Road safety, transport research and the European Community

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A state-of-the-art overview

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ROAD SAFETY, TRANSPORT RESEARCH AND THE EUROPEAN COMMUNITY
A state-of-the-art overview

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ABSTRACT

The traffic safety situation in Europe is reviewed and the research and policy needs are discussed, partly on the basis of the so-called Gerondeau-report to the EC Commissioner of Transport by the High-level Expert Group for an European Policy for Road Safety.

The safety situation of (passenger) transport in different modes (road, rail, air and water) are compared and differences in their safety levels and approaches in research are discussed.

The momentary activities of the European Community in relation to road safety in transport research (DRIVE from DG-XIII and EURET from DG-VII) are discussed and differences with policy and research activities in the frameworks of the CEMT and the OECD are evaluated.

The aims and organization of FERSI, the in 1991 constituted Forum of European Road Safety Institutes, is presented and the recent involvement of FERSI in EC-affairs is discussed.

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1. RESEARCH AND ROAD SAFETY IN EUROPE

1.1. Road safety development

Since the Treaty of Rome the number of deaths in road traffic of the now twelve countries of the EEC has reached two million; the number of injured is over 40 million. The economic loss due to road accidents is very substantial and endangers the welfare in the community. Nowadays the macro-economic costs for the lack of road safety are about 70 billion Ecus per year in the countries of the EEC. The fact that this figure is larger than the Gross Domestic Product of, for example, Greece, Ireland or Portugal, demonstrates the extent of the losses involved.

The comparison of the fatality rate per kilometrage for road traffic between the countries of the EEC on the one hand and United States of America and Japan on the other hand shows that road traffic is half less dangerous in the USA and about one-fourth less dangerous in Japan than in the countries of the EEC as a total.

Area	Motorkilometers 100 million	Fatalities within 30 days	Fatality rate
USA	34992	46405	1.3
Japan	6251	14595	2.3
EEC	19524	52689	2.7

Table 1. Fatality rates 1990 in USA, Japan and EEC.

There are also large differences in risk on the roads inside the European Community. Per million vehicles the Netherlands and Great Britain have a rate of road deaths which is less or about 250, while the rates in Spain, Greece or Portugal are 3 to 4 times higher. The fatality rate per motorized kilometrage differs even more with a factor up to 7 for these countries (UK and NL about 1.4; Portugal 10.5; per hundred million vehicle kilometers).

In view of these figures and the differences in motorization between countries it has been argued (Koornstra, 1991) that the development of road

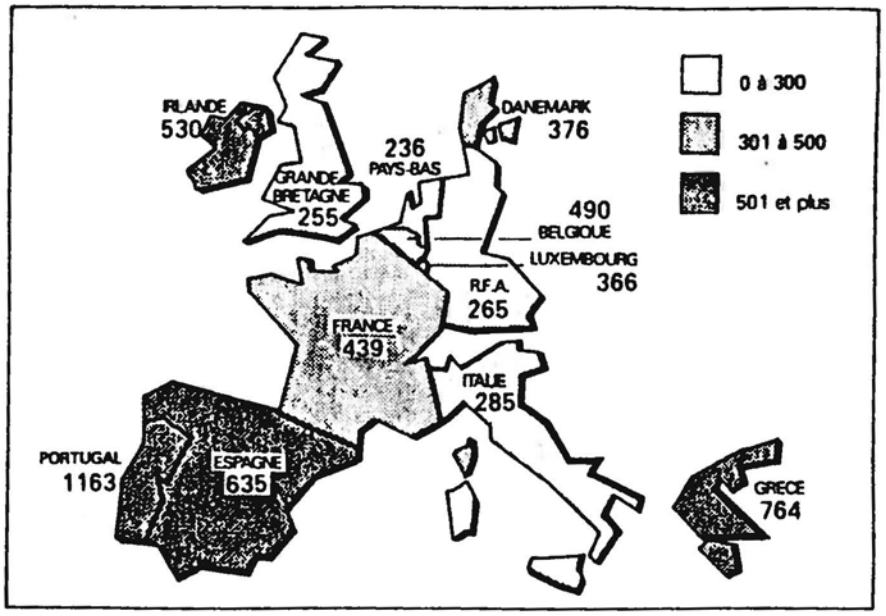

Figure 1. Fatalities per million vehicles in the EEC in 1988. Illustration from the Gerondeau-report (1991).

safety probably is driven by the increasing motorization. In the first evolution phase the degree of motorization and the level road fatalities are both low. The mid phase is characterized by a fast increase in motorization. At the end of this phase the absolute motorization is still at a moderate level, but the road safety worsened to a very high level of road fatalities due to the relative lack of safety provisions in the traffic system. Apparently the care for road safety is lagged in time with respect to the growth of motorized mobility. The last phase is the phase of saturating motorization and generally congestion is observed on roads in populated areas during peak hours. In this phase road safety is increased markedly and the number of road fatalities reduces very much.

Nowadays the south of Europe typically is in the mid phase, while the USA, Japan and North-West Europe has entered the last phase. Central and East Europe probably are just passing over from the first to the mid phase and the increasing motorization is indeed followed by the tendency of a sharp increase in road fatalities. By reducing the time lag between the developments of road safety provisions and the growth of motorization authorities can, if not to abolish, at least reduce the number and seriousness of road accidents. This asks for a proactive, instead of a reactive policy for road safety with respect to traffic growth.

The High-level Expert Group in their report to the High Commissioner of Transport in the European Community (Gerondeau, 1991, p. 15) states that the authorities have a fundamental part to play, through the action which they do (or do not) take. They are responsible for the road network and its equipment, for the standards applying in building and controlling vehicles, for organizing assistance and lastly, to a very large degree, for the opinions and the behaviour of road users, whom they can influence through education and training, information, traffic regulation, enforcement and penalties. The Gerondeau-report acknowledges that individual mistakes or bad conduct can be demonstrated in 90% or more of road accidents, but warns not to draw the wrong conclusion from that point. It states that: "the behaviour of every road user is in fact largely dependent on circumstances of his journey outside his control (road network characteristics, other users' behaviour, the regulations, the degree of enforcement, etc.)." A convincing illustration can be found in the fatality rate on motorways which is many times lower than on other main rural roads; it is hardly acceptable to assume that responsibilities of drivers on these roads are suddenly changed. The frequency of road user failures and the consequences vary considerably with the characteristics of the elements of the road traffic system he uses.

The Gerondeau-report concludes: "Whilst the part played in accidents by individual faulty actions of large numbers of users is often used as an excuse for inaction, there is a need for the awareness that, in spite of the appearances, **the responsibility for taking action against traffic accidents is primarily collective and that it falls firstly on the various public authorities which might take such action**. ...Progress is only possible through this approach, as is shown by the experience of those Community countries which have achieved the best results. ... **That includes a commitment from the Community**."

1.2 European Road Safety Policy

The Gerondeau-report formulates three general objectives for a European strategy for road safety. Firstly the setting of quantified multi-year target, such as 30% less road fatalities by the year 2000. Secondly the harmonization of the safety levels in the Member States, encouraging the countries with low safety to catch up the advanced countries. Thirdly, the

promotion of a behaviour model for road users mindful of others. These three objectives can be reached, according to the Gerondeau-report, by adopting measures which have shown to be effective in reducing the number and seriousness of road accidents, but which are not applied in all Member States. It does not concentrate on modern electronics and telematics, despite the potential value which such measures may have. Nearly all the concrete proposals in the Gerondeau-report are already at least applied in one of the Member States with positive results on road safety which are judged to be also effective in the other Member Countries. The only innovations were some combinations of measures which were judged to yield a more optimal effect. The Gerondeau-report lists 64 proposals for such concrete measures. Not all proposed measures concern the European level, but on the level of the European Community action toward the national and regional levels can be taken by dissemination of knowledge and the pooling of experience in Member States. The EC should actively facilitate the adoption of proposed measures and if necessary, urge the adoption of some measures by Member States.

For this role of the European Community, the Gerondeau-report presents 14 proposals of a more process and organization oriented nature. The general idea beyond the scope of the 14 organizational measures of the Expert Group is the belief that there should be a coherent policy across the continent of Europe, and that the Community must involve itself in new ways of road-accident prevention expressed by four chief aims:

- to improve knowledge by research support;
- to produce technical reference material gradually;
- to establish a European 'Highway Code';
- to support road safety policy.

In the Treaty of Rome it was unclear what the authority of the European Commission is with respect to road safety, but in the treaty of Maastricht it becomes a duty of the European Community to improve European road safety and to establish a harmonized and optimized transeuropean network of motor freeways. The authority of the European Parliament on transport issues is increased especially on matters concerning road safety and this transeuropean network. In Brussels the Ministers of Transport have agreed to put the topic of road safety on their agenda and so they have done also for the agendas of their meetings in the CEMT.

It can envisaged that the Gerondeau-report will become, and partly is already, a source for action on the level of the European Community. The Gerondeau-report does not recommend the exclusive use of mandatory actions, but the coverage of road safety topics by the organization of advise to the national, regional and local levels of authority. That advise is thought to cover the following aspects:

- analysis of experience and action implemented in individual Member States in order to reveal the lessons of common benefit;
- initiation of new and participation in existing research programmes;
- publication of periodical surveys, information material and technical studies aimed at the public or specialists;
- compilation and monitoring developments in road safety, making use of a network of bodies in the Member States;
- production of recommendation or preparation of decisions at the request of Member States, the Commission, the Council or European Parliament;
- support to non-governmental bodies working on road safety.

1.3. Improved European road safety

The Gerondeau-report mentions the area's which are most beneficial for the improvement of the European road safety. I can not discuss all the 64 concrete measures that are proposed in the Gerondeau-report. However, the main principles beyond the proposals has been that human behaviour is not infallible and also that no one really wants to become involved in an accident by ones own behaviour. Nonetheless, the frequency of the seldom failures of millions of road users results in the enormous amounts of losses in road safety. The opportunity for failures is largely dependent on the human made traffic infrastructure. Therefore, increased road safety must be sought in an infrastructure which elicits less opportunity for failure as well as in an improvement of the road user interactions.

The Gerondeau-report proposes a dozen actions for infrastructural measures. The ideas beyond the infrastructure proposals are based on a hierarchical categorization of roads in the network with homogeneous characteristics along each type of routes. Each category should have a unique and uniform layout and the same should hold for the connection links within and between types of roads. Despite the gradual upgrading of the road system nowadays the road network still constitutes a more or less unpre-

dictable concatenation of a nearly infinite variety of road sections by an also nearly infinite variety of cross-connections. The result is a road system which is too complex for the road user to allow reliable predictions for the next oncoming situation. As shown by the illustrative Table 2 for Dutch roads, which together with the British and Swedish networks belong to Europe's most safe road networks, all road types other than motor roads and calming areas have considerable high injury rates.

Road type	Max. km/h	Mixing fast/slow	Level crossings oncoming traffic	Injury rate per million veh. km.
calming area	< 30	yes	yes	0.20
resid. street	50	yes	yes	0.75
urban arterials	50	yes/no	yes	1.33
rural roads	80	yes/no	yes	0.64
rural motor road	80	no	yes	0.30
rural motor road	100	no	no	0.11
motorways	100/120	no	no	0.07

Table 2. Injury rate for road categories in the Netherlands 1986.

The lack of safety varies with the combination of the level of speeds, degree of separation (oncoming traffic) and the amount of variation in speeds due to discontinuities (level crossings) and mixture of slow and fast categories of road users on the road type. The urban arterial roads, where actual speeds are generally much higher than the speed limit, are the most dangerous ones. The redesigning of the road categories between motorways and residential calming areas to a limited number of categories of self-explaining roads with well predictable uniform layouts of routes and crossing types is most urgent. This is a major long term task which should be undertaken in a coordinated way on a European level, since diversity in the Community increases the unpredictability for the foreseen increase of cross-national travel of road users in Europe.

The ingredients of such a redesigned road network ask for more research on safer layouts, but some elements are know already. Separation of slow and fast traffic and traffic with large mass differences is one of the

safe design principles. This means only pedestrians on sidewalks and cyclist on separated cycle paths, while crossings for pedestrians and cyclists on rural main roads and arterial urban roads preferably should not be designed as crossings on the same level. It also may mean special truck routes for inter-regional heavy good transport and limitation for trucks in urban areas, where delivery by smaller vans from just-in-time transit centers outside towns can be foreseen. Separation of tracks for oncoming traffic on rural main roads and urban arterial routes is also needed, combined with increased safety on reconstructed crossings and accesses to these roads. British research and research in France and the Netherlands has shown that the British round-about with priority for round-about traffic is a much safer level crossing than sign-regulated or unregulated crossings. Reductions to even 10% of the accidents has been observed after reconstruction of crossings to round-abouts in the Netherlands. The relative low share of fatal car-car accidents in the UK, compared to other Western European Countries may perhaps be explained by the frequency of the British round-abouts in their road network. On the other hand the British authorities could learn from other countries how their relative high share of fatal pedestrian accidents can be reduced.

The Expert Group in the Gerondeau-report, however, stresses that opportunities for failures are not only due to lack of infrastructural safety, but are as well elicited by the interactive behaviour of road users. Most concrete proposals concern the improvement of road user behaviour with respect to the others directly. The idea beyond them lies in the fundamental principal that human behaviour is conditional to circumstances and individual backgrounds as well as to the expected utility of the outcome of that behaviour. The individual background is shaped by public information, education and training, but mainly by the experience in traffic it self. That experience in traffic is not only conditioned by stimuli from the physical traffic structure, but also by traffic regulations and their enforcement and penalties. The behavioural proposals are directed to these domains which condition the road user behaviour. This can not be achieved by separate measures, but by packages of integrated measures with reinforcing components. Apart from the European harmonization in the proposals, the integrated scope of the proposals for (a) graded licensing based on accompanied learner driving,(b) speed regulations and (c) specific and general enforcement practices can be seen as the most important behavioural proposals for an effective road safety strategy.

If the proposals on the training and licensing of drivers by accompanied learning would lead to an application throughout the Community, then the risks of novice drivers could reduced considerably. The French experience with accompanied driver learning shows that skills and knowledge alone are not sufficient for safe driving by youngsters. If the French results apply in general such a risk reduction of young drivers could mean a 10% less serious accidents in total for the Member states. This means a gain of 7 billion Ecus for the Community; a cost-effective and important live saving measure indeed. If the validity for other countries holds, which has to be researched, it only depends on the political willingness of its adoption. The level of mean speed and the variation in speeds are important factors in traffic safety. The deviation between speeds on the road (also between catagories of simultaneous road users) determines to a large extent the opportunity for accidents. If the opportunity for accidents is reduced by a reduction of the deviation between speeds, than the number of accidents approximately can change proportional to the reduction in speed variance. That means a quadratic relation with the deviation from mean speed, as is empirically confirmed by Solomon (1964) and Cirillo (1968). The level of speed determines quadraticly the seriousness of the outcomes of given accidents. Since deviation between speeds often reduces proportional with the reduction of absolute mean speed, it follows that mean speed reduction

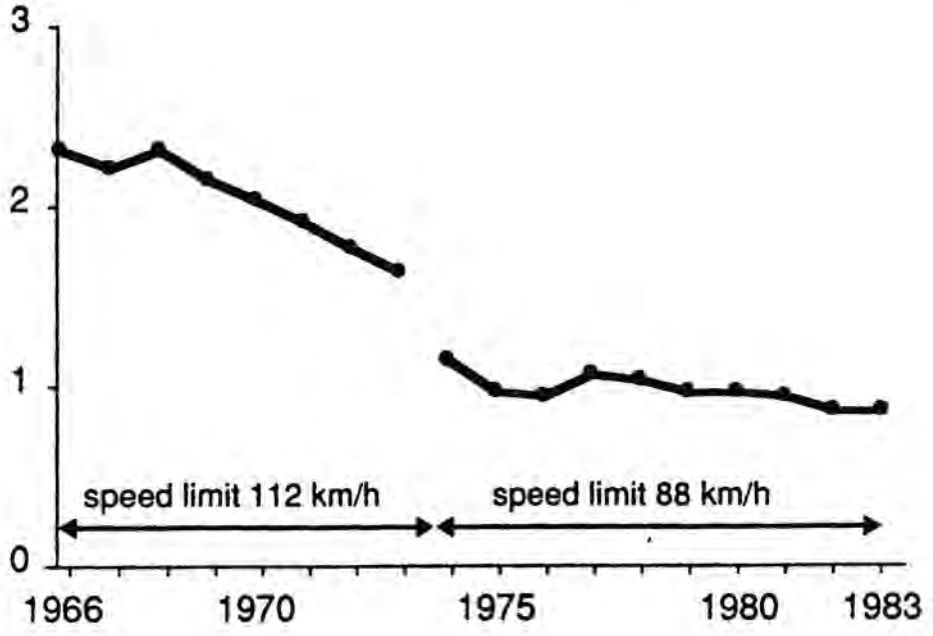

Figure 2. Annual number killed per 10^8 km on US Interstate highways

even can have a fourth power effect on safety. This for example means that a reduction of 10% in mean speed (factor .90) can change the number of road fatalities by 34% (factor $.90^4 = .656$). These considerations are confirmed by a Swedish study (Nilsson, 1982) and are also in line with results from speed limit changes on motorways in the USA and France in 1974 as is shown by an illustration for the USA data after the speed limit reduction after 1973 (Figure 2).

The Danish speed reduction from the urban speed limit change of 60 km/h to 50 km/h and the Dutch results on the so called "woonerf" by traffic calming measures in living areas which reduce speeds from 50 km/h limit to speeds below 30 km/h affirmed this relation between speeds and accidents. The network related proposals on speed limits and their enforcement and automatic control, therefore, are of utmost importance for the whole of the Community. This applies also to the German motorways, whereby together with a lowering the speed limits on rural roads it also can reduce the increasing share of traffic fatalities from rural roads in Germany.

The importance of the intensified and modified enforcement practices of specific and general police control can be illustrated by the results of random breath testing in New South Wales in Australia (Arthurson, 1985) Figure 3).

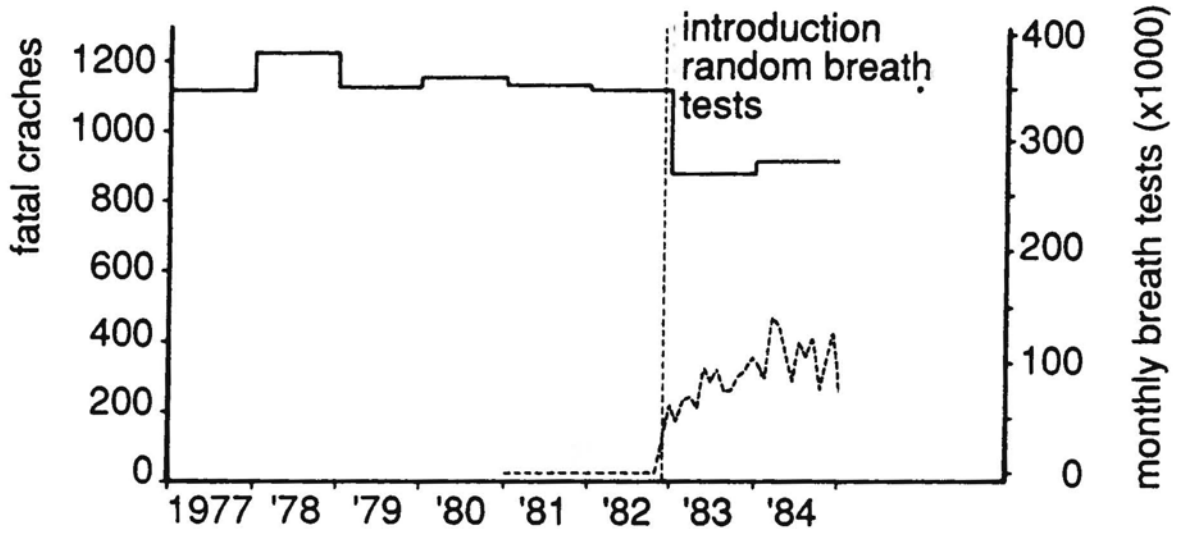

Figure 3. Annual fatal crashes and number of random breath test in New South Wales (after Arthurson, 1985).

These results show that a high density of random breath testing of about one out of three license holders per year leads to a lasting reduction in fatalities of about 25%. Such a high density is still cost effective and has a return rate of 2 for 1 cost unit as Dutch research has shown.

There is a long way to go before the next generation of road users is educated to behave safely and before a consistent road categorization can be established. The first steps, according to the proposals in the Gerondeau-report, are the conceptual creation of the hierarchical structure of the categorized road network and the clarification of regulations and behavioural principles on a European level. It is proposed to begin with the introduction of harmonized licensing system, harmonized speed and alcohol limits and their improved control as well as a periodically systematic and compulsory inspection of the safety of roads and the preparation and dissemination of reference material on all the principles and rules for the safest-possible traffic system.

2. SAFETY IN TRANSPORT MODES

2.1. Risk comparison

The safety situation is quite diverse for different transport modes. The safety of the road transport system seems in many respects less well developed. The risk in different transport modes only can be compared if we relate the frequency of accidents or fatalities to identical transport production or exposition measures. In the table below such is tried to estimate by kilometrage for road, rail, air and water transport and by person kilometers and by person travel time for the passenger modes.

Fatal risk	Veh. km.	Pers. km.	Pers. hour
Road[1]	2.7×10^{-8}	3.5×10^{-8}	1.0×10^{-6}
Rail[2]	1.1×10^{-9}	1.6×10^{-10}	0.1×10^{-7}
Sea[3]	0.6×10^{-8}	-	-
Air[4]	0.7×10^{-9}	0.4×10^{-10}	0.2×10^{-6}

[1] EC; Gerondeau (1991) (1.3 pers.p.veh.; mean 35 km/h)

[2] North-West Europe; Schopf (1989); Zuber (1990)

[3] Japan seacorridors; Hashimoto & Okushima (1990)(fatal/accid.=0.1)

[4] USA; NTSB publications

Table 3. Risk per mode by several transport production measures.

For all transport production measures the risk of road transport exceeds the risks of other transport modes. Risks in collective transport modes, which can not be controlled by the behaviour of the user and are characterized by disastrous accident types, are clearly judged to be more important than individual risks in road transport. The annual total number of fatalities in road transport, however, are much larger than in any other mode of transport. The collective transport modes are constrained by strong safety regulations, as is the employer in the work situation. There, the safety rules which are imposed by the governments are much stronger than those which the same authorities impose on themselves by supplying the road infrastructure. Of course collective transport has a self interest by

the safety of its transport, because it has to attract the user to its mode of transport. However, one may ask why the governmental authorities do not judge the safety standards for the road infrastructure as equally important. Why is it that one type of death represents less value than the other ? It seems not rational that road safety do not match the safety of other transport modes.

2.2. Safety optimization strategy

The way safety is optimized in the different transport is characterized by more or less the same strategy. The strategies are all based on the decomposition in frequencies of exposure to danger conditions and the severity degree of consequences of the danger conditions. On the basis of that decomposition it is tried to optimize the transport system by management for exposure to danger conditions and control of outcome severity. Dependent on acceptable safety levels for the decomposed categories a protection level is required for parts of the transport system. This is represented by the profile of Figure 4, taken from Zuber (1990).

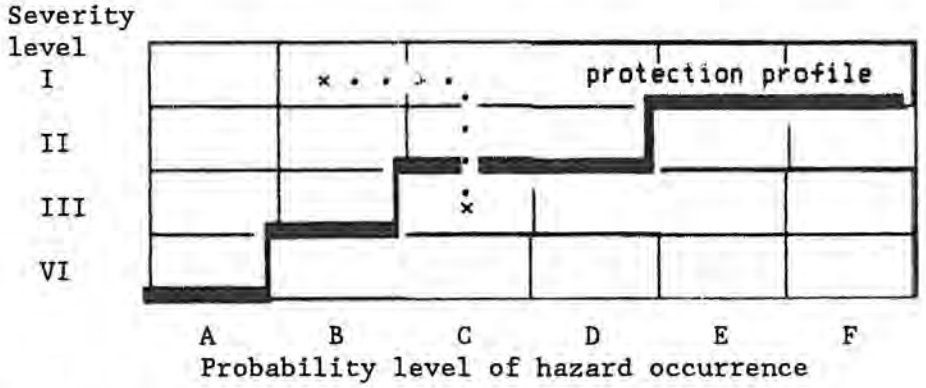

Figure 4. Protection profile dependent on severity and probability levels.

In this profile the levels of outcome severity ranges from I (fatal / catastrophal) to VI (negligible), while the occurrence probability is structured from level A (relative high probability) level F (virtually zero probability). The more the identified type of hazard is located in the left upper part the more effort for its prevention is taken. Measures may reduce its severity level or its level of probability or both (for example in Figure 4 from I,B to III,C) in order to lower the danger to an acceptable one. Some measures only reduces the level of outcome severity

(for example safety belt wearing in road transport) others only the frequency of occurrence (for example crossings on separate levels). Sometimes measures for severe outcomes do generate not intended new possibilities for less serious outcomes (for example traffic lights reduce accidents with severe side impacts, but create more rear-end accidents with less damage). The systematic analysis of severity and probability level and subsequent actions to lower the frequency of unacceptable outcomes is comparable for risk analysis and management in all transport systems. An excellent example of that strategy for rail can be found in the rapid rail system of Zurich opened in 1990 (Zuber, 1990; Röttinger, 1989). For the safety of ships in seacorridors the Japanese study of Hashimoto & Okushima (1990) is also a recent example. The study of Bush et al. (1980) describes the comparable strategy and analysis for air transport. Although the underlying strategy and principles are the same for all transport modes, the actual data analysis for the assessment of risks are different for road transport compared to the other modes. The data analysis in road safety is based on the statistical analysis of data of many actually occurred accidents, while for other transport modes the risk analysis is based on a priori estimates of possible frequencies and severity of outcomes. The strategy in road transport as a consequence is of a curative nature and in the other modes foremost preventive. This means a world of difference in thinking on safety.

2.3. Risk assessment: the big difference

The optimization of safety in rail, air and water transport can not gain very much by statistical analysis, due to the small number of accidents in these modes. Kanafi (1986) states that the risk difference between the actual 5 fatal plane accidents in the USA in 1979 and a conjectured number of 26 such accidents does not say anything about its acceptability. The first number means 1.7×10^{-9} fatal accidents per airplane mile and a fatality rate of 0.125×10^{-9} per passenger mile. The second hypothetical number with over five times more accidents in 1.0×10^{-8} fatal accidents per airplane mile and 0.65×10^{-9} death per passenger mile. Such risk figures hardly, so argues Kanafani (1986, p. 405-406): " by themselves would convey a significant different level of safety.... Realistically, while the public and system planners may be satisfied with the actual figures for 1979, as indeed they seem to be, it is very unlikely that anyone would tolerate a fatal airline crash every two weeks".

Air, rail and water transport are considered to be safe if only accidents occur which are caused by combinations of factors which were not known to happen up to the time of their occurrence. The strategy for optimization of safety in these sectors is directed to the elimination of accidents possibilities which can be foreseen and avoided. Theoretical chance distributions of deviations from the ideal course of affairs are the basis for the mentioned analyses in Röttinger (1989) for rail, of Hashimoto & Okushima (1990) for seatransport and of Busch et al. (1980) for airlines. Such distributions of deviations always concern the possible presence of relative large differences in speed of transport carriers in the critical proximity of each other. Dependent on the probability and severity levels of such deviating situations, the transport system is adapted in such a way that on the basis of existing knowledge the system becomes 'fail safe' in certainty approaching probability limits. If still a severe accident happens the system is subsequently changed on the basis of an in depth study of the chain of chance factors which have caused such accidents. In this way these transport systems become intrinsic safe designed or are modified to an inherently safe system. Automatic and electronic devices constitute the feedback mechanisms in these systems which interfere in order to eliminate possible consequences of remaining human failures.

This is in marked contrast to the safety strategy in road transport. Road transport is not designed to be fail safe, but evolved out of the mechanization of the coach and pedestrian transport system. Moreover, the changes in the system have not been based on the a priori elimination of things that can go wrong. A very demonstrative example of the post factum approach are the popular planes for investments of so called 'black spots', in stead of compulsory rules for an a priori optimal safe design of roads. In the road transport system there also does not seem to exist a safety inspection that is comparable to the ones in other transport modes.

Transition of safety knowledge between different transport modes is traditionally only based on knowledge from common background disciplines, such as 'human factors research' (Baise & Miller, 1978; Hale & Glendon, 1987) and 'constructive crashworthiness' or biomechanics in crashes (see Garret & Kidd, 1969). In view of the risk comparison of different modes it is clear that the other modes can not learn very much from road transport.

The reverse, however, seems very appropriate. A reconstruction of the road transport system to a designed system in which the non-negligible probabilities of failures are eliminated a priori, is the main lesson to be learned for road traffic. This also can be seen as the main issue in the infrastructural proposals in the Gerondeau-report, discussed in paragraph 1.3, which were aimed to establish such a safety strategy for a inherently safe road infrastructure in Europe.

3. EUROPEAN COMMUNITY ACTIVITIES

3.1. The need for actions

In view of the sad record of European road safety, compared with other industrialized continents as well as compared with other modes of transport, there clearly is a need for an active road safety policy. The Gerondeau-report has expressed the opinion that road accidents are too often seen as the inevitable price for the utility of travel and transport. And hence the possibility of an active road accident prevention policy is ignored. Such an active policy, however, can be possible on the basis of research and recommendations. The Gerondeau-report requests the European Community, that is the European Parliament, the Council and the Commission, to provide assistance in the work undertaken by the Member States against road accidents, because the Community is in the right position to do so. It has done so in matters of environmental protection and the advancement of science and technology in Europe. The Community should surely take a comparable action in a matter to which its citizens are highly sensitive, since it concerns the preservation of life itself and the safety of millions of its citizens. It seems not a too ambitious task to bring the level of road safety in the whole of the Community below the level of the USA, which is already nearly the level of safety in some of the more advanced countries in the Community. The achievement of such a modest target still would leave the road safety in the EC on a level that is over a 100 times more dangerous than other passenger transport modes, but it would save more than 20.000 lives and over half a million injured on a yearly basis. In such an achievement the national States (and their regional and local authorities) still have to play a major role, but on the Community level the research for the road safety knowledge as well as the promotion of and the assistance to the implementation of a common transport and road safety policy should be undertaken without further delay. At present there is no well staffed entity on the Community level that matches these tasks. The establishment of an organization, comparable to the European organizations for environment or technology, is needed barely in view of the economic and human problem of the lack of road safety in Europe. Up to now the transport related activities of the EC are mainly based on provisions and regulations for fair trade, but with the Treaty of Maastricht there is now a genuine task for the EC to deal with matters of European road transport and road safety.

3.2. European R&D-programmes

In the research and development programmes of the EC the research is mainly directed to technology in order not to be dominated by technological research and industrial developments in Japan and the USA. The technological research for transport got a push by the so called DRIVE-programme in which advanced electronics and telematics are researched for their application in road transport. The DRIVE-programme, because of its technological nature, is managed by the EC Directorate-General of Technology and not by the Directorate-General of Transport. The results of the first DRIVE-programme are now under way (DRIVE, 1991a) and the real life applications of that research with respect to the effects on road safety will be tested on the basis of recommendations of a special task force group (DRIVE, 1991b) in the so called HOPES-project of the DRIVE II-programme. In a recent OECD-report 22 field test on telematics in transport are identified and reviewed (OECD, 1992). It reveals that only 8 studies have given some concrete results or valuable progress in the evaluation of applications and that none of the studies has reported until now on the actual effects of road safety. The DRIVE-programmes, as the PROMETHEUS-programme of the collaboration between European motorcar industries, have been promoted as programmes which will bring a major unprecedented safety contribution to road transport, but it must be feared that the results for road safety up to now are rather disappointing or have to wait a very long period. For the moment the valuable contributions of DRIVE are mainly in transport efficiency, although potentials for road safety are undeniable also present. Probably the degrees of freedom in the road transport first have to be reduced, before more than informative advice systems can assist the driver on the road or can safely take over some of the driver's tasks.

To the third research and development programme of the EC, of which the DRIVE I and II-programmes are part, the less technological oriented EURET-programme for transport research has been added in a later stage. The EURET-programme had a limited budget compared with the high tech programme parts, but is directed to actual problems in the European road transport (EURET, 1990), such as transport regulations, economics and logistics. The EURET-programme is managed by the Directorate-General of Transport and contains some aspects of road safety related to freight transport. In this first EURET research programme, however, the lack of safety in European

road transport compared to other continents and other transport modes was not a central issue. This probably will change in the follow up of the EURET II-programme which is now in preparation.

The fourth framework for research and technological development, which is now in discussion between the Commission and the European Parliament, has a total proposed budget of 14.700 MECU for 1994-1998 and explicitly deals with transport and its safety improvement. It states: "The objective is to contribute to the development and management of safer, more efficient and cleaner transport means." The EC Directorate-General of Transport has taken the initiative to formulate under this framework a EURET II-programme. The first preliminary draft proposal for EURET II (EURET, 1992a) contains explicitly the topic of Road and Vehicle Safety apart from other more technological and road mainatanance and construction topics. An annex in that draft proposal concerned short project description (the numbered topics below) and research suggestions (topics marked by an * below) on:

- Road User Behaviour
  1. Europinion (periodic comparative inquiry on road safety attitudes)
  2. Improvement of novice training and reduction of novice accidents
  3. Influence of legislation, enforcement practices and penalty levels
  4. Effects of speed and speed control.
- Vehicle Safety
  (*) Assessment of passive safety
  (*) Compatibility between different sized vehicles
  (*) Improvement of frontal impact test
  (*) Biomechanics of human tolerance in crashes
  (*) Improved restraint systems
  5. Lightning configuration.
- Unprotected Road Users
  (*) Efficiency of regulations and policies for vulnerable road users
  6. Child pedestrian accidents.
  (*) Safety of two wheelers
- Accidentology
  (*) European observatory and 'road safety barometer'
  (*) Improved data collection and analysis on the European level
  7. European accident causation databank
  8. Harmonization of definitions of accidents.

- Prospective Analysis
  9. Modelling developments, forecasts and interventions
  10. Trans-European goods transport
  11. Tourism and foreigners.

Recently a preparatory workshop for the discussion of the draft EURET II proposal has been held in Brussels. Various working groups discussed the possible contents of the EURET II-programme and so did a working group on road and vehicle safety. That working group (EURET, 1992b) felt that the formulation of the fourth framework for R&D by the Commission of the EC still was not clear enough about the importance of road safety and proposed amendments to the Transport Committee of the European Parliament. The working group also noted that up to now the research proposals which were formulated in the draft document are not so much directed to the safety aspects of the infrastructure of the road network. The group referred to the Gerondeau-report and stressed that cooperative research is needed for the missing area of road network safety. A revision of the first draft proposal for EURET II on the basis of these discussions is to be expected. Its budget and its priority in the fourth R&D framework of the EC still is matter on which decisions are to be taken next year.

3.3. European cooperative research

The uniqueness of cooperative transport research for Europe is well demonstrated by the programmes, such as DRIVE and EURET. Its cooperation is quite different from the European collaboration in the preparatory work of State officials for the Committee of the European Ministers of Transport (CEMT). Although the work there is more than preparation of national administrations for collaborative actions of the 16 European States represented in the CEMT, it is restricted to exchange national experiences with transport related implementations of regulations in the different States and to dissemination of knowledge and national transport planes by round tables and conferences organized by the CEMT.

The activities of the OECD in the Road Transport Research (RTR) programme represent also a very valuable branch of international collaboration in the field of transport research. Its scope is broader than the EC or CEMT in that it covers the collaboration of research institutions from all over

the world. Besides the very useful collaboration in the documentation of the transport literature and in the databases for international comparative traffic and safety data, the work of the OECD/RTR mainly consists of up-to-date state of the art reports on transport research topics and transport policies. The research work of the OECD concerns the examination of the validity and the integration of existing research results from all over the world. How valuable this is does not to be questioned, but the work in the OECD/RTR does not, with some few exceptions, concern the actual doing of new research. In fact the OECD can not provide the funding for such cooperatively executed research and in the few example of actual cooperative research within the setting of the OECD/RTR, the funding has been based on ad hoc voluntary contributions of the participating nations.

It, therefore, must be concluded that the European need for cooperative transport research can only be fulfilled by programmes which are generated and funded by the EC. The cooperative nature of the research projects from the EC guarantees that the best experts of European research units join their forces in real innovative research with new empirical results and new potential applications. As a by product of such a European cooperation the results are easily acknowledged as valid in each of the nations and also will find their way in the national transport policies. As such this type of cooperative research has in itself, without mandatory regulations, a harmonization effect on transport in Europe.

4. FORUM OF EUROPEAN ROAD SAFETY RESEARCH INSTITUTES

In view of the needs in the European Community for an improvement of the relative bad road safety situation and for cooperation in research for an effective road safety in Europe the national road safety research institutes took in 1991 the initiative to establish a more or less formal organization for their collaboration and founded the Forum of European Road Safety Research Institutes (FERSI). Now the members of FERSI are national road safety research institutes of 12 countries in the EC or EFTA coming from:

- Austria, Kuratorium für Verkehrssicherheit (KfV);
- Belgium, Institut Belge de Sécurité Routière (IBSR);
- Denmark, Rädet for Trafiksikkerhedsforskning (RfT);
- Finland, Valtion Teknillinen Tutkimuskeskus (VTT);
- France, Institut National de Recherche sur les Transports et leur Securité (INRETS);
- Germany, Bundesanstalt für Strassenwesen (BASt);
- Netherlands, Institute for Road Safety Research (SWOV);
- Norway, Institute of Transport Economics (TØI);
- Portugal, Laboratorio Nacional de Engenharia Civil (LNEC);
- Sweden, Statens Väg- och Trafikinstitut (VTI);
- Switzerland Schweizerische Beratungsstelle für Unfallverhütung(BfU);
- United Kingdom, Transport Research Laboratory (TRL).

The objectives of FERSI are in line with the recommendations of the Gerondeau-report and are achieved by:

- regular exchange between member institutes of information, experience, trends and new initiatives in research;
- the identification of research needs and opportunities for collaboration;
- undertaking joint research projects and sharing top-expertise and special (large and expensive) research facilities;
- furthering the development of European requirements and standards in the field of road safety;
- dissemination of the results of research by all possible means to policy makers, administrators, professionals and researchers in road safety and to the general public;
- encourage of exchange of researchers and of the set up and maintenance of appropriate data-bases.

In the spirit of the recommendations of the Gerondeau-report a conference 'Road Safety in Europe' in Berlin was organized in cooperation with FERSI in September this year. It is aimed by FERSI that this conference will grow out to the proposed major Road Safety Conference of the European Community. Under the umbrella of FERSI the initiative has been taken to propose some joint research projects for the oncoming second programme of European Research on Transport (EURET II) of the EEC. Some proposals (the numbered ones discussed in paragraph 3) are worked out now by members of FERSI, while other ones are only suggested as area's of interest.

The organization of FERSI will be the basis for formation of consortia of top-experts from the member institutes in order to perform the needed research on the highest quality level and with the most general validity of application in European countries. The fact that the outcomes of the cooperative research will lead to recommendations which are shared by the leading national institutes, is of great importance for the impact on national and European policies for road safety. The organization of FERSI is a first step which has to be followed by an organization that assists the EC Directorate-General of Transport in a European policy on road safety. It is envisaged now that the EURET II-programme indeed contains the necessary dedication for road safety research. Its funding probably will be approved in 1993 and its tendering will be opened presumably at the end of 1994. So at last the European Community is heading forward now in establishing the necessary funding and organization for safety research.

Road safety is, however, not only a matter of organization and political dedication. In a democratic Europe the basis for common action and their resource allocation is based on public support. The Community, therefore, should promote the need for a common road safety policy by an active social marketing and defeat the unjustified belief that road accidents are an inevitable phenomenon of motorized transport. Road transport is a man-made technology and this man-made technology can be made much safer. The know-how is partly there and can be further obtained by creative research, the organization for that improved safety and the measures for its realization can be proposed in concrete terms. The FERSRI is ready to provide the research based scientific input to policies and practices for an improved road safety of intergovernmental bodies and central and local governments in Europe, the response to the appeal has to come from these responsible bodies in the Community and from the EC it self.

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