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INTRODUCTION

1. Outline of the research paper

This working paper was drawn up by the European Parliament’s Directorate-General for Research as part of its 1997 research programme, at the request of the Committee on Transport and Tourism. It has been produced in connection with the Communication from the Commission Promoting Road Safety in the EU - The Programme for 1997-2001, and more generally because of the importance the European Parliament attaches to road safety in the various positions it has adopted on inland transport policy.

Road safety is central to the idea, championed by the European Parliament, of sustainable mobility for all modes of transport. However, inevitably, attention tends to be focussed on the means of transport most widely used by non-professional drivers and which causes the most injury and damage to people and goods. The extent of the problem and its economic and human consequences also gives a social dimension to the issue. The following statement by the European Commission spells out the full scale and seriousness of the phenomenon:

"...about 1 in 80 European citizens will still end their lives on average 40 years too early in a road accident and it is estimated that 1 in 3 European citizens will need hospital treatment during their lifetime as a result of injuries suffered in a road accident."

The problem obviously has a significant economic impact: the financial burden, put at 15 billion ECU a year, includes the cost of medical treatment, welfare provision, and time spent by the public services responsible for dealing with accidents. The strictly economic cost in terms of lost economic output is estimated at 30 billion ECU. The human cost, in terms of pain and suffering, is estimated at 100 billion ECU, according to the internalization of external costs theory using what is known as the contingent valuation/stated preferences approach.
2. Main areas of public policy

Road safety is a goal in which success is judged on the basis of trends and which involves a range of public policies.

Because road safety is a relative goal success cannot be measured in terms of achieving a predefined result, but must be defined as the minimization of the number and seriousness of accidents. In other words, progress is measured in relation to a theoretical optimal situation in which the level of accidents, victims and damage is zero. The Commission has therefore set a goal of reducing the current number of road accident fatalities, which stands at 45,000, by 7,000 by the year 2000 and by 18,000 by the year 2010.

Road traffic policy is the public policy specifically responsible for road safety, and, in the traditional categorization of public policy, it falls under the heading of civil law enforcement. This policy area covers the issuing of licences, vehicle testing, and regulating and controlling traffic by the adoption of general rules (the Highway Code), and the use of preventive regulations to control driver behaviour on certain roads (bans on traffic, no parking, one-way streets). Traffic is also controlled by fluctuation-based regulation, involving the continual observation of actual traffic flows, (by police officers in the field or intelligent traffic light systems), by the preventive programming of traffic flows (traditional traffic light systems), or by taking repressive traffic control measures i.e. fines.

This public policy area is inevitably tied up with other policy areas: mainly, infrastructure, industrial, health, and criminal justice. Infrastructure can cause accidents or it can reduce their number and seriousness: hence it is important that the authorities responsible for road infrastructure take traffic and safety requirements into consideration at the planning stage.

Industrial policy determines the technical specifications of motor vehicles during the type-approval process, when safety considerations are considered specifically, and when decisions are taken about measures designed to encourage technological development relating to vehicle protection measures and the power of engines.

Health policy is important above all in relation to the organization of the emergency services, which partly determine the outcome of accidents. However, the general psychological and physical health of the population also has an impact on people’s driving ability, and irrespective of the basic health standards required to obtain a driving licence, this affects the number and seriousness of accidents.

Criminal justice policy determines the overall system of penalties imposed for offences committed under traffic laws, mostly punished with civil penalties, and offences committed under laws relating to criminal acts capable of causing or aggravating road accidents.

The policies mentioned above clearly tie up with the main categories of possible causes of accidents: infrastructure, the state and behaviour of the driver, the vehicle and its efficiency, the emergency services.

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4 Communication from the Commission, Promoting Road Safety ..., p. 17.
As illustrated by the following two examples, these policy areas interact with other public policies: urban planning policy determines the siting of buildings which in turn has an impact on infrastructure policy; similarly, taxation policies affect how much car manufacturers are able to invest in research and development and also influence the car market itself by setting the tax burden on different sizes and types of engine. Trade policy can have an effect on traffic flows through the regulation of opening hours, causing traffic to build up or spreading it throughout the day.

The introduction of high-quality road safety education can also have a decisive influence on the future behaviour of drivers. Road safety education is a critical part of any road safety policy because experience has shown that whenever there is an accident there is someone who has infringed the highway code, and not necessarily the driver of a vehicle involved in the accident.

3. Groups and interests involved

Public policy is made to satisfy political demands and has therefore to mediate between conflicting interests. Road safety is in the interests of the community as a whole and of anyone who travels by road, including, especially, pedestrians. Because this covers such a large part of society road safety is not supported by a single interest group, instead there are a number of separate interest groups who support road safety but for whom it is not the primary objective.

The Automobile Clubs of the various countries are perhaps the organizations most active in the area of road safety. However, these organizations are very unlikely to support road safety measures which their members, who are all motorists, do not like. For example, while they may be open, at least in principle, to the idea of reducing speed limits, they are very unlikely to accept changes in taxation designed to encourage the use of slower vehicles or to promote safer driving behaviour. Instead, they will support measures which are static in their effect, such as improvements to road signs, traffic control systems and changes to infrastructure.

Infrastructure operators, working within the constraints of sometimes tight budgets, tend to be reluctant to take on board demands for infrastructure changes that may be costly. They tend to claim that infrastructure is not to blame for accidents and instead point to bad weather conditions, about which nothing can be done, as the cause of accidents.

Car manufacturers, even those most concerned about safety issues are unlikely to agree to the idea of reducing speed, for commercial and image reasons.

Night club operators tend to be reluctant to accept a reduction in their opening hours, even assuming that this would be a useful measure.

These examples illustrate the considerable difficulty a comprehensive road safety policy would have in getting support, at least from among interest groups with a stake in road use. Moreover, public opinion is not particularly aware of the problem, or at least less so than it is of other deadly

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5 The notion of instruments that are static in their effect originates in sustainable economic development theory, which, when applied to road safety, includes the application of well established technical solutions, administrative regulations, and provisions under the law on liability.
problems. The road safety issue does not have the same power to move people that the prevention of certain illnesses does, despite the fact they cause fewer deaths than road accidents. Indeed, certain types of driving behaviour, which are among the primary causes of accidents, such as speeding, have a positive image communicating qualities such as skill and success.

4. Structure of the document

The aim of this document is to provide an overview of road safety problems and possible solutions, with particular reference to the role played by the European Community. It provides an analysis of road safety structured in the traditional way on the basis of the factors that cause accidents: human (i.e. the driver), the vehicle and infrastructure. The fourth factor, nature (i.e. weather, either climate, or bad weather conditions), is not dealt with separately, but in relation to other factors over which man has some influence with which to counter the forces of nature to improve road safety.

The central importance of the European Community in this document has meant less emphasis has been placed on infrastructure and civil engineering issues, which remain almost entirely within the remit of national, regional and local authorities. However, it has also meant that more attention has been given to road telematics (treated as part of infrastructures, but dealt with separately). For the same reasons the European context has been highlighted, an overview of which is provided in the first chapter.
CHAPTER ONE

THE EUROPEAN COMMUNITY AND ROAD SAFETY

1. Preliminary considerations on accident statistics

The international statistics on road safety only cover data for accidents involving personal injury and do not deal with accidents involving only material damage, however serious. It is also important to be clear about what is meant by a fatality: the Economic Commission for Europe defines a fatality as being a victim who dies within 30 days of a road accident, but not all Member States accept this, consequently the actual number of road fatalities should be assumed to be higher than is suggested by the statistics and the number of injured victims lower. There is no standard international statistical definition for what constitutes an injury, and every country accounts for injuries differently: some countries define injured persons as only those whose injury requires the attention of a doctor. As a result, the most meaningful data, which must nevertheless be treated with caution as explained above, are those about fatalities.

Other issues include the comparability of data about the different countries: in countries with similar car densities the data comparability is good, but where large divergences exist in the geographical and socio-economic characteristics of different countries data is difficult to compare. Nevertheless, the international statistics enable each country to be situated in relation to the others.

Of the various correlations that can be established, those between the accident data and the number of vehicles on the roads or of inhabitants are not very meaningful, whereas the correlation between accidents and traffic volume, which is certainly more meaningful, is made difficult by the lack of data on traffic volume for many countries.

More detailed comparisons would also need to look at fatalities and (and injured persons) by category of road user. However, it is important to take account of the size of each category as a proportion of the total number of users in order to avoid basic errors in evaluating the data.

It is clear from these initial observations how important international cooperation is in the area of road safety statistics, which already exists and made up of two planks: ensuring the consistency of nomenclatures and methods, and the setting up of data banks. Cooperation takes place in three forums: the UN Economic Commission for Europe which is active in the first area of cooperation, the OECD which has set up the data bank IRTAD, containing the combined data

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6 For example Spain counts only deaths occurring within 24 hours of an accident, Austria deaths within 3 days, France deaths within 6 days, and Italy deaths within 7 days. Portugal however, includes only deaths at the time of the accident or during the journey to hospital. IRF World Road Statistics, Geneva, 1997, p. 121.

7 Cars per 1000 inhabitants.

8 Number of vehicles/km travelled.
on road accidents and some information to facilitate its interpretation\(^9\) for 30 countries, and the European Community which has launched the CARE programme, to be dealt with later.

2. **The road safety situation in the EU**

Even taking into account the limitations of the international statistics, the injuries and fatalities caused by road accidents are comparable to the effects of an annual medium-sized war and make road transport the most dangerous means of transport and a much more common cause of death than illnesses perceived by public opinion as serious risks. In the collective mind death and sometimes permanent disability are day-to-day risks, and affect only the individuals close to the victims.

Worldwide comparisons are problematic as for many countries, including industrialized countries data is incomplete or even simply lacking. However, it is perhaps interesting to note that among the small number of countries for which data exists about the number of fatalities per kilometre travelled, Morocco, with 18 fatalities per 100 million km/vehicle, and Georgia, with 0.09 fatalities are at opposite ends of the scale and can be considered to be the countries with, respectively, the most dangerous and the safest roads. In the absence of reliable information it is generally estimated that worldwide 250,000 people die and ten million people are injured every year as a result of road accidents\(^10\).

The following statement by the Commission gives a measure the problem specifically within the European Union:

*In 1995 in the fifteen countries of the EU road accidents resulted in approximately 45,000 deaths and more than 1,600,000 people being injured.*\(^11\)

Nevertheless, detailed analysis of these data is made difficult by the decision taken by the Commission and the Member States "not to release statistics produced by CARE during the pilot study phase of the project"\(^12\). However, some information from CARE is contained in the communication from the Commission, although not information relating to the causes of accidents, which is the most useful type of information for the purpose of road safety policy-making, and also the most difficult to process.

\(^9\) Population, traffic, registered vehicles and road networks.


\(^12\) Report from the Commission, *On progress with the project and its future prospects CARE* (Com (97) 238), point 2.6.8.
The first item of data is reassuring and indicates a gradual fall in fatalities in the EU from 1970 to 1994 with only 4 years during which a rise against the trend was recorded. At national level the data shows substantial differences in the trends: three countries, Spain, Greece and Portugal rose against the general trend over the period being looked at, as a result of explosive growth in car use. However, in Spain and Portugal the situation improved between 1991 and 1994. Over the same period the Netherlands saw an insignificant increase in mortality of 1.32.

When the number of fatalities are related to the number of inhabitants, road fatalities in countries where there are the least accidents (Finland, Netherlands, United Kingdom and Sweden) vary between 6.8-9.6 per 100,000 but rise to 16.2-32.9 in countries with the most accidents (Belgium, France, Spain, Greece, Luxembourg, Austria and Portugal). There are also wide variations in fatalities per million cars registered: in 1994 this figure varied from 164 fatalities in Sweden to 1043 in Portugal. In the Netherlands a significant number of accidents involve cars registered abroad, which distorts this particular ratio. In fact, an accident/traffic volume ratio would be more meaningful, traffic volumes having grown by 50% in the EU between 1980 and 1995.

Similar observations can be made about injured persons for which the historical data shows a much less marked downward trend both across the EU as a whole and in individual countries. Italy is one of the countries where the injured persons figures have moved against the general trend over the period being examined.

The most significant of the data contained in the communication from the Commission is the ratio of fatalities to registered passenger vehicles. In the EU this fell from 1211 fatalities per million vehicles in 1970 to 298 in 1994 with the trend showing steady decline to varying degrees in all Member States.

These data would seem to indicate that road accidents are becoming less serious and the Commission attributes this improvement in the situation to "improved vehicle design and increased use of helmets and safety-belts".

"Young adults are the group most at risk: death rates for 15 to 24 year olds are typically between 50% and 90% higher than those for the general population. And young men are statistically at the greatest risk."  

A further variable is type of road user: the highest number of fatalities occur among vehicle passengers, but when the data is weighted to take account of distances travelled the groups most at risk are pedestrians who were involved in 19% of road accidents with fatal outcomes in 1994, motorbike and moped drivers (14.8%) and cyclists (6.1%).  

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13 See table 1 at the end of this chapter.  
15 Variations of up to 5% are ordinarily not considered to be significant and are attributed to chance.  
16 Com (97) 131, p. 12.  
17 Ibid.  
18 Ibid. Data does not include Austria, Finland and Sweden.
Table 1 at the end of this chapter shows the number of accidents involving injury to people in the fifteen Member States and compares the overall figure with the figure for accidents in urban areas. Contrary to what one might expect, the result shows that accidents in urban areas do not involve only material damage but are in fact extremely dangerous.

How then do the data about such a widespread problem match up with the public’s perception of the problem? The SARTRE\textsuperscript{19} programme has shed some light on this:

The risk posed by roads is not perceived as being particularly high compared with other risks, although perceptions vary from country to country and seem to reflect the level of accidents in each country. There is a significant difference between an overall perception of the problem (43% of European drivers) and the perception of personal risk, to which only 23% of drivers felt exposed. Accidents are mostly blamed on the state of the roads (52%), followed by inadequate driving tuition (36%), and inadequate roadworthiness tests (31%). Among the accident causes for which drivers are responsible, alcohol abuse is thought to be the most important, followed by speeding, not keeping the right distance between vehicles, fatigue and failure to indicate. However, most drivers, with no significant differences between countries, think they obey the highway code and drive less dangerously than everyone else. The picture that emerges is one in which drivers generally overestimate their own driving abilities and underestimate other people’s.

3. Road safety in the Treaty\textsuperscript{20}

No specific provisions mention road safety, however, following the amendments made by the Treaty of Maastricht, article 75 of the EEC Treaty gives the Community competence in the area of transport safety.

This extension to Community competencies represents the conclusion of a long process marked by divisions between those Member States convinced that the problem of transport safety could only be dealt with effectively within a European framework, and those convinced that it was an area that should remain strictly within the remit of national governments. It is hard to say whether the problems of road safety influenced the decision to add transport safety to the areas of Community competence. However, road transport is clearly the most dangerous mode of transport, in terms of victims and damage caused, and marine and air transport are already governed by international safety legislation agreed at world rather than European level. It is also the case that one member state had been pressing since 1972, a black year for road safety, for Community competence in this area at the same time as another member state was somewhat reluctant because of industrial policy considerations. In the following paragraphs we shall see how the absence of any mention of safety in article 75 did not prevent the Community from using it as the legal basis for the adoption of directives relating to road safety.

\textsuperscript{19} Social Attitudes to Road Traffic Risk in Europe. The results of this programme set out in the text are taken from \textit{European Drivers and traffic safety}, Presse de l’École des Ponts et Chaussées, Paris, 1994.

\textsuperscript{20} Deviating from the presentational structure usually followed by the “Transport Series” of the “Working Documents” the author has chosen to deal with Community legislation arising from the Treaty in the chapters covering each topic, owing to its extremely specialized nature, which prevents it from being dealt with separately. This paragraph therefore simply sets out the ‘constitutional’ provisions which are important in relation to road safety.
As the current treaties stand, competence in transport safety, like any other Community competence, must be exercised according to the principle of subsidiarity, according to which Community intervention must be justified by the inability of national authorities to achieve the goals of Community action.

As has been pointed out in the introduction, promoting road safety involves taking measures in a number of public policy areas relying on a variety of legal foundations. It is therefore important to categorize accidents according to cause, and thereby according to the corresponding preventative measures.

Article 75 constitutes the most suitable legal basis for Community legislation aimed at avoiding dangerous behaviour on the part of drivers caused by their general state of psychological and physical fitness, their psychological and physical state while driving, their driving abilities, their driving behaviour and speed limits.

Article 100A, which governs the harmonization of Community internal market legislation, appears to be most suitable basis for the adoption of Community standards on vehicles. It is important in this connection to draw attention to the third subsection of the article in question: "The Commission, in its proposals referred to in paragraph 1 in the area of health, safety, environmental protection and consumer protection, proceeds on the basis of a high level of protection".

However, there is no specific legal basis giving the Community powers to intervene in the area of infrastructure and road accident emergency services.

The provisions of the Treaty mentioned above give the Community specific areas of competence that can be used directly to promote road safety. However, other, constitutional provisions provide the basis for a role contributing indirectly to the goal of improving safety: primarily, provisions relating to research and development in technology enabling the Community to take action specifically designed to direct research in the car industry and in other public bodies towards improving vehicle safety.

4. Community road safety initiatives

The Communication from the Commission for an action programme on road safety, which implements a Council resolution of 21 June 1991, specifically deals with all aspects of the problem of road safety and lists the initiatives the Community has adopted or could adopt. The results of this programme are detailed in an annex to the Communication from the Commission Promoting road safety in the EU: the programme for 1997-2001, which as its title indicates is
a continuation of the previous communication containing a more wide-ranging and detailed analysis of the area.

The most substantial results of the 1993 programme were in the area of legislation, aimed mostly at harmonizing vehicle safety regulations, which will be dealt with at greater length in the relevant chapter. In concrete policy terms, CARE was launched, a Community data bank on road accidents. In addition, a series of 14 pilot projects were launched, and largely completed, to analyse and study various technical and theoretical aspects of safety. 8 projects forming part of the Fourth framework programme were begun in 1996 and are still under way.

The CARE programme is especially important for obtaining detailed knowledge and information about accident phenomena. It is designed to process non-aggregate data relating to accidents involving fatalities and injuries and is currently in a pilot phase. The Commission has recently published a progress report on the project which, since it is of interest to the EEA, will be extended to cover Iceland, Liechtenstein and Norway.

The essential characteristic of CARE "is the high level of disaggregation, i.e. CARE comprises data on individual accidents as collected by the Member States. This structure allows for maximum flexibility and potential with regard to analysing the information contained in the system and opens up a whole set of new possibilities in the field of accident analysis." This statement is open to debate since without harmonization in the national classification systems, it is hard to see the value of comparisons between accidents in the various States. However, it is easy to understand the reluctance of Member States to embark on a far-reaching process of harmonization that would mean standardizing official accident reports and statements, definitions and data collecting methods.

5. The Community’s strategy for the coming years

The strategy the Commission announced in its Communication Promoting road safety in the EU, containing the programme for 1997-2001, is based on taking into consideration the external costs of road accidents in making decisions about road safety. The cost of road accidents, estimated at one million ECU for every fatality, should be taken into account in road safety policy so as to offset the lower investment costs which historically road transport has enjoyed.

The Commission does not go as far as advocating the application of the principle of internalizing external costs to road safety, i.e. assigning them to the factor responsible for the accident, but

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27 Com (97) 238 final.
28 Ibid., p. 4.
29 Com (97) 131.
30 The choice to calculate external costs on the basis of fatalities has been made because this criterion is more reliable compared with accidents involving injury or material damage, which are subject to significant variations. Since the Commission’s analysis also emphasizes the economic cost of accidents, clearly if the external costs of all accidents are expressed according to the number of fatalities the figure arrived at, one million ECU (with guaranteed media appeal), also includes the cost of a proportion of the non-fatal accidents: for every fatality there are about 8 accidents involving serious injury, 26 involving slight injury and 200 involving only material damage. (Ibid., p. 15).
uses an approach based on comparing the cost of an action with the external cost of a fatality. Although the Communication from the Commission does not set numerical goals, it forecasts that if the Member States adopt the strategy proposed, the number of fatalities should fall by 40% by 2010 at the following rate:

<table>
<thead>
<tr>
<th>Year</th>
<th>1995</th>
<th>2000</th>
<th>2005</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>45,000</td>
<td>38,000</td>
<td>32,000</td>
<td>27,000</td>
</tr>
</tbody>
</table>

This forecast is based on the assumption of "an equal effectiveness of road safety policies in the future as in the past." Such an assumption is vulnerable to the criticism that the law of diminishing returns would suggest that no public policy will remain effective to the same extent indefinitely, especially if one considers that the spectacular improvements of recent years have been made possible by the introduction of seat belts. The Commission seems to be aware of these criticisms and has anticipated them by ascribing a preventative role to the development of telematics similar to the protective role played by seat belts.

The goal the Commission has set itself is to reduce fatalities, considered to be the most reliable indicator of improvement in road safety. Given the significant differences between the situations of each country, the most realistic approach is not to set a quantitative goal for the reduction of fatalities worked out on the basis of specific actions, but instead to extrapolate the future fatality rates which can then act as reference points for monitoring the situation.

An overall strategy is required to achieve a quantitative goal such as this, as well as a suitable forecasting model. The latter has been identified in the fatality rate per kilometre travelled which historically has fallen over time as a result of the combination of falling numbers of fatalities and linear growth in mobility, i.e. the number of kilometres travelled per year.

6. Outline of proposed actions: the role of the Commission

The Commission’s proposals cover three areas:

- collection and dissemination of information and best practices
- measures aimed at preventing accidents
- ways of limiting the consequences of accidents when they happen

The aim of the first area is essentially to facilitate effective road safety policy-making by giving decision-makers access to information about situations and experiences encountered by others. The second and third areas relate more to specific actions likely to fall within the remit of the Member States and regional and local authorities.

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31 Reference year.
33 Ibid.
34 See paragraph 2 of current chapter.
The European Community and Road Safety

The first area involves the Commission directly and is primarily about assessing progress throughout the EU in a way that reduces to a minimum the distortion of the statistics caused by the random nature of some of the data, even for some of the major countries. It will then be possible to offer politicians and the general public a picture of the extent of the problem in the Community in order to raise awareness.

Part of the Commission’s role is to act as facilitator for spreading best practices, which, although they cannot always be applied successfully in other countries, can serve as useful references saving research and experimentation. As in many other sectors, the Community is able to make a crucial contribution through its own research programmes.

The 1997-2001 research programme sets out 13 actions in the field of the collection and dissemination of information. Of particular interest are CARE plus, the goal of which is the uniformity of the data in the CARE data bank, the integration of accident data with traffic data, and the setting up of documentary archives on Community and international experiences in road safety.

Included in the area of information is the development of cooperation between police forces and the establishment of independent bodies to investigate accidents.

7. Specific actions

The central planks of the Community’s strategy are external costs and the assumption of the constant effectiveness of safety policies, which determine the areas for intervention, i.e. those in which the cost of intervention costs less than one million ECU per human life saved. However, the salient characteristic of the programme is its systematic approach, based on the idea that "road casualties are caused by failures in complex systems of human decisions and actions, a variety of infrastructures and all kinds of vehicles". Consequently, the Commission rejects the traditional division of road safety policy initiatives into the categories of driver behaviour, vehicles and infrastructure, which are however difficult to abandon altogether as is shown by the summary table below, in the belief that "reducing the number of casualties means improving these systems in such a way that failures occur less frequently and/or can be compensated within the system and, in the event of an accident occurring, creating an environment that can reduce the consequences".

The Community has a role as a coordinator in this area, particularly in respect of vehicles, for which it has been responsible for detailed harmonization legislation. The Commission intends to participate in new car assessment programmes (NCAP) looking at safety, which have already

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35 Com (97) 131, p. 19.
36 The list of actions is taken from Ibid., but the classification by area has been carried out for the purposes of this document. Forecasts of the reduction in the number of fatalities have been made for each action envisaged. This introduces, albeit in forecast rather than prescriptive form, the idea of quantitative objectives for the reduction in the number of fatalities on the basis of specific actions, rejected above as a general approach for reasons explained in the text.
37 Ibid.
38 See chapter 4.
been carried out by a number of consumer and car driver organizations, and by the UK and Sweden. In particular, its coordinating role would consist of regulating the objective safety tests compulsory for all vehicles in any one category, and which would cover the performance of active safety devices, such as brakes, ABS, etc.

A very large number of specific measures are envisaged by the 1997-2001 programme and are divided into two main categories: **Direct impact on user** and **User environment**. The first category covers measures relating to:

- *Driving licences*, including the setting up of a high-level working group looking at learner drivers, and the mutual recognition of the withdrawal of driving licences on the part of Member States other than the state of residence\(^{39}\).

- *Physical state of drivers*, including specific action about the consumption of alcohol, drugs and medication, as well as the effects of fatigue.

- *Raising awareness*, including information campaigns and one-off initiatives such as equipping motor vehicles with accident recorders.

\(^{39}\) This falls within the third pillar with the Commission in the role of observer of negotiations between Member States.
### Areas and actions identified by the Commission

<table>
<thead>
<tr>
<th>Area</th>
<th>Actions</th>
<th>Reductions in fatalities</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Behaviour of drivers and passengers</strong></td>
<td>Bringing seat belt use in all the Member States up to the level of the states with the highest level of seat belt use.</td>
<td>15%</td>
</tr>
<tr>
<td></td>
<td>Reducing use of drugs and medication by drivers.</td>
<td>16% (estimates made in certain regions)</td>
</tr>
<tr>
<td></td>
<td>Reduction in blood alcohol limits to 0.5mg/ml and enforcement of limit.</td>
<td>5-40%</td>
</tr>
<tr>
<td><strong>Vehicle</strong></td>
<td>Design of vehicles to make them less dangerous for pedestrians.</td>
<td>7%</td>
</tr>
<tr>
<td></td>
<td>Manufacture of vehicles with the highest level of passive safety features for their category.</td>
<td>15%</td>
</tr>
<tr>
<td></td>
<td>Equipping vehicles with collision warning systems and intelligent cruise control systems.</td>
<td>Reduction not quantified</td>
</tr>
<tr>
<td></td>
<td>Use of vehicle driving lights switched on during daylight.</td>
<td>5%</td>
</tr>
<tr>
<td><strong>Traffic</strong></td>
<td>Reducing average speed by 5 km through traffic engineering, telematics and information systems.</td>
<td>25%</td>
</tr>
<tr>
<td><strong>Infrastructures</strong></td>
<td>Implementation of best practices in the construction and modernization of infrastructures: roundabouts, road barriers, improved road lighting, etc.</td>
<td>reduction not quantified</td>
</tr>
</tbody>
</table>

**User environment** covers all measures relating to the vehicle, infrastructure and traffic management. Numerous actions are planned for vehicles, such as the introduction or implementation of compulsory features (for example speed limitation devices) and research and experimentation projects (for example automatic adaptation of speed to take account of the distance from the vehicle behind). Intervention in infrastructure is essentially about the introduction of and experimentation in the use of telematics for road transport and in particular in traffic management.

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40 Summary table drawn up on the basis of on list on p. 16 of Com (97)131.
41 A device currently being tested on buses.
8. The European Parliament’s position

The European Parliament has adopted numerous positions on road safety. These cover the period from 1986 to 1994, including only acts for which the procedure has been completed\textsuperscript{42}. These resolutions express the European Parliament’s support for the Commission’s efforts, and invite the Commission to intensify its efforts.

In particular, the European Parliament would like to see minimum road safety standards and Community funding made subject to their application. It is particularly concerned about the categories of road user most affected by road accidents, while not being especially to blame for them: pedestrians, for example, for whom the European Parliament has approved a special Charter\textsuperscript{43}. In fact, the contents of the Charter, which also cover the quality of life in cities, seem to be aimed mainly at the inhabitants of cities, nevertheless a number of points specifically refer to pedestrians: the creation of large pedestrianized areas that are organically integrated into the fabric of cities, pedestrian-friendly traffic management, rethinking the car to take account of the safety of pedestrians, either through active measures (road sign systems), or by designing the structure of vehicles so as to minimize injuries to pedestrians in the event of an accident.

The rapporteur for the 1997 Communication from the Commission welcomed the contents of the document but, in line with the position consistently expressed by the European Parliament, highlighted the importance of setting quantitative goals for the reduction of fatalities. To support this position, it was pointed out that the greatest improvements in road safety have been achieved in countries that have set goals (for example, the United Kingdom, Denmark, Finland, Sweden and the Netherlands). In addition, the rapporteur expressed misgivings about the one million ECU test which could encourage the replacement of current preventative measures with other cheaper measures.

"A [quantitive] goal at EU level would, according to the rapporteur:

- Confirm that political will exists for effective action at EU level.
- Send a signal to European citizens that substantial action is now being take to reduce road traffic accidents.
- Give all players involved a focus for their activity"\textsuperscript{44}.

\textsuperscript{42} The list of European Parliament resolutions is contained in “Critical Note on Sources and Literature”, at the end of this document.
\textsuperscript{43} Resolution of 12 October 1988 on the protection of pedestrians and the European charter of pedestrians’ rights, in OJ C 290 of 14.11.88, p. 51.
\textsuperscript{44} Draft Report by P. Cornelissen of 19 November 1997 on the communication from the Commission, Promoting Road Safety in the EU - The Programme for 1997-2001, PE 224.496.
The rapporteur deals with the harmonization of vehicle safety and of safety accessories and devices. Human behaviour also receives some attention with particular reference to speed limits and drunken driving and driving under the influence of drugs or medication. The rapporteur’s proposals about drunken driving, responsible for 20% of road fatalities, are particularly detailed and include reducing the permitted blood alcohol level at European level and involving the insurance industry to encourage it to increase premiums for drivers found guilty of dangerous driving while drunk.

It is also suggested that driving licences should be reformed: penalty points driving licences could be introduced and different driving licences issued on the basis of the driver’s experience, which would help improve road safety by influencing the human factor.

45 Seat belts, airbags, crash helmets, collision warning systems, intelligent cruise control systems.
Table 1 - Accidents in Member States in 1994

<table>
<thead>
<tr>
<th>State</th>
<th>A. Total number of accidents</th>
<th>B. Accidents in urban areas</th>
<th>B/A (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Belgium</td>
<td>53 018</td>
<td>28 894</td>
<td>0.54498472217</td>
</tr>
<tr>
<td>Denmark</td>
<td>8 279</td>
<td>5 097</td>
<td>0.6156540645</td>
</tr>
<tr>
<td>Germany</td>
<td>392 754</td>
<td>248 995</td>
<td>0.63397190099</td>
</tr>
<tr>
<td>Greece</td>
<td>22 222</td>
<td>15 996</td>
<td>0.71982719827</td>
</tr>
<tr>
<td>Spain</td>
<td>78 479</td>
<td>44 120</td>
<td>0.56218861097</td>
</tr>
<tr>
<td>France</td>
<td>132 726 (1)</td>
<td>90 694</td>
<td>0.68331751126</td>
</tr>
<tr>
<td>Ireland</td>
<td>6 610</td>
<td>3 680</td>
<td>0.5567322239</td>
</tr>
<tr>
<td>Italy</td>
<td>170 679</td>
<td>124 295</td>
<td>0.72823838902</td>
</tr>
<tr>
<td>Luxembourg (2)</td>
<td>46 601</td>
<td>759</td>
<td>0.0162872041</td>
</tr>
<tr>
<td>Netherlands</td>
<td>11 469</td>
<td>6 493</td>
<td>0.56613479815</td>
</tr>
<tr>
<td>Austria</td>
<td>42 015</td>
<td>25 073</td>
<td>0.59676306081</td>
</tr>
<tr>
<td>Portugal (3)</td>
<td>48 645</td>
<td>33 456</td>
<td>0.68775824854</td>
</tr>
<tr>
<td>Finland</td>
<td>6 245</td>
<td>3 692</td>
<td>0.59119295436</td>
</tr>
<tr>
<td>Sweden</td>
<td>15 888</td>
<td>9 446</td>
<td>0.5945367573</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>234 101</td>
<td>172 202</td>
<td>0.73504273504</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1 269 731</strong></td>
<td><strong>812 892</strong></td>
<td><strong>0.64020804407</strong></td>
</tr>
</tbody>
</table>

(1) Data includes accidents not involving injury to people.
(2) Data from 1990.
(3) Data from 1993.

### Table 2 - Fatalities, variations and relationship with registered vehicles for 1970, 1991, 1994

<table>
<thead>
<tr>
<th>States</th>
<th>Number of fatalities</th>
<th>Variations %</th>
<th>Fatalities per million vehicles</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>70</td>
<td>91</td>
<td>94</td>
</tr>
<tr>
<td>Belgium</td>
<td>2 940</td>
<td>1 661</td>
<td>1 543</td>
</tr>
<tr>
<td>Denmark</td>
<td>1 208</td>
<td>606</td>
<td>546</td>
</tr>
<tr>
<td>Germany</td>
<td>19 123</td>
<td>11 300</td>
<td>9 805</td>
</tr>
<tr>
<td>Greece</td>
<td>1 111</td>
<td>2 005</td>
<td>2 050</td>
</tr>
<tr>
<td>Spain</td>
<td>5 456</td>
<td>8 836</td>
<td>6 248</td>
</tr>
<tr>
<td>France</td>
<td>16 145</td>
<td>10 483</td>
<td>9 301</td>
</tr>
<tr>
<td>Ireland</td>
<td>540</td>
<td>445</td>
<td>404</td>
</tr>
<tr>
<td>Italy</td>
<td>10 923</td>
<td>8 054</td>
<td>7 036</td>
</tr>
<tr>
<td>Luxembourg</td>
<td>132</td>
<td>83</td>
<td>65</td>
</tr>
<tr>
<td>Netherlands</td>
<td>3 181</td>
<td>1 281</td>
<td>1 298</td>
</tr>
<tr>
<td>Austria</td>
<td>2 428</td>
<td>1 476</td>
<td>1 338</td>
</tr>
<tr>
<td>Portugal</td>
<td>1 842</td>
<td>3 218</td>
<td>2 504</td>
</tr>
<tr>
<td>Finland</td>
<td>1 055</td>
<td>632</td>
<td>480</td>
</tr>
<tr>
<td>Sweden</td>
<td>1 307</td>
<td>745</td>
<td>632</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>7 501</td>
<td>4 753</td>
<td>3 807</td>
</tr>
<tr>
<td>Total</td>
<td>75 171</td>
<td>55 576</td>
<td>48 993</td>
</tr>
</tbody>
</table>

N.B.: this data has been taken from two tables in Com (97) 131, on the basis of which the 1994 variations have been calculated. The years selected are the first and last years available in the document mentioned, and 1991, the first year in which the data for Germany included the data from the ex-GDR Länder. The percentage variations shown are negative (i.e. they indicate a reduction in fatalities between the two years taken into consideration). Where the variation represents an increase in fatalities the percentage is shown in bold and preceded by a positive sign (+).
CHAPTER TWO

DRIVER BEHAVIOUR

1. The human risk factor

People, nearly always drivers, are the main cause of around 60% of road accidents, and if accidents in which the driver’s behaviour combines with other risk factors to cause an accident are added to this, the figure rises to 90%. Humans cause accidents in a wide variety of ways, including: aggressiveness (probably the main cause of speeding), the excessive consumption of alcohol, drugs or psychotropic drugs, as well as poor physical health. Whether they are aware of it or not, there are probably very few drivers who take to the road completely free of all such performance impairing factors. Indeed, it is not possible to avoid systematically all incidences of physical illness, which in most cases are temporary.

It is therefore necessary for road safety policies to be focussed on the causes that can be most effectively dealt with and which are the most significant in terms of their impact on road safety: ensuring the highway code is obeyed, setting minimum standards of general physical fitness, the setting of standards relating to a number of pathological conditions, such as blood alcohol level, which can easily be checked. There are extensive possibilities in this area.

This chapter starts by setting out Community legislation in the area of driving licences and driving times for professional drivers and then goes on to look at the problems of behaviour, the ways in which it can be positively influenced and how to remove adverse influences on behaviour.

2. Drivers and their behaviour in Community law

Road accident experts agree that whenever an accident happens it is nearly always caused or partly caused by someone breaking the highway code, and not necessarily the driver of a vehicle involved in the accident.

This makes clear how important effective driver training is, both to ensure that the highway code is obeyed and to enable drivers to cope with unusual situations that may be caused by a failure by others to abide by the highway code. The quality of driving instruction is therefore central to this issue, as are national policies governing driving schools and road-user education programmes which schools should provide for pupils, but which do not exist in all Member States.

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46 Nevertheless, in some cases temporary illness is not taken seriously because of a lack of awareness on the part of the public authorities, as is the case for drowsiness.

47 A distinction should be made between general physical fitness for which standards can be set short of which a driving licence would not be granted, and temporary illness which only a responsible driver can control.
The European Community has not produced any harmonization legislation about driving schools, although the legislation on driving licences contains provisions that make up for the absence of Community legislation in this area. This absence reflects the fact that the principle of subsidiarity has been properly applied.

On the basis of article 75 of the Treaty the Community has adopted a directive on driving licences, which established a Community driving licence model, and set minimum conditions for the granting of driving licences. This implicitly establishes at Community level the training and physical and mental capacities required by people wishing to drive a motor vehicle: motorcycles, cars and commercial vehicles falling into various categories and subcategories. This area is dealt with in Annexes II and III.

In line with this approach Annex II lists a whole set of skills, knowledge and behaviour required of either drivers in general, or of drivers of particular vehicle categories and sets out, on the basis of these characteristics, the minimum requirements for driving tests. Annex III Minimum standards of physical and mental fitness for driving a power-driven vehicle classifies applicants in two groups according to category or subcategory. The first distinction relates to the nature of the medical examination, compulsory or otherwise: in the first case a medical examination is carried out if in the course of the application formalities or the tests, it emerges that the applicant suffers from one of the incapacities, which, in accordance the Community directive, disqualifies the applicant from obtaining a driving licence. In the second case a medical examination is compulsory and must be repeated periodically.

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49 A distinction should be made between the physical and mental capacities required when driving licences are issued, which are periodically checked, and the physical and mental state in which drivers, in full possession of their physical and mental capacities, may suddenly find themselves while driving.

50 Group 1 includes applicants for driving licences for motorcycles, three-wheel or four-wheel motor vehicles, vehicles weighing more than 3 500 kg (categories A, B, B+E and subcategories A₁ and B. Group 2 includes the other categories which cover heavier vehicles.

51 The frequency is laid down by national law.
The other distinctions between the two groups relate to the consequences of the various disorders for the issuing of driving licences. The disorders that would prevent a driving licence being issued are set out in Annex III:

- Complaints or abnormalities of the **locomoter system** with derogations possible for Group 1 subject to a medical opinion, which can also specify certain modifications to the vehicle.

- Any disease capable of exposing an applicant to a **sudden failure of the cardiovascular system** with derogations possible, subject to medical opinion and regular check-ups, for applicants or drivers wearing pacemakers.

- **Diabetes mellitus**, for Group 2 only with derogations possible in exceptional cases subject to medical opinion and regular check-ups.

- **Neurological diseases** with derogations subject to medical opinion. For Group 2 however driving licences cannot be issued to applicants or drivers suffering from **epilepsy**.

- **Mental disorders** consisting of mental disturbances or mental retardation with derogations subject to medical opinion for Group 1. For Group 2 the medical authority is required to give due consideration to the additional risks and dangers involved in the driving of vehicles covered by the definition of this group.

- **Alcoholism**, the issuing of driving licences is possible only after a proven period of abstinence and subject to medical opinion. For Group 2 the medical checks are required to apply the same criteria set out above for mental disorders.

- **Abuse of drugs and medicinal products**, in cases of **regular use** where the quantities consumed are such as to have an adverse effect on the ability to drive, in the case of psychotropic drugs the same criteria apply for Group 2 as above.

- **Serious and irreversible renal insufficiency**, for Group 2 only, with derogations possible in exceptional cases subject to medical opinion and regular check-ups.

In the case of certain complaints driving licences may be issued subject to medical opinion and regular check-ups: this applies to **diabetes mellitus** and **serious renal insufficiency** for Group 1 and **hearing** disorders for Group 2. As regards **sight**, minimum standards of visual acuity are laid down for the issuing of driving licences.

Finally, driving licences cannot be issued to applicants suffering from disorders not contained in Annex III that result in a level of functional incapacity that might be a danger to road safety.

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52 The legislation relating to regular consumption is applicable to medicines that have an effect on the ability to drive.
The directive outlined above was adopted before article 75 included any reference to road safety and indeed the motivations of the directive go beyond road safety and include the implementation of a common transport and movement of people policy. The directive is justified from the point of view of the principle of subsidiarity since driving licences need to be issued on a uniform basis in order for Member States to mutually recognize national driving licences, and it is necessary for the drivers of every country to satisfy uniform criteria relating to their fitness to drive. On the basis of the principle of subsidiarity, the Community, on the advice of the Commission, will not be able to introduce what are known as penalty point licences as requested by Parliament.

In addition to the legislation on driving licences which deals with driver behaviour, a further piece of legislation is relevant to this issue which concerns all passengers: the Directive on the approximation of the laws of the Member States relating to compulsory use of safety belts in vehicles of less than 3.5 tonnes, which introduced the compulsory wearing of seat belts for adults and restraint systems for children under the age of twelve and less than 150 centimetres tall. This directive is part of a series of earlier and later directives aimed at the technical harmonization of the fitting of safety belts.

### 3. Professional drivers and their behaviour in Community law

Specific legislation has been necessary for professional drivers, who drive for longer hours than normal drivers, suffer from higher levels of stress and physical fatigue caused by driving and therefore represent a greater potential risk to themselves and to others. The Community has passed legislation governing the age and professional qualifications of crews, and the driving periods and rest periods for professional drivers working in road transport, for the purposes of both social protection and road safety. These provisions are contained in Regulation 3820/85, which takes as its legal basis article 75 of the Treaty.

Under this regulation, in line with standard practice in the transport sector which has to take account of applicable international legislation, the AETR agreement is to apply in the Community and its application is to be effectively extended to any road transport operation in

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55 A restraint system is a "system combining a seat, fixed to the structure of the vehicle by appropriate means, and a safety belt for which at least one anchorage is located on the seat structure". This should be distinguished from a restraint system for children, which is a series of components which may include a combination of straps or flexible components with a safety buckle, adjustment systems, anchorage components and in some cases an additional seat and/or a protective screen, which can be fitted in a motor vehicle.
56 Regulation 3820/85 (see note 4) defines drivers as: "any person who drives the vehicle even for a short period, or who is carried in the vehicle in order to be available for driving if necessary" (article 1, paragraph 3). The term "vehicle" means motor vehicles, tractors (or tractor and trailer), trailers and semi-trailers (article 1, paragraph 2). Article 4 of the regulation referred to here, lists the vehicles to which the regulation does not apply.
57 Regulation 3820/85 defines carriage by road as "any journey, made on roads open to the public, of a vehicle, whether laden or not, used for the carriage of passengers or goods" (article 1, paragraph 1).
59 European Agreement concerning the Work of Crews of Vehicles engaged in International Road Transport of 1 July 1970.
the Community, even when carried out by vehicles registered in a State that is not a contracting party to AETR. This first step in contributing to road transport safety means that commercial vehicles driven by drivers with insufficient training or who are not sufficiently physically fit will be taken off the roads.

The minimum age for driving vehicles used for carrying passengers or with a maximum permitted load of more than 7.5 tonnes is set at 21 and at 18 for lighter loads. The age limit for the transport of goods is set at 18 if the driver possesses a certificate of professional competence in accordance with Community legislation. In addition to these conditions, the driver must have a minimum level of specific types of driving experience in order to carry out journeys of more than 50km from where the vehicle is usually based.

The regulations governing driving times and stops are probably more directly relevant to the question of safety: a driver must not drive more than 90 hours in the course of two consecutive weeks or for a daily driving period of more than 9 hours, which can be increased to 10 hours not more than twice in any one week, and which must be include a break after four and half hours of 45 minutes, which can be replaced by breaks of at least 15 minutes in the course of the four and a half hours.\textsuperscript{60}

After every daily period of driving the driver must have a daily rest period of not less than 11 hours, which may be reduced to nine hours not more than three times in any one week, on condition that an equivalent period of rest be granted as compensation before the end of the week. However, daily rest can be taken in two or three separate periods, one of which must last at least 8 hours. During each period of 30 hours when a vehicle is manned by two drivers, each driver is to have a rest period of not less than eight consecutive hours.

After no more than six daily driving periods\textsuperscript{61} a driver must take a weekly rest period of at least 45 hours. This rest period may be reduced to a minimum of 36 hours if taken at the place where the vehicle is normally based or where the driver is based, or to a minimum of 24 hours if taken elsewhere. Each reduction must be compensated before the end of the third week following the week in question.

A system of exceptions allows Member States to adapt the Community legislation and to apply higher minima or lower maxima. Nevertheless the Community regulation remains applicable to crews of vehicles registered in other Member States by the replacement of the nationality criterion with a territorial criterion. Drivers can also depart from the provisions of the regulation within two limits: provided that road safety is not jeopardized, and an exception may be made to the extent necessary to ensure the safety of persons, of the vehicle or of its load. However, the author is of the view that it is difficult to understand how the safety of persons, the vehicle or its load can be separated from road safety as a whole, which is a possibility implicit in this exception.

\textsuperscript{60} In the case of the regular transport of passengers the break may last 30 minutes for every period of not more than 4 hours, if a longer break would cause traffic problems and if it is not possible to use the system of 15 minute breaks.

\textsuperscript{61} Twelve for the international carriage of passengers other than on regular services. Member States are also able to extend this different frequency for weekly rest periods to cover national carriage with the same characteristics.
The Regulation examined above should be seen in conjunction with the Regulation on recording equipment in road transport which provides the means by which it can be applied effectively, in spite of the fact that it is an area open to fraud. However, fraud should be gradually reduced by improvements in technology.

4. The problem of drinking and driving

The accident causes dealt with in this paragraph are difficult to identify and are generally described in police reports as driving without due care and attention, speeding, falling asleep at the wheel, etc. Although differing national legislations on the testing for blood alcohol levels also make it difficult to define the problem in percentages, alcohol is estimated to be the main cause of between 15 and 40% of accidents, in which drivers show a blood alcohol level above the legal limit in the various Member States, and of 20% of road fatalities.

Nevertheless, experts in the field and public opinion agree that the consumption of alcohol is the cause of the majority of accidents where the driver’s behaviour is to blame. The term consumption has been used instead of abuse, because alcohol has an adverse effect on driving even when consumed in quantities generally considered to be normal or moderate.

The effects of alcohol on drivers depend on age, gender and body weight. The consumption of food, its quantity, and the time interval between the consumption of food and the consumption of alcohol are also important variables. Also, there is an increasing tendency particularly among young people to use alcohol and drugs for social purposes. A study carried out in 1992, said to have been conducted in New South Wales, shows that the risk of accident increases exponentially beyond a blood alcohol level of 80mg/100ml, which is the highest level normally permitted on European roads. On the basis of this study, the probabilities of males with a blood alcohol level of 105mg/100ml having an accident, depending on age, are as follows: 17% under 21 years of age, 13% between 21 and 29, 13.5% between 30 and 50 and 11.5% above 50 years of age. Between 40 and 80mg/100ml the risks for the same age groups are respectively between 5.5 and 10%, between 2 and 5%, between 4.5 and 6% and between 2 and 4%. Up to 40mg/100ml the risk stands at between 0.8 and 3% for all age groups with no significant variations. The differences in risk between the various age groups and especially between young people and adults is due largely to the fact that young people are not yet accustomed to alcohol and probably also to the fact that young people tend to drive after entertainment and recreational events and are therefore often in a state of psychological excitement. The explanatory

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62 Regulation 3821/85 of 20 December 1985 on recording equipment in road transport, in OJ L 370 of 31.12.85, p. 8. This second regulation, amended several times to reflect technological advances, is designed to ensure that the provisions of the first are adhered to.


64 Explanatory statement of Motion for a Resolution of the European Parliament (PE 224.496) on the Communication from the Commission Promoting road safety in the EU.


66 In the case of those under 21 the risk rises sharply to between 7%, for a blood alcohol level between 60 and 70mg/100ml, and 10% for a blood alcohol level of 80 mg/100ml.
memorandum of the previous proposal for a directive on the maximum blood alcohol concentration for vehicle drivers\cite{67} contained similar data showing evidence of a sharp increase in risk for young occasional drivers with a blood alcohol level of 60mg/100ml and above 100mg/ml for older drinkers who drank more heavily.

However, it is difficult to compare the Lloyd study and the Grand Rapids results\cite{68}, because these results, which seem to show the likelihood of lower levels of risk, are not divided by age group. Nevertheless, the conclusions are similar: "...the more alcohol the driver has consumed the greater the risk of accident and this correlation becomes stronger the more the driver is under the influence of alcohol\cite{69}, as a result, the risk of serious accident increases correspondingly\cite{70}.

What are the effects of alcohol on drivers? Despite the difficulties and inaccuracies inherent to rigid generalizations about individual cases subject to wide variations, the categorizations suggested by WG1\cite{71} substantially confirmed in other studies and publications, can be taken as a reliable guide:

- **Up to 30mg/100ml**: driving tends to become less careful and faster; simultaneous reaction capacities are slightly impaired; concentration and the ability to perform simple manoeuvres and direction changes is impaired.

- **Towards 40mg/100ml**: impaired ability to process information from the senses.

- **Between 40 and 50mg/100ml**: difficulties in lateral vision and in distinguishing vertical signs; errors are made in estimating distances.

- **Between 50 and 60mg/100ml**: driving errors.

- **Between 60 and 80mg/100ml**: reaction times slow down, at blood alcohol concentrations near to 80mg and above drivers experience difficulties in coordination between driving, the situation of the vehicle and speed; trouble in remaining vigilant.

- **Towards 150mg/100ml** serious vision impairment, with difficulty distinguishing trees.

5. **Drinking and driving: the Member States’ and the Community’s approach**

In view of the above facts, at what level should the permitted blood alcohol concentration be set? The simplistic and draconian approach of setting the level at zero should be discounted

\begin{itemize}
  \item Com (88) 707.
  \item The results of this study are set out in a table in Alcohol, Drugs, Medicines and Driving of WG1.
  \item Blood alcohol concentration
  \item Alcohol, Drugs, Medicines and Driving, p.15.
  \item Ibid., p.17.
\end{itemize}
immediately, since where it has been applied it has not had the desired effect. In common with any legal obligation, such a law needs to be backed up by the certainty that penalties would be applied and therefore by an effective policing system. Public opinion must also be willing to accept such a limit, which would require a high level of public awareness about the problem.

In view of these factors, it is clear that the legal level must be set at a level consistent with the policing system and road safety policy as a whole. Three functional criteria can be used for this purpose, either individually or as a set of criteria:

- The minimum risk criterion, which identifies the level above which there is a risk of accident. This level will logically be zero therefore it is necessary to take the level at which the risk takes on a particular degree of significance. This criterion relies on a highly effective system of policing alcohol levels, as well as the certainty of severe penalties for driving over the legal alcohol limit.

- The criterion of the maximum result of the legal limit, this will indicate a higher level than the previous criterion and is dependant on the effectiveness of the system of policing alcohol levels and of penalties applied.

- The educational criterion, i.e. a level that discourages the use of alcohol. This would require the legal level to be accompanied by awareness-raising campaigns to discourage the use of alcoholic drinks.

As the situation stands, all the Member States have set a legal limit and most of them have set it at 80mg/100ml, which is also the highest legal limit. The exceptions to the majority are: Belgium, France, Netherlands, Portugal and Finland who have set the limit at 50mg/100ml, while Sweden has the lowest legal level at 20mg/100ml. The fact that the states where the legal level is 50mg/100ml are also those whose road safety record is worse than the European average is an indication of the strength of the commitment these states have made to improve the situation.

Since 1988 the Commission has been proposing to harmonize the maximum legal blood alcohol level at 50mg/100ml but despite the favourable opinion of the European Parliament, the Council has not taken the proposal any further.

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72 The law in some West European countries requires (or has required in the past) a blood alcohol concentration of 0, but their road fatality rates are not lower than those of countries that have set the legal level at 80mg/100ml. In "Le politiche della sicurezza, coordinamento, comunicazione e partecipazione", in Mobilità 2000: viaggio al centro dell'utenza, Relazioni ed interventi alla 53ma Conferenza del Traffico e della Circolazione, by various, Milano (Acinova), 1997, p. 73.

73 France has severe legislation in this area, driving with a blood alcohol level above 80mg/100ml being a criminal offence.

74 Spain has set maximum levels of blood alcohol at 50mg and 30mg/100ml for drivers of particular categories of vehicle.

75 The German Bundestag is currently examining a proposal to reduce the legal level to 50mg/100ml. In Germany an alcohol level of more than 30mg/100ml is already punishable under the law in the event of an accident or an infringement of the highway code. Identical legislation, but from 50mg/100ml, is planned in Greece.


6. Testing blood alcohol levels

The question of testing was touched upon at several points in the preceding paragraphs: tests have a role in deterring drivers from drinking and driving and their effectiveness is proportionate to the likelihood of being stopped to be tested, even though only a small percentage of tests show a positive result. There are a number of different types of tests:

- Alcohol test (known as the breathalyzer) with a pocket-size spirometer, simple and quick but not 100% reliable.
- Testing for alcohol by taking a blood sample is the most reliable and accurate method, but also the longest, most complicated and unpleasant for the person undergoing it.
- Testing using an electronic spirometer which offers a high level of reliability without the disadvantages of taking a blood sample.

Testing for blood alcohol levels poses legal and practical problems. Legal problems arise in relation to the admissibility of breathalyzer results as legal evidence which some states do not recognize and also in relation to the powers of the police which in some states, but not in all, are allowed to carry out tests on drivers even when they are not suspected to be over the limit. This is known as random testing. These tests play a highly effective deterrent role, but in some countries they are considered to be an unjustifiable infringement of the freedoms of law-abiding drivers.

A summary of the way in which breathalyzers and alcohol tests are used is given in the table that appears on the following page. This shows that four states (Germany, Ireland, Italy and Austria) carry out tests only when there is a suspicion that the driver is over the permitted blood alcohol level.

Before examining the practical problems of testing for alcohol levels, it is first necessary to make a technical point: the percentage of positive results for alcohol tests is very low in the majority of states and there is a negative correlation between this percentage and the percentage of alcohol tests carried out per one thousand vehicles on the road. The conclusion that can be drawn from this is that the fundamental role of tests is not the prevention of alcohol abuse, but dissuasion.

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78 The Draft Report on Alcohol, Drugs, Medicines and Driving of the WG, p. 28 mentions Denmark and Germany in this connection.
79 This summary table is taken from the Draft Report on Alcohol, Drugs, Medicines and Driving of WG, p. 31. The Draft Report dates from December 1995.
80 In fact suspicion is a subjective assessment made by the police officer made on the basis of driver’s behaviour in traffic and only under certain circumstances (for example during systematic checks in a particular place) an absence of suspicion, which is a necessary prerequisite of testing, can be proven.
81 If the figures for tests per one thousand vehicles on the road are set out in decreasing order and the percentages of positive tests, which are shown in the table on the following page, in increasing order (excluding Greece for which the percentage of positive tests is not available), this correlation becomes clear. The two sets of figures are as follows:

<table>
<thead>
<tr>
<th>762</th>
<th>400</th>
<th>204</th>
<th>167</th>
<th>73</th>
<th>36</th>
<th>29</th>
<th>17</th>
<th>17</th>
<th>0</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>5</td>
<td>9</td>
<td>16</td>
<td>30</td>
<td>85</td>
</tr>
</tbody>
</table>
and that this dissuasive role is greater the higher the number of tests carried out per one thousand vehicles on the road.

Nevertheless, the cost and time required to carry out tests by taking blood samples, which is the most reliable method, are relatively high if carried out on a large scale, in addition to being complicated and agreed to only reluctantly by drivers. This limits the amount of testing and as a result many states prefer to use breathalyzers, in spite of the legal problems mentioned earlier. This trend has been strengthened by the use of electronic breathalyzers.

<table>
<thead>
<tr>
<th>Member State</th>
<th>Breathalyzer test</th>
<th>Compulsory test after accidents</th>
<th>Random testing</th>
<th>Tests per 000 vehicles</th>
<th>% positive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Belgium</td>
<td>x</td>
<td>x</td>
<td>36</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>Denmark</td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Germany</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Greece</td>
<td>x</td>
<td>x</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spain</td>
<td>x</td>
<td>x</td>
<td>29</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>France</td>
<td>x</td>
<td>x</td>
<td>167</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Ireland</td>
<td></td>
<td></td>
<td>17</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>Italy</td>
<td></td>
<td></td>
<td>0</td>
<td>85</td>
<td></td>
</tr>
<tr>
<td>Luxembourg</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Netherlands</td>
<td>x</td>
<td>x</td>
<td>73</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Austria</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Portugal</td>
<td></td>
<td>x</td>
<td>204</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Finland</td>
<td>x</td>
<td>x</td>
<td>762</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Sweden</td>
<td>x</td>
<td>x</td>
<td>400</td>
<td>&lt;0.5</td>
<td></td>
</tr>
<tr>
<td>United Kingdom</td>
<td>x</td>
<td></td>
<td>17</td>
<td>16</td>
<td></td>
</tr>
</tbody>
</table>

The problems associated with testing mentioned above can be dealt with by using a hierarchy of tests: during the initial phase a test can be carried out using a breathalyzer with a pocket-size spirometer, if this gives a result of around 50mg/100ml a test using an electronic breathalyzer can be performed, which is more accurate and reliable. In one report on this problem the advantages of this system are looked at in terms of time: "assuming, for the sake of argument, that the proportion of positive results showing blood alcohol levels reaching 50mg/100ml (and that at the same time these are also positive up the limit of 80mg/100ml) is equal to 5% of the subjects to be examined and that a standard test requires at least 10 minutes to perform. Testing 100 subjects would take 100 X 10 minutes = 1000 minutes, around 17 hours (in order to identify five positive subjects). We shall therefore have spent three and a half hours to identify one positive subject.
(and this is being optimistic since we have excluded subjects positive up to 50mg/100ml, but negative up to 80mg/100ml).

Whereas using an electronic breathalyzer the test takes less than a minute, the total time involved (assuming once again for the sake of argument a probability of 100% that a subject positive up to the first level is also positive up to the second level) will be 100 X 1 min + 5 X 10 min = 150 minutes, or two and a half hours, in other words about half an hour to identify a positive subject.

The effectiveness ratio between the two strategies is, on the basis of the assumptions made in the example, around 1:7.\(^{82}\)

It is because of these considerations that Member States are moving towards simplified systems which enable the number of tests to be increased. The central importance of tests in the fight against drinking and driving is also evident from the prominence they are given in the proposals made by the Commission’s Working Group, which are based around three areas of action: low limits combined with rising penalties to reflect the amount by which drivers are over the limit, a monitoring system on roads broadly along the lines of the system described above and public awareness campaigns. On the subject of testing, particular importance is attached to random testing, which it would like to see extended to all countries.

7. The problem of driving under the influence of psychotropic drugs

The widespread use, especially by young people, of drugs and psychotropic drugs, sometimes in combination with alcohol, and without any medical supervision, constitutes a road safety problem. Current medical knowledge enables us to be sure that psychotropic drugs have an effect on driving, but insufficient research has been carried out by medical science into the exact nature of these effects, in particular as regards the types of effect and the relationship between the concentrations of such drugs in the bodily fluids and the resulting changes in behaviour. Nor is it clear whether the presence of such drugs in the bodily fluids indicates that they have been consumed recently, or whether their presence alone is likely to result in dangerous driving.
On the basis of the research carried out so far it is possible to say that cannabis is a drug that is the subject of particular concern in connection with road safety, both because of its widespread use and the direct effects it has on driving: the reddening of the eyes caused by the use of cannabis makes it difficult to focus on obstacles and the outlines of the surrounding environment. Research carried out on volunteers has also shown that cannabis causes an increase in the pulse rate, which constitutes an additional risk for those prone to cardiovascular disorders. Cannabis is the most frequently encountered psychotropic drug, after alcohol, involved in road accidents, and driving abilities are impaired even when consumption is only occasional. In many cases these drugs are taken in combination with alcohol.

The effects of opiates on driving have been studied very little, although GB Chesher shows that "the chronic administration of heroin in volunteer subjects causes behavioural changes, characterized by an initial increase in psychomotor activity, followed by drowsiness and abulia". The risks as far as driving is concerned are clear, and are often exacerbated by a combination with alcohol, often associated with opiates. T. Seppala and others show how patients undergoing maintenance treatment with methadone do not run a higher than average risk of having an accident and point out that methadone can in fact be useful in preventing withdrawal symptoms, which according to the authors constitute a real danger. However, the report that refers to this point warns that this study must be treated with caution as the maintenance treatments currently used involve considerably higher doses of methadone than those administered in 1979.

A description of the effects of cocaine and amphetamines has not been found. However, as regards amphetamines, the report to which most frequent reference has been made in connection with this area, points out that they have only recently become widespread and that toxicological investigation is hampered by a lack of scientific data and of a sufficiently wide range of case studies. Most of the data about cocaine, although not recent, do not indicate the widespread presence of this drug in people involved in accidents. However, an investigation carried out in 1990 on deaths following road accidents in the city of New York showed the presence of metabolites of cocaine which had been recently consumed in 56% of cases.

83 Various studies and epidemiological research, not detailed here because they are recent or restricted to particular areas, are covered in Le politiche della sicurezza, etc., by various, p. 76.
84 "The influence of analgesic drugs in road crashes", Accident analysis and Prevention, Special Issue, "Drugs and Accidents", 7, 1985, p. 303-309 quoted in Le politiche della sicurezza, etc., by various, p. 75.
85 "Drugs, Alcohol and Driving", Drugs 179 (17), p. 389-408 quoted in Le politiche della sicurezza, etc., by various, p. 75-76.
86 Le politiche della sicurezza, etc., by various, p. 76.
87 Ibid.
8. The problem of drugs: the recommendations of the Working Group

The Commission’s Working Group on "Alcohol, drugs and medicines and driving", which set up a subgroup on the specific problem of medicines and drugs, has made three groups of recommendations in three areas: identifying the drugs used by drivers and the associated risks, monitoring and the drugs-alcohol association. The three areas are closely linked, and the recommendations are mainly concerned with monitoring and the processing of the various data collected.

The purpose of monitoring and testing for drugs is not the same as for alcohol since the substances in question, except when used for the purposes of medical treatment, are illegal, which means that, unlike for alcohol, no maximum permitted concentrations in bodily fluids can be set. In the approach taken by the Working Group, the main purpose of monitoring is to discover the extent of the phenomenon and to crack down on the use of psychotropic drugs rather than to deter their use as in the case of testing for alcohol levels. In the author’s view the emphasis placed by the Working Group on identifying the most widespread drugs is not justified because, as has been seen above, existing research already provides a sufficiently detailed picture: cannabis use is prevalent, often in association with alcohol, and cocaine use is increasing. Only for amphetamines is sufficiently detailed information lacking, however this is more due to the fact that it is only relatively recently that they have become widely available than because of any objective difficulty in carrying out research on them.

Taking account of these comments, the Working Group’s recommendations raise two basic problems:

- Defining the maximum level of the presence of the drugs consumed as part of a course of medical treatment or maintenance treatment: for example methadone is compatible with safe driving so long as drivers undergoing treatment are monitored.

- Testing techniques.

The second problem has similarities with the corresponding problem for blood alcohol levels: an alternative to taking blood samples must also be found for drugs testing, but it is not possible to use the breath to test for drugs, and other bodily fluids must be used. Taking a urine sample at the roadside is obviously not practical but taking a saliva sample would appear to be useful. Germany is currently doing research into the feasibility and effectiveness of using saliva for testing. Another method is based on the systematic checking of drivers’ oculomotor functions, taking a blood sample in cases where drivers show symptoms typical of subjects under the effects of psychotropic drugs.

The Working Group has expressed the desire for the testing method based on saliva samples to be adopted by all Member States, if the German research shows positive results, which may possibly involve amending national legislations to enable such tests to be performed.

Other recommendations relate to blood tests for all drivers seriously injured in accidents and the standardization of procedures applied in forensic science laboratories.
9. The problem of driving under the influence of medicines

Although the use of medicines is a source of great concern, the uncertainties surrounding the medical research, and above all the absence of quantitative data about the effects of medicines, such as is available for alcohol, mean that the problem should be approached with caution and efforts concentrated on preventative measures and raising awareness. A resolution of the ECTM took this approach and recommended in 1993 that Member States promote warnings on medicine labels of possible side-effects that might affect driving. Similarly, the CPMP suggests that all medicines registered after 1 January 1993 should indicate the possible side-effects that may influence driving or the use of machinery and say to which of the following categories the medicine belongs: (1) no risk or very unlikely to cause side-effects, (2) liable to have minor or moderate side-effects, (3) liable to cause harmful side-effects that are serious or dangerous.

The recommendations of the Commission's Working Group on "Alcohol, drugs and medicines and driving" reiterate the importance of warnings about side-effects on the packaging for medicines. The Working Group's recommendations specifically in the area of road safety policy are concerned with information and the epidemiological identification of medicines.

The recommendations relating to information cover both campaigns aimed at raising awareness about the problem of medicines and driving, which to be effective must be run on a permanent rather than sporadic basis, and the setting up of a documentation centre on medicines that are dangerous for driving. The work of this centre would be aimed at professional bodies and consumer organizations and would look especially at new medicines. The recommendations are directed only at national ministries and, deliberately, do not make any mention of collaboration at Community level. Any such collaboration could take place through the European Medicines Agency (EMA), which is responsible for the type-approval of medicines.

It is likely that the uncertainty mentioned earlier surrounding the results of research carried out in this field prompted the Working Group to emphasize the epidemiological identification of medicines. Indeed, it is a field that also faces legal restrictions in states where, to protect personal data, the comparison of medical prescriptions with accident statistics, already technically challenging, is not permitted. The recommendations propose cooperation between the Transport and Health Ministries in each state for the purposes of carrying out a large-scale epidemiological survey that would provide the subjects with appropriate guarantees of confidentiality.

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89 ECTM/CM (93)/S/final text.
90 Comité des Spécialités Pharmaceutiques, guidance note Summary of product characteristics (III/9163/90 of 16.10.91).
10. The problem of sleep-related accidents

Drowsiness while driving is dangerous and is not taken seriously in consideration by road safety policies, largely because it is often not properly recorded in police accident reports. Police officers are not trained to investigate drowsiness as an accident cause and drivers are not aware of their drowsiness or are afraid of the legal consequences of admitting to it. However, very recent British research has shown that one fifth or one quarter of accidents are caused primarily or in part by drowsiness.

In medical terms "drowsiness consists of a fall in the level of vigilance causing a fall in attention, concentration and reaction times resulting in a decline in the subject's performance thereby exposing him or her to the risk of making errors in carrying out his or her daily activities." It can be caused by the circadian cycle, which generally predisposes people to fall asleep between 2 and 7 a.m., and to a lesser extent between 2 and 5 p.m., by a chronic lack of sleep, caused by bad sleeping habits or night-shift work, by psychotropic drugs such as alcohol, sedatives and drugs, as well as sleeping disorders:

- **Insomnia** affects 30% of the population and as it tends to lead to the taking of sedative drugs, the two combine to cause drowsiness.

- Syndrome of **apnoea caused by obstructed nasal passages**, of which the typical symptom is snoring which impairs the intake of oxygen during the night and breaks up sleep resulting in drowsiness during the day. This mostly affects men between the ages of 40 and 60, particularly when overweight. It has been shown recently that this syndrome frequently affects obese lorry drivers.

- **Narcolepsy** is probably the most serious of the sleep pathologies and in some states driving licences are not issued or renewed for affected individuals. This takes the form of sudden and irrepressible attacks of falling asleep occurring several times during the day.

The relative importance ascribed to the above factors in causing accidents is a question on which experts are divided: while some maintain that the circadian cycle is the most important factor and that the pathologies are less important, French researchers have found that 38% of accidents caused by drowsiness resulted from a lack of sleep (of which 30% occurred between 2 and 6 a.m.), whereas only 4% were due to drowsiness caused by insomnia. Of those involved in

91 This paragraph is based on the paper by Mondini S., Cirignotta F., "Sleep-related accidents: an underestimated risk factor", Mobilità 2000: viaggio al centro dell'utenza, etc., p. 109-111.
92 Laboratory experiments have shown that individuals can be not only unaware of their own drowsiness, but can actually fall asleep for 2-4 minutes without realising it. Mondini S., Cirignotta F., cit., p. 109.
95 Mondini S., Cirignotta F., p. 109.
accidents 31% were prone to apnoea caused by obstructed nasal passages, 10% suffered from narcolepsy and at least 16% had taken benzodiazepines in order to sleep.\footnote{96}

The distribution of accidents due to drowsiness throughout the day is an important item of data\footnote{97}:

<table>
<thead>
<tr>
<th>Time</th>
<th>Drowsiness</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-2</td>
<td>15%</td>
</tr>
<tr>
<td>2-4</td>
<td>19%</td>
</tr>
<tr>
<td>4-6</td>
<td>15%</td>
</tr>
<tr>
<td>6-8</td>
<td>13%</td>
</tr>
<tr>
<td>8-10</td>
<td>6.4%</td>
</tr>
<tr>
<td>10-12</td>
<td>3.4%</td>
</tr>
<tr>
<td>12-14</td>
<td>3.5%</td>
</tr>
<tr>
<td>14-16</td>
<td>6.4%</td>
</tr>
<tr>
<td>16-18</td>
<td>5%</td>
</tr>
<tr>
<td>18-20</td>
<td>2.6%</td>
</tr>
<tr>
<td>20-22</td>
<td>3.4%</td>
</tr>
<tr>
<td>22-24</td>
<td>6.7%</td>
</tr>
</tbody>
</table>

Drowsiness occurs mostly during the night and especially between two and four in the morning, which is exactly the time night clubs close, and it peaks again less sharply between two and four in the afternoon, which, as has already been mentioned, are the two main periods in which people are prone to falling asleep because of the circadian cycle.

Other studies have shown that drivers under the age of thirty are those at greatest risk, particularly at night, whereas drivers over the age of forty-five are at greatest risk in the afternoon and those over the age of seventy between 10 and 11 in the morning. Women seem to be less prone to drowsiness than men.

This data is an indication of the extent to which drowsiness is widely neglected as a cause of accidents by road safety policy-makers. The first step that should be taken is to make police officers aware of the problem in order at least to ensure that it is recorded as an accident cause. "Systems for detecting drowsiness and warning drivers in their vehicles are under development, but currently they offer no guarantee and could turn out to be counterproductive.\footnote{98}

11. The problem of speeding and public opinion

Speeding is the main cause of road accidents together with drunken driving, which is often also the cause of speeding. As is the case with all human causes of accidents, speed has an impact on the driver’s reaction times: whereas alcohol, drugs, medicines and drowsiness slow down reaction times and, at certain levels, distort the driver’s perception of the external environment, speed makes reaction times insufficient to alter the course of the driving situation, as well as having implications for the behaviour of the moving vehicle, for example the stopping distance.
The European Community and Road Safety

The only measures capable of reducing this cause of accidents are speed limits, which can be enforced by speed checks and penalties, and also by the fitting of speed limitation devices99. The fundamental problem of speed limits, as for any road safety measure, is one of acceptance by public opinion. Public opinion is generally very receptive to measures designed to combat drinking and driving, because the image of a drunken individual and of alcohol abuse in general is associated with the socially maladapted. However, public opinion is more resistant to reductions in speed limits because the image of speed is associated with values society sees as positive, such as success and skill, and which car manufacturers have for many years exploited in their advertising campaigns.

This analysis is supported by SARTRE100, the results of which can be summarized as follows:

- European car drivers are aware of the speed problem: 76.1% of them say it is a frequent, very frequent or even ever-present factor in accidents.

- 36.5% of European car drivers like speed (and 4.1% the risks) and, although 81.1% think that other drivers drive faster than they do, many admit to breaking speed limits: 28% on motorways, 21% on suburban main roads, 11% on minor roads, 7.5% on urban main roads and 4% in urban areas. Nevertheless, 55.9% of drivers think they drive more safely than other people.

- In spite of these attitudes 67.5% of European car drivers are in favour of the imposition of speed limits in cities101, but only 27.6% are in favour of a limit of not more than 30km/h in residential areas. Only 6.4% are in favour of a speed limit of 110km/h or more on suburban roads and most people express a preference for a speed limit between 80 and 100 km/h: 21.59% for 80 km/h, 24.95% for 90km/h and 30.78% for 100 km/h. Only 7% are against speed limits on motorways, but this percentage rises to 29.9% in West Germany102. A consensus emerged from the survey in favour of a harmonized speed limit throughout Europe with 78% supporting a maximum speed of 50 km/h in cities and 58% supporting a speed limit of 120 km/h on motorways. 42.7% were also in favour of the introduction of speed limitation devices based on a harmonized speed limit.

The picture that emerges can be interpreted as a confirmation of the considerable self-esteem in which car drivers hold themselves: drivers are aware that the problem exists and that serious measures need to be taken, but feel that the responsibility lies with other drivers. The result may

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99 “Checks and penalties” (i.e. the application of penalties, usually financial) are the measures usually applied to all vehicles and speed checks can now be carried out with sophisticated equipment using radar technology, and more recently, lasers, which prevent the radio signal being intercepted by drivers possessing the necessary equipment. Speed checks using radar have created problems of evidence in cases where offences are not immediately contested and these problems have been overcome by using technological innovations enabling the number plate and face of drivers to be photographed, creating however problems of confidentiality. Speed limitation devices are intended only for certain types of vehicle and are provided for by Directive 96/96/EC of 20 December 1996 on the approximation of the laws of the Member States relating to roadworthiness tests for motor vehicles and their trailers, OJ L 46 of 17.2.97, p. 1.

100 See Chapter 1, paragraph 2.

101 51.1% (of all car drivers) are in favour of a speed limit of less than 50km/h.

102 The SARTRE research was carried out between 1991 and 1992.
be that when people are faced with effective measures that limit their speed the percentage of car drivers in favour will fall compared with the number of who, in theory, say they are in favour.

12. Speed limits

In 1988 the Commission submitted a proposal for a Directive on the harmonization of speed limits\textsuperscript{103}. The proposal distinguished between vehicles using the international vehicle categories\textsuperscript{104} and divided the road network up between motorways, expressways, other suburban roads and roads in inhabited urban areas. On the basis of these categories the proposal suggests the following harmonized speed limits:

- **Motorways**: 100 km/h for all vehicles, except vehicles in category N\textsubscript{3}\textsuperscript{105} and vehicles with trailers or semi-trailers for which a limit of 80 km/h is proposed.

- **Expressways**: 80 km/h for all vehicles.

- **Other suburban roads**: 80 and 70 km/h which correspond to limits of 100 and 80 on motorways.

- **Roads in urban areas**: 50 km/h for all vehicles.

The proposed speed limits are the same as those already in force on urban roads in all Member States but are considerably lower than the limits in force on other roads. The SARTRE results would suggest that car drivers may accept them. Nevertheless, it is likely that when faced with the introduction of the kind of speed limits contained in the Commission’s proposal car drivers’ reactions will be different from those expressed in response to theoretical situations suggested to them in a survey.

\textsuperscript{103} See previous note.

\textsuperscript{104} The international vehicle categories, defined by the United Nations Economic Commission for Europe are incorporated in the Communities legal system by Directive 70/156/EEC relating to the type-approval of vehicles, which is dealt with in the relevant chapter.

\textsuperscript{105} Vehicles designed for the carriage of goods of a maximum mass of more than 12 tonnes.
The European Community and Road Safety

Table summarizing speed limits in the European Union\textsuperscript{106}

<table>
<thead>
<tr>
<th>MEMBER STATES</th>
<th>MOTORWAYS</th>
<th>OTHER SUBURBAN ROADS</th>
<th>URBAN ROADS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Belgium</td>
<td>120</td>
<td>90</td>
<td>50</td>
</tr>
<tr>
<td>Denmark</td>
<td>130</td>
<td>100</td>
<td>50</td>
</tr>
<tr>
<td>Germany</td>
<td>130</td>
<td>100</td>
<td>50</td>
</tr>
<tr>
<td>(recommended speed)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Greece</td>
<td>120</td>
<td>90</td>
<td>50</td>
</tr>
<tr>
<td>Spain</td>
<td>120</td>
<td>90</td>
<td>50</td>
</tr>
<tr>
<td>France</td>
<td>130</td>
<td>90</td>
<td>50</td>
</tr>
<tr>
<td>(110 km/h during rain)</td>
<td></td>
<td>(80 km/h during rain)</td>
<td></td>
</tr>
<tr>
<td>Ireland</td>
<td>112</td>
<td>96</td>
<td>48</td>
</tr>
<tr>
<td>(70 mph)</td>
<td>(60 mph)</td>
<td>(30 mph)</td>
<td></td>
</tr>
<tr>
<td>Italy</td>
<td>110/130</td>
<td>90</td>
<td>50</td>
</tr>
<tr>
<td>Luxembourg</td>
<td>120</td>
<td>90</td>
<td>50</td>
</tr>
<tr>
<td>Netherlands</td>
<td>120</td>
<td>80</td>
<td>50</td>
</tr>
<tr>
<td>Austria</td>
<td>130</td>
<td>100</td>
<td>50</td>
</tr>
<tr>
<td>Portugal</td>
<td>120</td>
<td>90</td>
<td>50</td>
</tr>
<tr>
<td>Finland</td>
<td>120</td>
<td>80</td>
<td>50</td>
</tr>
<tr>
<td>(in winter 100 km/h)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sweden</td>
<td>110</td>
<td>90</td>
<td>50</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>112</td>
<td>96</td>
<td>48</td>
</tr>
<tr>
<td>(70 mph)</td>
<td>(60 mph)</td>
<td>(30 mph)</td>
<td></td>
</tr>
</tbody>
</table>

The summary table\textsuperscript{107} above shows that speed limits on urban roads are effectively already harmonized, the differences being due entirely to the conversion of miles into kilometres. However, there are variations of up to 20 km/h on motorways and suburban roads.

13. Initiatives in the area of human behaviour

\textsuperscript{106} Taken from Putignano C., “An instrument of safety policy: statistical information”, Mobilità 2000, etc., p.118.

\textsuperscript{107} Only minimal changes have taken place compared with the limits set out in the table appended to the Proposal from the Commission on speed limits for certain categories of motor vehicles in the Community (Com 88 706).
Road safety policy aims to ensure that legislation designed to prevent accidents and eliminate their causes is adhered to. It tries to achieve this in two ways: road safety campaigns, aimed at raising road user awareness and encouraging more responsible behaviour, and financial penalties, or in more serious cases, civil penalties (withdrawal of driving licence) and criminal proceedings.

The effectiveness of awareness campaigns is disputed, with successes and failures to support both sides of the argument, however no country in the world has abandoned them completely. In order for campaigns to be successful they must not be sporadic, although making a campaign permanent is no guarantee of success unless it forms part of a coherent framework of road safety measures, and provided it is not countered by advertising messages that take an opposite line. A campaign must also enlist the support of companies, institutions, the media and public opinion in achieving road safety goals. In other words, a campaign must be based on a shared system of values.

Since road safety campaigns have to work within the cultural context of a society it follows that the education of young people is fundamental to dealing with the problem. Young people should be made familiar with the rules governing road use from a very early age. There are considerable differences between Member States in this area:

- **Pre-school age** only 6 Member States provide road safety teaching in educational facilities for children between the ages of 3 and the compulsory school age, traffic clubs exist in 5 states and in 4 it is entirely the responsibility of parents. In pre-school educational facilities and at the clubs, publications and videos are used as well as games and exercises.

- **During compulsory schooling** (7/14 years) only two Member States do not provide courses at school, but only in five are the courses compulsory. Such courses generally use traditional teaching material but in four states computer simulators are used, and road traffic lanes also in four states.

- **Above 14 years of age or the minimum age at which driving licences are issued** the teaching provided by schools is supplemented by extra-curricular teaching for the purpose of getting a moped licence which can generally be obtained at the age of 16. Only three states do not provide courses in schools, but generally they are not compulsory, whereas it is generally compulsory to attend a course to obtain a moped licence.

- **Issuing of driving licence**: a specific compulsory theoretical and practical course must be attended, in all Member States apart from one. The Community harmonization of driving licence legislation has probably meant that the disparities found in road safety education in schools are not found in this area.

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108 The data quoted here are taken from Directorate General for Transport - European Commission *Traffic Safety Education at school and Training of Young Drivers*, Working Group of high-level Representatives of Governments of Member States, which contains a questionnaire on the subject. The states to which the data set out relates are not specified here.

109 In Italy and Belgium there is no moped licence, and the age limit is 14.
Although as the situation currently stands the Member States who have made the greatest efforts in education are not always those with the lowest number of accidents, this is because the benefits of education are only felt over the long-term. However, the inclusion of road safety in school curricula raises awareness on the part of road users from a very early age. It also helps to foster an accurate and complete knowledge of the rules of the road and lays the foundations for the shared system of values mentioned above.

Road safety education in schools has to compete with advertisers, who use their persuasive skills to promote messages that are the opposite of messages aimed at improving road safety. In view of this the ECTM has adopted a resolution\(^\text{110}\), which identifies five **messages to avoid** in advertisements:

- Encouraging drivers to break the law and the basic rules of careful driving.
- Promoting performance and power.
- Showing scenes that contain car races, violent acceleration and high speeds.
- Appealing to needs incompatible with safety or overblown ideas of dominance, impulsiveness and power.
- Creating a false sense of security in drivers by suggesting that certain technical features will enable them to overcome any situation, even the most dangerous.

This recommendation is directed at the advertisers, i.e. the car industry, advertising agencies and the media, although it would be legitimate to question why these messages should not be avoided, not just in advertisements, but in cinema and television which very often contain the type of scene described by the ECTM.

\(^{110}\) No 56 of 22 November 1989.
CHAPTER THREE

VEHICLE SAFETY

1. Types of vehicle safety

Vehicle safety is usually divided into two types: active safety which covers the prevention of risk through the design of the mechanical devices that affect manoeuvrability and passive safety which covers measures designed to reduce the seriousness of injury to people and damage to goods transported in the event of an accident. The term preventive safety is also used, which consists of creating comfortable and ergonomic conditions for drivers and passengers in order to create optimal conditions for safe driving: this is essentially an extension of active safety.

2. Active safety over the lifetime of the vehicle

The active safety of a vehicle depends on its design, manufacture, maintenance and use. The design stages have lately been concentrating on braking systems and road holding. There have been significant innovations in these two areas: ABS, which prevents the vehicle from going out of control in the event of sudden braking, and the "double triangular circuit" which ensures that in all circumstances it is possible to brake on three wheels, including the two back wheels. To improve road holding ASR anti-skidding systems have been developed which compensate for the loss of road adherence of one or more driving wheels in the event of sudden acceleration or acqua-planing.

"Stability under any load and driving conditions is the purpose of sophisticated and complex rear axle designs, deliberately made rigid to ensure good road holding, but at the same time capable of being responsive to steering. Above all independent rear suspension using multiple counteracting mobile wishbones enable stability and ease of handling to be combined with comfort."

The main issue as regards manufacture is cost: many active safety features, especially electronic features, are so expensive that they can only be fitted to top-of-range cars, since the price increase in mid- to bottom-of-range cars that would be necessary would make them uncompetitive. Nevertheless, the market is more safety-conscious than in the past and is forcing car manufacturers to compete on safety. The demand generated for active safety systems has resulted in...
in the classical virtuous cycle of the market: demand causes increased production, which reduces unit costs and therefore demand is stimulated further. Another stimulus for the fitting of sophisticated devices to vehicles could come from legislation, although legislators generally act with caution when dealing with technological innovations.

**Maintenance** is primarily the responsibility of car drivers in whose interest it is to ensure that the vehicle and its various components work efficiently, independently of the compulsory vehicle roadworthiness tests carried out in accordance with the law. Similarly, car drivers are responsible for the use of active safety systems while driving the vehicle. At first sight active safety may seem above all to be a manufacturing issue, but as soon as drivers take control driver behaviour becomes a component of active safety.

### 3. Active safety and new technologies

As has been mentioned above the fitting of electronic devices to mid- and bottom-of-the-range vehicles is hampered by the problem of cost. Nevertheless, it is perhaps useful to take a look at what has been achieved in this field and what is under development. High technology devices fall into two categories: firstly, **stand-alone systems**, which do not interface with devices outside the vehicle and **two-way data exchange systems**, which use signals transmitted by special equipment that forms part of the infrastructure or other vehicles, and secondly **passive systems**, which simply warn the driver about various dangerous situations and **active systems**, which have a direct impact on driving.

Among the most important of the stand-alone systems are the **vigilance control systems** which warn the driver when he or she exceeds certain safety criteria, as well the large number of **vision assistance systems**.

Vigilance control systems, which are under development, should be integrated with other control systems. Trials have shown that they can reduce accident rates, as well as operating costs thereby paying for themselves within one year. Included in this category of equipment are devices for **controlling road holding** based on measuring tyre-road friction.

Vision assistance systems include systems that improve poor visibility caused by environmental conditions, either weather conditions, or caused by other drivers, as in the case of dazzling, and also systems that improve vision using radar and video cameras. Equipment designed to combat poor weather conditions usually use ultraviolet light technology, systems to combat dazzling use liquid crystal technology and video cameras to enable drivers to view blind spots. Vision assistance systems using radar probably offer the greatest scope for development, and a type of electronic scanning has also been perfected.

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115 This paragraph is largely based on the European Commission Staff Working Paper - *Road Transport Telematics High-level Group - Final report on activities within the EU in the field of Road Transport Telematics* (SEC 97 475).
Passive systems form the basis for the development of active systems, although currently stand-alone and active systems already exist, for example speed-limitation devices, which are already compulsory on certain categories of vehicle\(^\text{116}\). The next stage in the technological development of such systems is *intelligent cruise control* which adjusts speed in response to the environmental situation and traffic. These devices can be used in either informative mode (i.e. passive mode) or in automatic mode (i.e. active mode), although the experiments carried out have shown that drivers prefer the automatic mode, which is more comfortable and effective from the security point of view. The most basic of the passive data exchange systems enables the infrastructure operator to disseminate information by radio, however at this level of technology one of the prerequisites of these systems is that traffic flows through suitably equipped infrastructures or that communication is possible with other vehicles with compatible equipment. Neither of these things are common at the moment which means that these systems will remain something for the, albeit near, future. Data exchange systems can be passive or active. Research is concentrated mostly on active systems, which are capable of providing *cooperative driving*. These are dealt with in the following chapter.

The Commission has launched four initiatives on telematics applications for road safety: **CHAUFFEUR**, which is about the automated driving of heavy-goods vehicles, **AC ASSIST** the goal of which is to produce 5 vehicles to demonstrate driving assistance and collision prevention systems, **SAVE** for an integrated system for vigilance monitoring and managing emergency situations, **UDC** aimed at producing a data exchange system for controlling speed and distances between vehicles on motorways.

4. Passive safety

The basic problem of passive safety is *frontal, side or rear impact* absorption. Accidents involving frontal impact are both particularly common and dangerous for passengers. What makes frontal impact so dangerous is the inertial movement of the passenger’s body within the passenger compartment, as a result of the vehicle stopping suddenly: this forward inertial movement occurs at the same speed as the vehicle’s at the time of the impact. Even at low speeds, the energy of the impact with the internal structures of the passenger compartment is very high, but at a speed of 50km/h the energy of the impact will be equal to that which the passenger would suffer falling from the third floor of a building and since energy increases as a function of the velocity squared and the bodily mass the devastating effects of higher speeds are not difficult to imagine. At 100 km/h the energy of the impact “will be equivalent to 3.5 tonnes...In this case the injuries will be serious or fatal, the head will hit the windscreen, the chest will hit the steering wheel and the dashboard, the lower limbs will hit the edge of the floor. It is also possible for the body to be thrown out of the passenger compartment. Passengers in the rear seats...will be thrown towards the front seats, hitting their heads against the seat backs and front passengers, causing serious or fatal injuries to the front passengers even when wearing safety belts\(^\text{117}\).”

\(^\text{116}\) See paragraph 7 of this chapter.

\(^\text{117}\) Costanzo A., ”L’Informazione per una migliore gestione dell’autovettura”, in *Mobilità 2000, etc.*, p. 105.
It follows that as far as passive safety is concerned the **passenger compartment** is the most important part of the vehicle, which must be designed as a **survival cell** capable of remaining intact after a frontal impact, partly by ensuring that the front of the vehicle collapses to absorb the energy of the impact. To protect against side impacts the design of the survival cell relies on the doors which are reinforced with anti-penetration and side-impact bars. The bars are placed at seat level and must ensure that it is possible for the doors to be opened. In modern vehicles, the **survival cell** is constructed around a box-shaped steel frame which turns it into a sort of protective cage.

As has been mentioned, the impact with the internal structures of the passenger compartment is also dangerous and passive safety therefore includes this. Over the last 40 years considerable progress has been made in this area: significant improvements have been made to windscreen technology, which no longer break up into large fragments, the body of the car is now capable of absorbing and deadening impacts by means of collapsible steel plates and structures, and the **internal architecture of the passenger compartment** which now avoids protrusions and sharp corners.

Restraint systems are fundamentally important, particularly **safety belts**, which **should be made compulsory for rear-seat passengers**, in view of the serious injury they can suffer and also cause.

### 5. Public policy and vehicle safety

As is clear from the brief outline provided above, car manufacturers have become safety-conscious and are committed to improving safety, partly out of a concern for their image, and all have research and development centres and departments working on safety. The aim of road safety public policy directed at vehicles is to create a framework of legal and administrative provisions for research and development to ensure the widespread implementation of safety technologies, by defining **minimum standards**, and ensuring these are adhered to.

These minimum standards would apply to car manufacturers and would therefore form part of industrial policy, with two basic limits: it will not be possible to compel all manufacturers to fit patented devices, since this would result in market domination, and it will not be possible to require the fitting of equipment based on technology that has not been sufficiently tested.

The monitoring of these standards would take two forms: the recognition of the conformity of a vehicle model placed on the market with the minimum standards (known as **type-approval**) and the monitoring of the vehicle’s efficiency, which must be acceptable at all times during the vehicle’s lifetime.

It is in the field of vehicle safety that the intervention of the Community as a legislator is most justified, on the basis of the principle of subsidiarity, because it is an area in which shortcomings cannot be remedied by one Member State without hindering the free movement of goods and people. The legal basis for this harmonization is article 100 of the Treaty. This has allowed the adoption of a provision relating to **type-approval**, i.e. the preventive checking of models put on the market, and **checks** carried out during the lifetime of each vehicle.
6. Type-approval

Type-approval is the first and most fundamental area in which harmonization is required: in 1970\textsuperscript{118} what is known as EEC type-approval was introduced and subsequently revised substantially in 1992\textsuperscript{119} in line with the requirements of the single market. This legislation lays down the type-approval process, provides for the introduction of technical standards relating to key areas of road safety that concern vehicles and for a special administrative decision-making procedure which ensures rapid adaptation to technical progress. As a result, a large number of Community directives have been adopted, particularly in the last two years, which have improved vehicle safety by regulating the specifications of various vehicle components.

In common with the rest of the industrial and transport sector, type-approval is increasingly subject to a regulatory phenomenon consisting of the gradual internationalization of legislation, caused by what is referred to as the globalization of economies. This phenomenon is already very widespread in sea and air transport, and not just as regards legislation governing technical areas. The 1992 directive provided for the equivalence between type-approval under a series of regulations produced by the United Nations Economic Commission for Europe\textsuperscript{120} and Community type-approval. A series of directives issued in 1997 has taken this process a step further by providing for explicit references to specific regulations issued by the UN Commission\textsuperscript{121}. As is the case for sea transport, legislative policy as regards road vehicles is increasingly based on the assimilation of international legislation. As a result, road safety issues related to the technical characteristics of vehicles can only be resolved effectively by decisions taken at international level\textsuperscript{122}.

Numerous technical directives, the most important of which are dealt with in the following paragraphs, are particularly significant as regards safety since they introduce standards specifically aimed at improving safety. A number of these, although previous to the 1997 directives which enshrined the principle of explicit references to UN regulations, nevertheless refer to them. The Community legislation covering each of the devices regulated usually consists


\textsuperscript{120}See Annex IV, section II, of Directive 92/53/EEC referred to in the preceding note.

\textsuperscript{121}Directives 97/28-32/EEC of 11 June 1997 in OJ L 171 of 30 June 1997. Each of these directives brings Community legislation on the following motor vehicle and trailer parts into line with technical progress: (28) installation of lighting and light-signalling devices, (29) retro-reflectors, (30) end-outline marker lamps, front position (side) lamps, rear position (side) lamps and stop lamps, (31) rear registration plate lamps, (32) reversing lamps. The previous Community legislation was contained in the following directives: 76/756-750/EEC and 77/539/EEC.

\textsuperscript{122}Since legislative internationalization in road transport has been compared to the same phenomenon in sea and air transport it is useful to point out the differences: the internationalization of maritime transport law predates the creation of the Community and is a result of the essentially international nature of this mode of transport and the consequent need for European ships to adhere to the legislation applied by all sea-faring nations. Legislative internationalization in road transport is essentially born of the need to ensure the international competitiveness of the European transport industry, and as in the case of sea transport it occurs specifically in the area of technical equipment.
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Under Directive 70/156/EEC. This, in common with the subsequent definitions, is taken from Directive 71/320/EEC, and is more fully explained in the following paragraph.

A braking device is taken to mean, in accordance with the Council Directive that forms the basis of legislation in this area, and referenced in detail in the subsequent footnote, "the combination of parts whose function is progressively to reduce the speed of a moving vehicle or to bring it to a halt, or to keep it stationary if it is already halted". The definition of category N differs from the previous one only in that it covers vehicles intended for the carriage of goods rather than passengers, while category O covers trailers and semi-trailers.

Category M has three subcategories: M1 covers "vehicles used for the carriage of passengers and comprising no more than eight seats in addition to the driver's seat" i.e. cars. Vehicles intended for public transport fall into categories M2 and M3 depending on whether they have a maximum mass of more or less than 5 tonnes and also a number of seats for passengers higher than that specified for cars. The international categories N and O are divided into three and four categories respectively according to maximum mass.

7. The vehicle and active safety in Community law

The braking device is probably the most important active safety device on a vehicle, indeed a Council Directive was issued about braking devices in 1971 and a number of technical adaptation directives on braking devices have also been issued by the Commission. These apply to cars and to public transport vehicles carrying passengers, vehicles for the carriage of goods, trailers and semi-trailers and lay down the requirements for their manufacture and installation, as well as for the tests for each type of brake allowed by the directives.

The basic rule governing manufacture laid down at the outset by Directive of 1971 specified that "The braking device must be so designed, constructed and fitted as to enable the vehicle in normal use, despite the vibration to which it may be subjected, to comply with the undermentioned requirements," and attaches particular importance to resistance to corrosion and ageing. The performance of a braking device is measured on the basis of the stopping

123 Under Directive 70/156/EEC.
124 This, in common with the subsequent definitions, is taken from Directive 71/320/EEC, and is more fully explained in the following paragraph.
125 A braking device is taken to mean, in accordance with the Council Directive that forms the basis of legislation in this area, and referenced in detail in the subsequent footnote, "the combination of parts whose function is progressively to reduce the speed of a moving vehicle or to bring it to a halt, or to keep it stationary if it is already halted".
distance, i.e. the distance covered by vehicle from the time the driver begins pressing the brakes until the vehicle comes to a standstill. The subsequent directives, restricted to technical adaptation, have not modified these basic criteria. However the 1985 directive introduced the retarder, i.e. "an additional braking system having the capability to provide and to maintain a braking effect over a long period of time without significant reduction in performance".

The technical requirements designed to ensure good visibility, which is essential for safe driving, have been standardized since 1977 as a result of a series of directives applicable to cars. Since 1st May 1991 the type-approval of a vehicle has been conditional on the technical requirements for visibility being met. Community legislation in this area consists of instructions on the positioning of a series of marks in the passenger compartment controlling the position of the seat so as to ensure that the driver is allowed the best visibility.

Tyres are also fundamental to vehicle safety and a directive issued in 1989 requires a minimum tread depth in the main grooves of at least 1.6 mm. This directive applies to tyres on vehicles and trailers for transport with a maximum mass not exceeding 3.5 tonnes.

Speed limitation devices can also be included in active safety legislation: a directive issued in 1992 provides for speed limitation devices for vehicles in categories M and N, i.e. essentially for vehicles used for public transport and for the carriage of goods over 3.5 tonnes, excluding vehicles used for public transport in urban areas. The speed limit is set at 90km/h by calibrating the device at 85km/h.

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130 Directive 85/647/EEC, annex, paragraph 1.17
131 Visibility is understood to mean visibility across 180° in front of the driver.
133 For technical information please refer to the annexes to Directives 77/649/EEC and 90/630/EEC.
135 The regulation states that it is applicable to vehicles in categories M, N, O, and O, as defined in annex I of Directive 70/156/EEC. The definition of category M appears in a previous footnote. Category N includes vehicles for the carriage of goods, with at least four wheels and a maximum mass not exceeding 3.5 tonnes (or three wheels and a maximum mass between 1 and 3.5 tonnes). Category O includes trailers with a maximum mass not exceeding 0.75 tonnes, while category O covers vehicles with a maximum mass between 0.75 and 3.5 tonnes.
8. The vehicle’s passive safety in Community law

The Directive on safety glazing and glazing materials on motor vehicles and their trailers\(^\text{137}\), based on article 100A of the Treaty, specifies the type-approval tests and also sets out a number of manufacturing specifications, which can be summarized as the following general requirements: the glazing must be of a quality enabling the risk of bodily injury to be reduced to a minimum and to withstand the stresses of normal driving conditions, atmospheric and thermal factors, chemical agents, fire and abrasion, in addition safety glazing must adequately transparent, cause no noticeable distortion to objects or any confusion between the colours used in road signs, and in the event of breakage they must allow the driver a clear view of the road.

Interior fittings means the furnishing of the passenger compartment. The first technical provisions governing these date from 1973\(^\text{138}\).

Interior fittings in the passenger compartment seats are the subject of extensive regulation especially as regards requirements for the strength of seats and of their anchorages\(^\text{139}\). These provisions utilize basically the technical requirements adopted by the UN Economic Commission for Europe in its Regulation No 17 ("Uniform provisions concerning the type-approval of vehicles with regard to the strength of the seats and of their anchorages") which is annexed to the agreement of 20 March 1958 concerning type-approval for motor vehicles\(^\text{140}\).

The surface of the rear parts of seats\(^\text{141}\) must not have any dangerous roughness or sharp edges. Seats with an adjustment system provided must also be equipped with an unlocking control that is easily accessible, even to the occupant of the seat immediately behind the seat concerned. Front (bench) seats must be equipped with head restraints at a height set to suit different body types which must in no case represent a risk to occupants.

The type-approval requirements relating to a whole series of interior fittings in the passenger compartment are defined on the basis of an absence of danger to the driver and the occupants of the vehicle, taking into account the impact zones, defined and referred to in various ways, of the parts of the body most at risk or of the body taken as a whole. The most dangerous parts of the passenger compartment are the controls, the roof and as has been mentioned earlier, the seats and

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\(^{138}\) Directive 74/60/EEC of 17 December 1973 on the approximation of the laws of the Member States relating to the interior fittings of motor vehicles (interior parts of the passenger compartment other than the interior rear-view mirrors, layout of controls, the roof or sliding roof, the backrest and rear part of the seats) in OJ L 38 of 11.2.74, p. 2. This directive was amended by the Commission Directive 78/632/EEC of 18 May 1978 relating to the technical adaptation of the previous directive in OJ L 206 of 29.7.78, p. 26.

\(^{139}\) The first technical provisions relating to seats are contained in Directive 74/60/EEC referred to above, however the basic legislation on seats is usually considered to be Directive 74/408/EEC of 22 July 1974 on the approximation of the laws of the Member States relating to the interior fittings of motor vehicles (strength of seats and of their anchorages) in OJ L 221 of 12.8.74, p. 1 which has been amended several times: most recently by Directives 81/577/EEC in OJ L 209 of 29.7.81, p. 34 and incorporated by Commission Directive 96/37/EC of 17 June 1996 which adapts it to technical progress in OJ L 186 of 25.7.96, p. 28.

\(^{140}\) The section in italics is a quotation taken, with a number of syntactic changes, from the explanatory memorandum of Directive 74/408/EEC.

\(^{141}\) The text refers to Directive 96/37/EC mentioned above.
the seat backs, as well as a number of parts that are not specifically mentioned but identified on the basis of where they are located in the passenger compartment.

Another area which, since 1975, has been the subject of a great deal of technical regulation is safety belts and restraint systems. These technical regulations can be divided into two groups: general provisions and those relating to anchorages for safety belts. The latest Commission directive containing general provisions was about airbags. Its purpose is not to make airbags compulsory nor to introduce any type-approval standards. Instead, where an airbag has been fitted it makes it compulsory for a warning to appear in the form of a pictogram indicating the presence of an airbag and warning against the use of restraint systems for babies and children that face backwards in the seats equipped with an airbag.

Community harmonization is designed to avoid the dangers arising from the combustion of interior padding, the interior linings of the passenger compartment, luggage compartment, ventilation and heating tubes, materials with thermal or acoustic functions, and light fittings. For each category of material the tests must show particular results.

The two directives relating to the protection of the occupants of motor vehicles in the event of side impact and frontal impact are among those based on UN regulations. The former refers to a document produced by the UN Economic Commission for Europe and the latter refers to the United States Federal Regulations Code.

The two directives lay down the procedures to be followed for the impact tests required for type-approval and the results that the tests must produce on the human dummy and on the vehicle. The technical requirements cover the results, the specifications of the human dummy and of the other devices used in the tests.


144 The Directive that regulates this particular area is 95/28/EC of 24 October 1995 relating to the burning behaviour of materials used in the interior construction of certain categories of motor vehicles in OJ L 281 of 23.11.95, p. 1.


9. **Vehicle roadworthiness tests**

Testing to ensure that a regulated product continues to operate efficiently is a standard adjunct to technical legislation. Where the efficiency of a product has safety implications, as is the case with motor vehicles, it becomes even more important. Vehicle roadworthiness tests have been harmonized since 1977 under a directive amended several times, for which the Community issued a single text in 1996 which in part introduces innovations into its provisions particularly as regards the testing of speed limitation devices.

Cars, except for taxis, and motor vehicles with at least four wheels for the carriage of goods and with a maximum authorized mass not exceeding 3.5 tonnes are subject to a roadworthiness test four years after they were first used and subsequently every two years. Roadworthiness tests for vehicles in the higher UN categories, taxis and ambulances, are carried out one year after they were first used and thereafter once a year. The items subject to compulsory testing are listed in annex II of the directive.

Roadworthiness tests are carried out by the state, by public or privately-run organizations, provided they are duly authorized to carry out tests and are subject to monitoring by the relevant authorities.
CHAPTER FOUR

INFRASTRUCTURE AND SAFETY

1. Overview

The road network is a central factor in accidents, both as a cause and as a means of prevention since it defines the spaces through which traffic moves and plays a part in determining traffic conditions. Infrastructure by itself can be a contributory cause of accidents, particularly when:

- Capacity is insufficient to ensure that traffic flows freely, in which case the public authorities are directly responsible for not having been able to upgrade the network to deal with changed traffic volumes.
- The route taken does not avoid or has not removed obstacles to the safe movement of traffic. In this case the planners are responsible, who should avoid designing roads as long straight-lines, which tend to make drivers drowsy or encourage them to break the speed limit, and reduce the number of crossroads, which increase the risk of collision.
- The areas on the sides of the road are full of obstacles that reduce visibility, such as trees or advertising hoardings.
- The network is not well maintained or where maintenance is carried out with no consideration for the requirements of road safety, in which case the network operator is responsible.

The above list is not exhaustive, but one thing emerges clearly from it: where infrastructure acts as a cause, or a contributory cause, of an accident, the responsibility, although not necessarily the legal liability, always lies with the infrastructure operator or a public authority. Conversely, infrastructure can help to reduce the number and the seriousness of accidents by adopting characteristics that avoid the problems set out above.

The central problem surrounding infrastructure issues is one of funding, and in times of tight resources expenditure on investment is the first item to be cut. The issue is a circular one: the problem of safety is dependant on funding, funding is linked to the issue of public-private partnerships and their corollary, charging for infrastructure use, and charging would then enable the necessary investments in infrastructure to be made to improve safety.
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The solutions to the infrastructure problems set out above require one-off measures which may consist of improving maintenance, removing obstacles or putting up constructions or introducing improvements that are by now well-established in the field of road transport civil engineering: underpasses to avoid the need for crossroads, roundabouts, "sleeping policemen" which force drivers to slow down (traffic humps can in fact be dangerous). These measures, precisely because they are one-off, can solve problems but can also displace traffic to other parts of the network and do not enable the network to cope with further increases in traffic. They are also the almost exclusive domain of national, regional and local governments and the principle of subsidiarity would make it difficult for the Community to undertake regulatory or operational initiatives in these areas. Safety impact audits could be introduced, along the same lines as environmental audits, linked to Community funding, but this could only be done for infrastructures financed with Community funds and consequently would affect only a small proportion of the road infrastructure.

The Community must therefore take a different approach. The European Community has based its infrastructure policy on the concept of networks, which does not mean simply joining up a series of systems but having an overall vision of the problems, which is encapsulated in the principle of interoperability. This concept, which is fundamental to the common transport policy requires the network architecture to make it easy, using the latest technology, to switch from one mode of transport to another by ensuring good connections between the different parts of the network. The concept of interoperability is intended to meet an economic need; however general improvements in the transport system mean that road traffic flows more freely which in turn results in improved road safety.

Another and more significant spin-off from interoperability as regards road safety is in technology: the telematics systems developed for interoperability can often also be used for road safety, and research and development in interoperability technologies provide a basis for specifically safety-related technologies.

According to best planning practice traditional road signs should already be seen as an integral part of infrastructures and in leading-edge infrastructures telematics applications should also be considered an integral part of infrastructures. Infrastructure therefore becomes a complex system made up of three separate elements: civil engineering, road signs, and telematics applications (telematics is for the future, although sooner than might be thought).

Road signs means the complex system of equipment and devices with which roads need to be equipped in order to transmit messages to users. It includes static signs (road markings and vertical signposting) and automatic signs for monitoring, controlling and regulating (traffic lights, for example). Telematics applications means systems that interact with the vehicle which are part of data exchange systems\textsuperscript{151}. In their most basic form telematics applications can be considered to be a development of automatic road signs.

\textsuperscript{151} See chapter 3, paragraph 3.
2. Road signs

The defining characteristic of road sign equipment and devices is that they provide the driver with visual information and instructions. In this document, attention is focussed on road signs giving instructions and warnings to drivers rather than directions, nevertheless, the importance of clearly visible directional road signs for smooth traffic flows, and therefore for road safety, should not be underestimated.\footnote{152}

The effectiveness of road signs depends on their \textit{visibility} and \textit{legibility}. Visibility means "perceptibility to users at the distance from which it is likely to be read."\footnote{153} Legibility means "the ability [of users] to read letters on a sign in relation to various factors, such as: contrast of the letters, their relative height and width, the width of the line with which the letters are drawn, the spacing between the letters and the vertical lines."\footnote{154}

Both of these properties depend on the characteristics of the device, the position in which it is placed, the weather and how good the driver's sight is. The driver's sight is a crucial factor in the effectiveness of a road sign system in that it determines the effectiveness of the (human) receiver of the signal. It is also the weak point in the system because it is subject to wide variations which cannot be predicted, except as an average statistical value.

In addition to this average statistical value, the operator must also take account of the complex process of perceiving and processing information by which drivers take driving action in response to the road sign. This process can be divided into four phases: \textit{perception}, the phase during which the visual data is chosen, coordinated, integrated and processed, \textit{deliberation}, during which the driver considers the driving options available given the signal perceived, \textit{comprehension}, during which the driver considers the consequences of each possible option, \textit{decision}, during which the option is chosen.\footnote{155}

The road sign system can determine the success of the first phase. However it must overcome the problem caused by the relative movement between the driver and the signalling device: this movement means that a specific amount of space must be allowed between the sign and the driver at the last reading point, and this space must provide sufficient time to carry out the process of perceiving and processing the information before reaching the situation referred to in the sign or the point from which the driving instruction given by the sign has to be carried out.

The space required depends on the speed, the height and the size of the sign, and the minimum reading time. In order to deal with these variables several signs are often placed at regular intervals along the road to warn, indicate and confirm. In general, the size and height of signs are

\footnote{152} It may also be noted that the Member States decided against standardizing vertical directional road signs because of the costs involved in doing so. Instead the Commission intends to standardize road signs on trans-European network infrastructures.

\footnote{153} This definition is taken from Ranzo A., “La qualità visuale dei dispositivi di segnalamento: aspetti critici progettuali”, \textit{Mobilità 2000}, mentioned above, p. 124.

\footnote{154} \textit{Ibid.} A distinction should be made between \textit{pure legibility} with unlimited time available and \textit{legibility at a glance}, when, as is the case for drivers, time is limited.

\footnote{155} \textit{Ibid.}, p. 124. The phases set out are taken from Neboit’s model of driver-environment interaction.
standardized on the basis of visibility and legibility in optimal conditions, which are not always, indeed rarely, the conditions under which they are read because of the weather, the topography of the area, or even simply the change from day to night.

The concept of *minimum visibility* is therefore important, i.e. the setting of minimum standards for road signs that take into account the various possible conditions or at least a wider range of conditions than simply optimal conditions. Setting appropriate standards for the hours of the night is relatively simple, although often standards are set on the basis of optimal night visibility. It is more difficult to set minimum visibility standards for the daylight hours, during which conditions are more variable. Above all weather variations are important\(^\text{156}\); while it is not possible for road signs to change in line with changes in the weather, the weather phenomena shown by the meteorological statistics to occur regularly in a particular area should be taken into consideration\(^\text{157}\).

The *luminosity contrast*, i.e. the way in which the sign stands out from the visual background of the environment is also important: a very bright background can make the sign less visible. It can also reduce the *colour contrast*. The visual background is largely determined by the position of the sun in relation to the road in the course of the day\(^\text{158}\) as well as by weather variations.

This takes us back to the issue of infrastructure, the design of which should also take into account the position of the sun in relation to the route taken by the road so as to optimize the visual background at the most critical times of the day.

The observations made so far apply mainly to vertical road signs, however they can also be relevant to road markings which can also suffer from poor maintenance making them illegible. Vertical signs can also suffer from obstacles to visibility created by advertising hoardings, which sometimes deliberately take on the misleading appearance of road signs.

### 3. Telematics applications based on stand-alone systems without in-vehicle devices

The previous chapter dealt with the possibilities offered by telematics for improving road safety using stand-alone systems fitted to vehicles. This chapter provides an overview of stand-alone systems external to vehicles and of data exchange systems.

The former include devices, not fitted to vehicles, that provide driving information, recommendations and instructions to drivers: included in this category are *variable message signs* (VMS), which are a telematics development of traditional road signs, *green wave* traffic management systems, which enable urban traffic to flow freely, without stopping and at a given

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\(^{156}\) *Weather variations* does not mean just bad weather, but also the characteristics of the weather: temperature, pressure and humidity, which affect the transparency of the air, and cloud cover which affects the level of sunlight and therefore brightness and luminosity.

\(^{157}\) For example, if a road crosses an area in which fog banks frequently form, the road signs should take account of this.

\(^{158}\) The sun can also cause dazzling phenomena in cases where it is positioned behind or in the area immediately next to the sign.
speed, by coordinating traffic lights on a corridor, the \textit{RDS-TMC}\textsuperscript{159} system, which consists of broadcasting messages about the traffic situation on a dedicated channel. The characteristic all these stand-alone systems have in common is that they interact with drivers, although in the case of the RDS-TMC system, some require a receiver device to be fitted to the vehicle. \textbf{VMS} are luminous or rotating signs, already fairly widespread, which use light emitting diode or liquid crystal technologies. Originally designed as a refinement of road signs they have become a dynamic tool for managing traffic and thereby improving safety. Surveys carried out in Finland about these devices have shown a high approval rating on the part of motorists especially as regards information about driving conditions, and particularly about the impact of weather on driving conditions. The instructions provided by VMS appear to be frequently adhered to, both in terms of the information supplied and the recommendations, for example recommendations about speed. VMS are also used in Finland to advise motorists about alternative routes in the event of congestion on the main thoroughfares.

The \textbf{green wave} management system has been less successful, as it has proved useful only in cities with "straightforward" street layout with wide roads, which is not very often the case in European countries where cities have mostly grown from medieval city centres.

The \textbf{RDS-TMC driving assistance system} has raised considerable hopes as it has significant advantages: it has a high information capacity (300 messages every 15 minutes) delivered at high speed enabling users to select only information relating to the area or section of road where they are. It also enables users to receive information in their native language anywhere in Europe, overcoming the language barrier which is a sometimes underestimated factor in road safety policy. This system, which has already been tested, should be introduced over the next few years in most European countries. An alternative analogue system based on the GSM\textsuperscript{160} network will be available from 1998.

4. Telematics applications: data exchange systems

The systems dealt with so far, which are designed to improve traffic conditions, help to resolve the problems associated with traditional road signs. Data exchange systems take the technology further by establishing interaction between infrastructure and vehicle\textsuperscript{161}. This raises wider issues that go beyond road safety\textsuperscript{162} such as automated highways, which are less futuristic than they might seem, at least in technical terms, if not financial and economic terms.

\textit{Assistance systems for maintaining a vehicle inside a specific lane} are currently the most feasible systems. They are mid-way between stand-alone systems fitted to vehicles and data exchange systems.

\textsuperscript{159} Radio Data System- Traffic Message Channel.

\textsuperscript{160} More exactly, it will be based on the General Packet Radio Service, \textit{GPRS}.

\textsuperscript{161} However, data exchange systems exist that do not involve infrastructure, only vehicles. An example of such systems is the piloting of columns of vehicles, on the AC Assist which Community research programme is under way (see chapter 3, paragraph 3).

\textsuperscript{162} Another aspect of telematics that can be integrated with data exchange systems is electronic fee collection, dealt with in EP (DG IV), \textit{Fiscal measures in the transport sector}, Working document "Transport series", TRAN 100, 1997.
systems. They consist of a system of a video connected to an on-board computer that recognizes the demarcation lines on either side of a lane (road markings), and which indicates the steering adjustments required to remain in the lane and emits beeps in the event that one of the two lines is crossed. In other words, there is no data exchange between two telematic devices, but the in-vehicle device can only work if the road markings on the infrastructure have been properly marked.

This type of data exchange does however exist in the case of cooperative driving in which telematic markers fitted to the infrastructure communicate with in-vehicle interfaces to exchange information. Cooperative driving obviously requires the vehicle and infrastructure equipment to be compatible. Nevertheless, also in this case, it is the driver who is interacting.

This represents the intermediate link between road signs, even in their most technologically advanced forms, described in the previous paragraph, and the automated highway i.e. road infrastructures equipped, on one or more lanes, with telematic devices that enable vehicles fitted with compatible equipment to travel in a coordinated way under the control of a computer system. The infrastructure equipment necessary for this is not big centralized systems but networks of small computers located on the sides of the road. Using this approach, the cost of an automated highway is competitive with extending the motorway network: supporters of this system claim that a lane equipped for automated driving would have a capacity of 6000 vehicles, and would be safer, compared with 2000 vehicles for a traditional lane with the safety levels already described. Recent tests carried out in Japan and California have produced positive results.

The automated driving test in Japan used magnets embedded in the centre of the lane, radio antenna running beside the infrastructure and video cameras, sensors and in-vehicle receivers.

The Californian tests were carried out by the NAHSC (National Automated Highway System Consortium). Three tests were performed using various systems:

- Two buses and three cars, all acting as free agents, i.e. with no data exchange with the infrastructure, only between each other: the technology used was sensors to measure distances including during overtaking and lane changes with communication between the lead vehicle and the others to warn about obstacles.

- Eight buses using a coordinated piloting system to remain in a column, also with communication only between vehicles, but with a higher level of cooperation compared with the previous test: in this case the spacing was constant within the column of vehicles even when a vehicle had left the platoon and when the platoon was split.

- Two manually driven vehicles, when drifting from their lanes, automatically managed acceleration and braking.

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Other trials have shown the effectiveness of a data exchange system which by involving the infrastructure is even able to coordinate vehicles for the purposes of maintenance.\textsuperscript{164}

Once automated highways are in operation the systems under development will enable drivers to drive onto a special lane by going through a barrier or over a ramp that will check that the vehicle has the necessary equipment. Once this check is over the driver selects the destination using the on-board computer which is then transmitted to the system, which allows the vehicle access to the automated lane and takes charge of the vehicle until it reaches its destination. A mixed system can also be used if the motorway is only automated along some stretches, in which case drivers can alternate between manual and automated driving.

Within the automated lane driving is not likely to be controlled entirely by the central system and will operate in two different modes: in one mode the central system will take complete control of the vehicle to which it will transmit instructions, in particular to set speeds and distances, and in the other mode the central system will only supply information to the vehicle which will detect obstacles independently and will drive itself. In the automated lane vehicles will be able to travel as free agents or in platoons in which every vehicle coordinates with the preceding and following vehicle.

In addition to the installation of telematic devices the conversion of a traditional motorway into an automated highway requires changes to the structure of the motorway, in particular, the building of access and exit ramps and barriers for the special lanes. However, most of the telematic devices involved need to be fitted to the vehicle.

Automated highways should bring benefits in terms of both capacity and safety. Although the 90\% reduction in accidents predicted by some experts\textsuperscript{165} seems excessively optimistic, there is no doubt that the importance of the human factor, which is always partly to blame for causing accidents, would be substantially reduced, and many of the problems related to road signs would be not only solved, but simply eliminated.

\textsuperscript{164} \textit{Ibid.}, p. 75.
\textsuperscript{165} \textit{Ibid.}, p. 77.
FINAL CONSIDERATIONS

1. Background

The wide-ranging nature and the political sensitivity of many aspects of the road safety issue, as well as the implications it has for other areas of public policy mean that final considerations are more appropriate than conclusions.

Firstly a number of points should be made based on the contents of the preceding chapters:

- The human factor is a fundamental component of all accidents and is therefore the area on which most effort should be concentrated by the authorities responsible for road safety.

- Technological developments, both in vehicle equipment and telematics for road transport, make an important contribution to road safety. However, the high cost of technologically sophisticated devices tends to mean they are not fitted in mid- to bottom-of-range vehicles, largely because of price competition between car manufacturers.

- Although the scope of most road safety initiatives tends to be national, regional and local, the European Community has a fundamental role in the technical harmonization of vehicles as part of its industrial policy and single market responsibilities and acts as a driving force for scientific and technological research.

- The Member States have shown a gradual recognition of the need for Community intervention in the area of transport safety, in particular as a result of amended Article 75 of the EEC Treaty, and specifically in road safety by supporting resolutions and specific Community programmes. Nevertheless, Community-wide harmonization in areas that remain within the remit of national governments or of sub-national governments remains subject to discretionary assessments made in the light of the principle of subsidiarity.

2. The human factor

These four points cover the background to Community road safety policy. It should be emphasized that road safety policy is taken forward by means of various public policies, the main aims of which may not necessarily be safety.

There is no doubt that the central importance of the human factor means that drivers must be made safer, particularly by reducing the legally permitted blood alcohol level, for two reasons: alcohol probably causes 20% of road deaths in the Union and public opinion is more receptive
to reductions in the legally permitted alcohol limit than to the tightening up of other limits, such as speed restrictions. Similarly, the difficult problem of the effects of drugs and medication on driving must also be tackled.

Different types of driving licence that link engine-size to driving experience could play a preventative role, while the introduction of penalty points driving licences and the mutual recognition between the Member States of laws governing the withdrawal and suspension of driving licences would have a deterrent effect.

Community-wide harmonization is desirable in these areas, although in the case of laws governing the withdrawal and suspension of driving licences, as Community law currently stands, only an agreement between the Member States would be sufficient to achieve mutual recognition.

The Community can make a fundamental contribution in the development of portable equipment for detecting the presence of drugs and medicines in the blood. Harmonization at European level of the forms used for declaring accidents would also be useful and although it would involve considerable effort it would enable CARE to be fully exploited.

3. The vehicle

It is in the area of vehicles that the Community contributes most by making technical adjustments to, and widening the scope of, existing directives, and through intervention in research and development regarding the application of new technologies to safety. However, the main problem appears to be how to extend the fitting of the most technologically advanced devices to all car models. In order to achieve this the European Community may take the regulatory route and increase the number of devices required for type-approval, although tax relief available at purchase could also be introduced, as could a framework agreement with insurance companies under which third-party car insurance premiums would take account of the non-compulsory safety devices fitted to the insured vehicle.

It is the author's view that speed limitation devices are important: if they were required to be fitted to all vehicles they could contribute more to improving safety than a reduction in speed limits, and would reduce speeding much more than police speed checks.

\[166\] The Parliament's rapporteur on the Communication from the Commission proposes increases in insurance premiums for drivers found guilty of drinking and driving. The reduced premium mentioned here could be seen as being complementary to this.

\[167\] See Chapter 3, paragraphs 3 and 7.
4. **Road and road telematics infrastructures**

The Community has limited scope to intervene in civil engineering projects, except where these form part of trans-European networks. However, in the area of telematics it has a significant role to play, both in research and development and in the integration of systems, which is made all the more necessary by the fact that such systems require network infrastructures as well as devices fitted to vehicles, hence the need for compatibility between networks and devices throughout the Community area. The possibility of integrating electronic fee collection systems with automated driving systems should be examined seriously so as to combine safety and the internalization of external costs thereby making automated driving systems more acceptable and reducing operating costs, at the same time.

While the Community has a fundamental role to play in information technology systems, its role with regard to infrastructures, albeit limited, allows it to intervene in two ways: through the technical harmonization of the trans-European road network, which includes access roads, and through the structural funds, which could finance projects solely on the basis of a safety impact assessment, carried out in a similar way to an environmental impact assessment.
CRITICAL NOTE ON SOURCES AND LITERATURE

1. Sources

The basic documents on European road safety policy are the acts of the various Community institutions which are usually available in all the Community languages.

Chief of these is the Treaty on European Union of which there are several editions. The edition used for the purposes of this working document is the version published by OOPEC\textsuperscript{168} entitled European Union, Selected instruments taken from the Treaties, Volume I, Luxembourg 1993.

The Official Journals of the European Communities contain the regulations, proposals for regulations and European Parliament resolutions. The references to each document quoted are given in the footnotes.

Various Commission communications already quoted in the document are of particular interest. The references are as follows:

- A programme on road safety (Com 84 170) which represents the Community’s first attempt to deal with the problems of road safety.

- An action programme on road safety (Com 93 246) which sets out the action programme ending 1997.

- Promoting road safety in the EU - the programme for 1997-2001 (Com 97 131) which follows on from the previous communication, examines the results of the programme up to 1997 and sets out, as indicated by its title, the programme for coming years.

- Report from the Commission on progress with the project and its future prospects CARE (Com 97 238) which deals specifically with this documentary and statistical database project on accidents in the EU.

We would also draw attention to the Commission communication entitled Telematics applications for transport in Europe (Com 94 469), which is of particular relevance to road safety, and the following proposals, which were never approved, on drinking and driving and on speed limits:

\textsuperscript{168} The Office for Official Publications of the European Community.
The European Community and Road Safety


The most important resolutions of the European Parliament are as follows:

- 18 February 1986 on common measures to reduce road accidents, as part of the Community’s programme for Road Safety Year, 1986 in OJ C68 of 24.3.86, p.35.

- 16 March 1987 on Community measures within the framework of the common transport policy to promote the bicycle as a means of transport in OJ C99 of 13.4.87, p.219.


For the decisions taken by the various European Councils we have used the press releases issued by the President-in-Office of the Council which are contained in the Bulletin of Activities of the European Parliament published by the EP’s DGI.

The European Conference of Ministers of Transport (ECMT), has been active in the area of road safety for some time and its resolutions, which have provided inspiration for the Community’s work, can be found in Principales actions de la CEMT dans le domaine de la sécurité routière/Principal actions of ECMT in the field of road safety, CEMT/ECMT 1994. This organization also edits a special series of publications about road safety.

The OECD, the Organization for European Cooperation and Development, which takes in a geographical area covering the industrialized nations, has made a considerable contribution to the study of economic and social phenomena and indeed also to the study of road safety, at times adopting a specific approach. A number of its publications are included in the bibliography. The WHO, the World Health Organization, publishes studies and documents on road safety from its own particular perspective, some of which are listed in the literature.

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169 The publications of the ECMT are distributed by the OECD, to which it is linked.
The parliaments of the Member States have also demonstrated concern about the problem and have produced the following studies:

- **BRD Bundestag (Hauptabteilung Wissenschaftliche Dienste)** *Einführung eines Verwarnungsgeldes für das Nichtanlegen des Sicherheitsgurtes*, 1982;

- **BRD Bundestag (Hauptabteilung Wissenschaftliche Dienste)** *Strafrechliche Massnahmen zum Schutz vor sog. Geisterfahrern*, 1983;

- **UK House of Lords (Select Committee on the EC)** *Blood alcohol levels for drivers*, 18th report, 1989

- **UK House of Lords (Select Committee on the EC)** *Road Safety in the Community*, 18th report, 1990

- **BRD Bundestag (Hauptabteilung Wissenschaftliche Dienste)** *Geschwindigkeitsbegrenzung auf Autobahnen? - Folgen aus der neueren Literatur*, 1991

- **E Senado** *Dictamen de la Comisión Especial de Encuesta e Investigación, sobre los problemas derivados del uso del automóvil y de la seguridad vial*, 1992.

2. **Literature**

The literature on this subject is vast and the following list only covers works used for the purposes of this document:

**a) General publications, statistics and epidemiology of accidents**

- **OMS**, *Road Traffic Accidents as a Public Health Problem*, Technical Discussions held during the 19th Session of the OMS Regional Committee for Europe, OMS Copenhagen, Budapest, 1969.


- **OMS**, *Education in traffic safety*, Report of a OMS ad hoc technical group, OMS Copenhagen, Essen, 2-4 October 1979.

OMS, *Prevention of traffic accidents in childhood*, Report on a OMS study carried out in collaboration with the international Children's Centre and the University of Uppsala, J.P. Deschamps, OMS Copenhagen, 1981.


**b) Publications on drivers**


c) **Publications on helmets and safety belts**


4. **Infrastructure and road signs**


Babkov V.F., *Road conditions and traffic safety,* Mir, Moscow, 1975.


