and that it reflected, at least in the first phase of ESV and Research Safety Vehicle programs, a consistent economic commitment that was nevertheless willingly met by all the interested parties in Italy in the belief that greater safety in road traffic was well worth even heavy financial burdens. We have in mind the auspicious aim—the reduction of traffic fatalities.

Let me thank the U.S. Government, the promoter of this policy of study and research, as well as the governments of our fellow North Atlantic Treaty Organization countries. I avail myself of this opportunity to address a grateful salute to Mr. H. Taylor for his wisdom and sagacity as President of the European Experimental Vehicles Committee and for his intention to carry on with a valid research program.

Unfortunately, the Italian Government is fighting a hard battle against economic difficulties now striking our country. I am quite sure we will overcome this uneasy situation, but I must say that austerity is affecting all of our country's initiatives and enterprises, in-

cluding study and research activities. Our ambitious programs will, therefore, have to be reexamined after a pause for reflection.

This does not necessarily mean the activities carried on until now will be interrupted; we shall go on with them using the available resources and shall take advantage of the results acquired from the latest studies, which are numerous and worthy of consideration.

As soon as possible, we shall resume our initial policy, specifically regarding the problems of compatibility and biomechanics. We are well aware of the objective difficulties that will arise when dealing with them.

We will not deviate from the path clearly indicated at the Kyoto conference and here in Washington—the part specifically indicated by Dr. Sirignano in his opening address.

Italy is available for continuing the programs along the new guidelines that emerged during this conference. In the meantime, she only asks for a longer period to prepare herself for the various meetings that will be held in the future in the various countries. We think it advisable to foresee a period of not less than 2 years between this conference and the next one.

I cannot conclude without stating how pleased Italy would be to host the next ESV conference. However, as I said before, the present serious economic situation leaves us no possibility of hosting it, and that I deeply regret.

Finally, I would like to express our gratitude to the U.S. Government for the splendid hospitality and to assure all the government officials and experts who participated in this important meeting of Italy's spirit of cooperation.

## Canada

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Mr. ERIC R. WELBOURNE  
Chief, Vehicle Systems  
Road and Motor Vehicle Traffic Safety

As I indicated in my remarks on Tuesday, very little vehicle research and development is conducted in Canada. I do not, therefore, propose to make a formal, 10-minute statement. I would, however, like to make two observations on the subject.

Listening to the papers presented at this conference, it has seemed to me that research and development in vehicular safety may have reached some kind of plateau. The very significant efforts in this area over the last few years, for which the Experimental Safety Vehicle (ESV) programme has provided a major stimulus, have left us with a number of safety systems that have been developed technically to the point where they could be incorporated in production vehicles. It is encouraging to see the way in which the lessons of the ESV programme are filtering down into the detailed design of many current vehicles. However, more advanced vehicle systems, such as antilock brakes or inflatable belts, are unlikely to appear in this way. Until they do, we shall be no more knowledgeable about their real value and real costs than we are at present.

I would suggest that large-scale field experiments with selected systems form a logical next step in vehicle safety research and development. The Restraint System Evaluation Program recently concluded by the Na-

tional Highway Traffic Safety Administration was, in several respects, a model of what could be done. It is, therefore, particularly unfortunate that both the program and the production of vehicles equipped with air-bag systems terminated before any unequivocal conclusions had been reached on the effectiveness of this type of occupant restraint. I would not wish to understate the technical, legal, and logistical problems of conducting such experiments, or their costs. However, if we do not do something of the sort, we have to choose between forgoing the potential benefits of advanced systems and mandating their fitness on the basis of limited development testing and rather inherently speculative projections of their performance in the real world. Neither option seems more attractive.

My second observation is really in a similar vein, but it addresses crash avoidance research more specifically. I simply point to the need to consider and to measure much more carefully than has generally been done to date how the driver uses the crash avoidance systems on his vehicle and how he responds to changes in the design of those systems. From a conventional engineering point of view, such changes may be self-evident improvements. Unless driver behavior is introduced into the analysis, it is the purest presumption to conclude that the probability of collision has actually been reduced. The accident avoidance seminar yesterday afternoon provided some excellent contrasts between the two research approaches.

This concludes my statement on future vehicle safety research and development.

## The European Experimental Vehicles Committee

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Mr. HAROLD TAYLOR

Chairman, European Experimental Vehicles Committee

Head of the Safety Department

Transportation and Road Research Laboratory

As we come towards the end of the Sixth Experimental Safety Vehicle (ESV) Conference, we can look back with satisfaction at the wealth of interesting and valuable information presented. Our thoughts turn naturally to considering the way this international programme should best proceed in the future. It is no secret that some people feel that many of the objectives of the original programme—so ably piloted by the United States—have now been met, and, therefore, some changes may be desirable. In commenting on these matters, I must emphasize that I shall be expressing my own personal views, but, it is hoped that, because of my long involvement in the programme, they may be of some value.

A collaborative international programme initiated at a government level prospers if it has clear objectives, and if there is an equally clear willingness on the part of all the participants to recognise the viewpoints of others. If necessary, they must be prepared to adapt their own approaches in the interests of further progress in collaboration. These aspects distinguish a programme of this kind from the more conventional scientific, or technical, conferences in which information is presented and views may be expressed, but the participants are under no obligation to make any response to them. In the case of car

safety, many opportunities exist for exchanging scientific and technical information through numerous conferences and other occasions; in my view, the international programme needs to have objectives beyond this level if it is to have a viable future.

The European Experimental Vehicles Committee (EEVC) has prospered in promoting car safety because it has met these requirements. The working groups serve to co-ordinate and reconcile the views of participating countries, and EEVC's work provides support to policy formation in the various European bodies concerned with harmonisation of vehicle standards; and it does so with the active encouragement of these bodies.

Finally, may I say a word on the possible extension of scope—or broadening—of the international programme, at present mainly concerned with safety aspects of cars. Most countries have recognised that car occupant and pedestrian casualties may grow to unacceptable levels unless further major improvements in car safety can be introduced. This realisation strengthens the bonds of collaboration and has enhanced the success of the international ESV programme. Furthermore, car safety research can readily be seen to be supporting the formulation of policy, internationally, from which specific actions will result.

If formal international collaboration is to be extended to other undoubtedly complex areas, it will be highly desirable for the link between research and policy to be well established, especially if, as seems possible, several agencies may be involved in each country.