A METHODOLOGICAL APPROACH TO NATIONAL ROAD SAFETY POLICIES

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European Transport Safety Council
Rue du Cornet 22
B – 1040 Brussels

Tel: 0032 2 230 4106
Fax: 0032 2 230 4215
email: research@etsc.be

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Mr. Maurizio Tira (Chairman)
Mr. Richard Allsop (Deputy Chairman)
Mr. Bernhard Biehl
Ms. Ilona Buttler
Mr. Patric Derweduwen
Mr. Rune Elvik
Mr. Dominique Fleury
Mr. Jaroslav Heinrich
Mr. Péter Holló
Mr. Klaus Machata
Mr. Jesús Monclus
Mr. Tomaž Pavčič
Mr. Antonio Avenoso (ETSC)

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The European Transport Safety Council

The European Transport Safety Council (ETSC) is an international non-governmental organisation which was formed in 1993 in response to the persistent and unacceptably high European road casualty toll and public concern about individual transport tragedies. Cutting across national and sectoral interests, ETSC provides an impartial source of advice on transport safety matters to the European Commission, the European Parliament and, where appropriate, to national governments and organisations concerned with safety throughout Europe.

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Executive summary

The main goal of this Review is to set out a methodological approach to the effective development and inplementation of national policies for safety on the roads in EU member countries – especially those whose safety levels are below the EU-15 average, namely Belgium, Cyprus, Czech Republic, Estonia, France, Greece, Hungary, Italy, Latvia, Lithuania, Malta, Poland, Portugal, Slovakia, Slovenia and Spain. ETSC has called these Southern, Eastern and Central European countries the SEC Belt.

Key findings of the Review

Central to the findings of the Review is a checklist presented in Chapter 4 to help decision makers and practitioners at national level to assess what they have achieved so far by way of road safety policy and to detect potential deficiencies. The checklist can be regarded as a "step ladder", encouraging decision makers and practitioners to climb to the highest levels of achievement in road safety by adding step by step to their achievements so far or by revisiting earlier steps. The checklist should be seen first and foremost as a set of suggestions and advice rather than a "one size fits all" solution. Therefore, the absence of one of the listed items does not imply failure of the current efforts. On the other hand, establishing all items in the checklist will facilitate success but will not guarantee it.

Chapter 4 also presents a number of common prerequisites for successful road safety work. Analysis shows that road safety performances vary significantly between Member States. There have been countless efforts to explain the differences between countries or to identify the key factors that make a country safer, but so far no stringent recipes are available: there is simply no single way to success and – given the various political and legal frameworks – a strategy that was successful in one country could well fail when applied to another without being adapted to national requirements.

In order to develop an effective targeted national road safety programme, a comprehensive analysis of road safety problems of the country concerned should be made. Chapter 5 briefly outlines the essential elements of such an analysis. The analysis of road safety problems is complex, as these problems are multidimensional and tend to be interlinked. To ensure that the most important problems are identified, it is important to rely on a systematic approach. The analysis should start by choosing a taxonomy to help classify problems. It is, however, impossible to analyse every conceivable road safety problem. Analysts should therefore confine analysis to those problems that are believed to be the most important. A realistic level of ambition is probably to aim for an analysis of around 20 road safety problems that are judged to be the most important.

The analysis should also take into account that road safety problems are multidimensional. The most important dimensions of such problems are

identified as being: magnitude, severity, externality, complexity, inequity, territoriality, dynamics, perception and amenability to treatment. It is important to try to assess amenability to treatment as part of the analysis otherwise there is a risk that the road safety programme developed will be too idealistic or optimistic with respect to the prospects for solving the problems. Finally, analyses of road safety problems should be updated regularly. New problems may emerge and some old problems may become less important.

While the preceding chapters demonstrate where safety problems may lie, how to analyse them, how to implement well-suited actions and how to evaluate the effects, Chapter 6 stresses that the application of these ideas in any particular country requires recognition of the complexity of road safety actions and therefore the importance of taking that country's specific features into account. Aspects of visions and strategies adopted elsewhere can then be adapted to the specific cultural, social and institutional features of each country in question.

Apart from taking into account the historical and organisational context in each country and the state of understanding of the risk of death or injury, the framework for a successful safety policy requires a mobilisation of skills (technical and organisational expertise to make a policy of real prevention and mitigation possible), an articulation of the problem (based, for example, on the state of social demand and level of risk), construction of the action, implementation, management and evaluation. All along this process a strong political will and commitment are necessary. No matter how technically well-founded it may be, no action can really be implemented without political will and commitment. It is therefore necessary for a number of politicians to be militants for the road safety cause, considering that it is within their power to act and to gather together a small core group of technical experts from various areas who can propose actions and implement them. They need to work together to move road safety up the agenda at the highest levels of policy-making.

Finally, it needs to be stressed that systematic and strategic thinking and action on the lines recommended in this Review are vital for the sustained medium- and longer-term reduction in death and injury on the roads. But such action takes time and planning for it is not and should never become a substitute for action now and in the shorter term. In every country there are known, identifiable and highly cost-effective measures that can be taken now, by the existing responsible organisations, using existing skills and at affordable cost. Nothing that is recommended here should stand in the way of such measures.

Background to these findings

The ways forward recommended in the Review are based on evaluation of relevant history and of practical experience with road safety policy and measures in the SEC Belt countries themselves and elsewhere in the EU.

Chapter 1 provides an historical background of road safety in the SEC Belt countries. The level of road safety in these countries reflects past and present political, social and economic situations. Though gathered under the SEC Belt umbrella, these countries have rather different historical backgrounds depending on conditions they emerged from. Highlighting the historical development, focusing mainly on the evolution of road transport, may reveal specifics and differences among these countries and may also expose hindrances on the way to acceptable road safety.

Understanding the historical background of the SEC Belt countries is crucial for better evaluating their road safety policies. Any analysis or comparison at European level should take account of the similarities and differences among European countries in order to reach reliable conclusions. For example, a country's road safety situation depends strongly on the level of motorisation it has reached. However, it is also important to consider how long it has taken to reach it and how quickly motorisation is now increasing. The process of adjustment of people to cars takes time and a period of rapid motorisation (as in the case of many of the new member countries) can have different (often worse) short-term impacts on road safety than a similar increase in motorisation spread over a longer period.

Chapter 2 contains an analysis of the road safety policy of four different countries, namely Czech Republic, Hungary, Poland and Spain. The evolution of safety approaches and their links to the country's historical and socio-economic conditions is of primary relevance to understanding the successes or failures of the processes adopted.

The awareness of the road safety problem in Czech Republic is rather low, as strong political support and commitment have historically been insufficient. This applies not only for objective financial needs, but also for a political support in approving new legislation. However, some positive developments can also be discerned. In light of a common European Road Safety Policy, the Government has approved the National Road Safety Strategy in April 2004 as a key document defining the future work in the different key dimensions of road safety. The strategy aims to halve the number of road deaths over the period 2002-2010, which is in accordance with the goal of the EU White Paper.

In Hungary, road safety does not seem to be a high priority for the government and the acceptance of measures that are popular in the short-term (e.g. increasing the speed limits) is higher than that of real countermeasures. In order to reverse the current trends, several suggestions are made such as a clear definition of road safety responsibility within the government, the increase of resources for road safety measures, the development of a dialogue between decision makers and researchers and the increase of police enforcement in the most important areas (speed, drink driving and seat belt use).

In Poland, road safety has never really been a strong priority issue for the top state authorities. The interest regional authorities take in road safety varies from region to region. There is minimal involvement from non-governmental organisations and local communities in the delivery of the governmental road safety programme. However, in the last years a different approach and attitude to road safety are developing and road safety awareness has grown. In April 2005 the government adopted a revised road safety programme, GAMBIT 2005. The programme's target is to reduce the number of deaths by 50% by 2013.

Three key current challenges for effective road safety management in Spain must be confronted with determination: horizontal and vertical cooperation between the various administrations, medium to long term planning and investing in road safety, and more science-based decision making processes. High level political support should still achieve higher societal visibility in Spain. A general objective of reducing the number of deaths by 40% before 2010 was included in the election programme of the now-ruling party; however a high-profile legislative document accepting and committing to that reduction is still missing, bringing again the policy back to the old familiar errors.

Chapter 3 is a collection of best practice examples from countries within and outside the SEC Belt. The aim of this chapter is to show how single measures are already applied with success and how much these can be relevant to improving road safety. Illustrating best practices may help to better understand the way road safety improvements have been achieved.

Firstly, the road safety activities of the best performing EU members, the so-called SUNflower countries (Sweden, United Kingdom and the Netherlands), are presented. Other examples from France (the new speed enforcement strategy), Belgium (preventing and deterring drink driving) and Austria (section control) are then considered. Finally, the Hungarian and Czech experiences of reducing speed limits in urban areas are analysed.

1. Historical background of road safety in the SEC Belt countries

Danger from unsatisfactory safety performance of the road system prevails especially within EU member countries with safety levels below the EU-15 average, namely Belgium, Cyprus, Czech Republic, Estonia, France, Greece, Hungary, Italy, Latvia, Lithuania, Malta, Poland, Portugal, Slovakia, Slovenia and Spain. ETSC has called these Southern, Eastern and Central European countries the SEC Belt (Figure 1.1).

Fig. 1.1 The SEC Belt Countries

The level of road safety in a country reflects past and present political, social and economic situations the country has experienced. Though gathered under the SEC Belt umbrella, these countries have rather a different historical background depending on conditions they emerged from.

Highlighting the historical development of these countries, focusing mainly on evolution of road transport, may reveal specifics and differences between these

countries and may also expose the hindrances on the way to acceptable road safety.

The historical road safety background presented here is based on data and information collected for the past period of up to 15 years. The statistics for most of the new member countries are scarce and differ in their validity. The lack of consistent data series has led to some generalisation of the encountered problems but not to their omission.

Road safety, as a consequence of the quality of the transport system, is directly and indirectly generated and influenced by many factors. The list encompasses general factors (geographical, environmental, demographic and socio-economic conditions) that trigger development of mobility and safety.

The long-term trend in deaths can be adequately described on the macroscopic level by development of mobility and death rate. Safety adaptation of the traffic system follows traffic growth and the effects of subsequent safety measures with a shift in time.

Assuming that kilometres travelled by road users function as learning process of travelling safely, the trends of motorisation and death rate seem to be a primary basis for making a comparison of road safety between countries.

Dynamics and timescale of motorisation have significant impact on the quality of human adaptation and people's response to the demands made on them by road use. Road safety evolution is well explained by the relationship between exposure and accident or injury rate.

State of the economy, personal welfare, land use and urban sprawl, vehicle-fuel price, quantity and quality of road infrastructure, degree of road network saturation and car utilisation are just some of the features influencing mobility (and thus exposure to risk).

Accident frequency and severity rate are on the other hand affected by safety of vehicles and the road network, traffic conditions, adequate legislation and level of enforcement, human factors with personal acceptance of risk as most important, level of societal safety (safety culture), political involvement and numerous other factors.

Figure 1.2 shows the road safety development of the SEC Belt countries in the period 1991-2003.

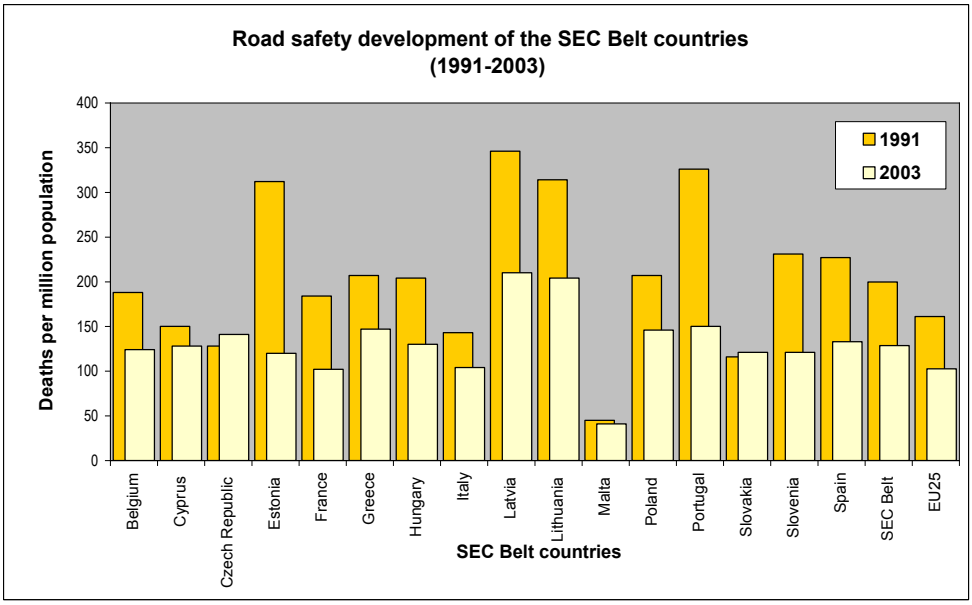


Fig. 1.2 Road safety development of the SEC Belt countries

Searching for historical background of road safety in the SEC Belt countries, some similar historical, social and economic environments have been identified to group the countries as follows:

- group I, Baltic countries: Estonia, Latvia, Lithuania;
- group II: Czech Republic, Hungary, Poland, Slovakia and Slovenia;
- group III: Cyprus and Malta;
- group IV: Belgium, France, Greece, Italy, Portugal and Spain.

A summary analysis of road safety history of the four Groups of SEC Belt countries follows.

1.1 Group I: Estonia, Latvia and Lithuania

Fig. 1.3 Group I of the SEC Belt countries

Though they may seem to be one homogeneous entity, the Baltic countries (Figure 1.3) are very different in terms of history, religion and language. From the transportation and mobility viewpoint they have some similarities regarding

low population density (46 people/km^2) combined with a model imposed by the former Soviet Union.

Road safety in these countries stems from a rather turbulent motorisation history of the pre-independence, transition and more recent periods. Consequently, it is reflected in the worst figures of the four selected groups though Estonia reveals a safer record. Road infrastructure was neglected in quantity and quality. Vehicle stock was old and badly maintained. Travellers relied mostly on public transport. Transport and traffic safety organisations were under-developed.

After the transition period the recovered economy boosted motorisation and personal car use with many inexperienced drivers on the roads adding to the problem of human adaptation to achieve safe traffic.

In the last decade impressive changes in the transport sector have been made resulting in large decreases in deaths in the period 1990-2003 (62% for Estonia, 39% for Latvia, 35% for Lithuania). Nevertheless road safety progress of Group I countries will still be hampered by the problems mentioned above.

1.2 Group II: Czech Republic, Hungary, Poland, Slovakia and Slovenia

Fig. 1.4 Group II of the SEC Belt countries

In these countries (Figure 1.4), also very different in terms of history, religion and language, early economic and mobility demands produced a longer motorisation period.

The way of treating the road safety problem has been historically inadequate, as the awareness of the road safety problem was rather low and the political support and commitment have historically been insufficient.

The road death indicators for these countries show better safety conditions. Though starting with only fair road quality and quantity and aged vehicles, they have accelerated infrastructure investment and modernised vehicle stock.

1.3 Group III: Cyprus and Malta

Fig. 1.5 Group III of the SEC Belt countries

Group III comprises two Mediterranean island countries isolated from transit road traffic (Figure 1.5). They have developed distinctive transport conditions with a longer history of motorisation. Though their road transport has similar performance like Group IV countries, they have to be observed separately regarding the environmental conditions that have to be noted with respect to safety development in the future.

1.4 Group IV: Belgium, France, Greece, Italy, Portugal and Spain

Fig. 1.6 Group IV of the SEC Belt countries

This group of countries (figure 1.6) has a long motorisation history with transport development like that of the EU member countries with higher safety levels. Yet their road safety is not satisfactory. A brief analysis is unable to reveal the obvious hindrances on the way to better road safety. Most has been done by way of engineering, while other aspects have been neglected. Very recently, important initiatives have been set up in France (a strong political commitment and speed limit enforcement) and in Italy (the National road safety programme).

1.5 Evolution of road safety in the four groups of SEC Belt countries since 1991

Road safety in the SEC Belt countries has improved over the decade with considerable differences in safety levels between the four groups. Highest safety improvements have been achieved in Group I and Group IV countries (Figure 1.7).

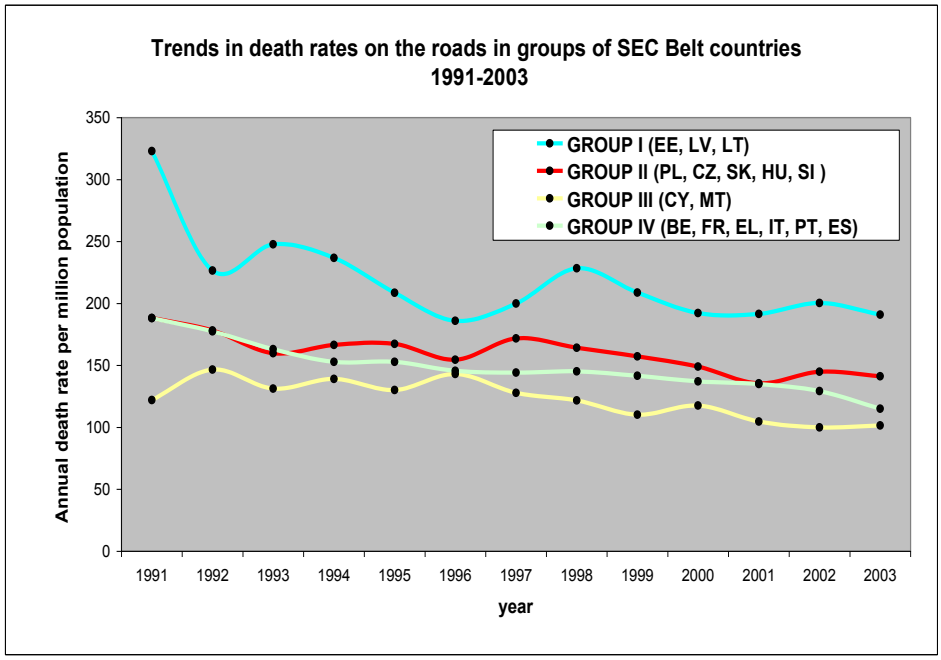


Fig. 1.7 Trends in death rates on the roads in groupings of SEC Belt countries

Changes in the vehicle stock show increases in private vehicle and decreases in public transport fleets within Group I and Group II countries (Figure 1.8).

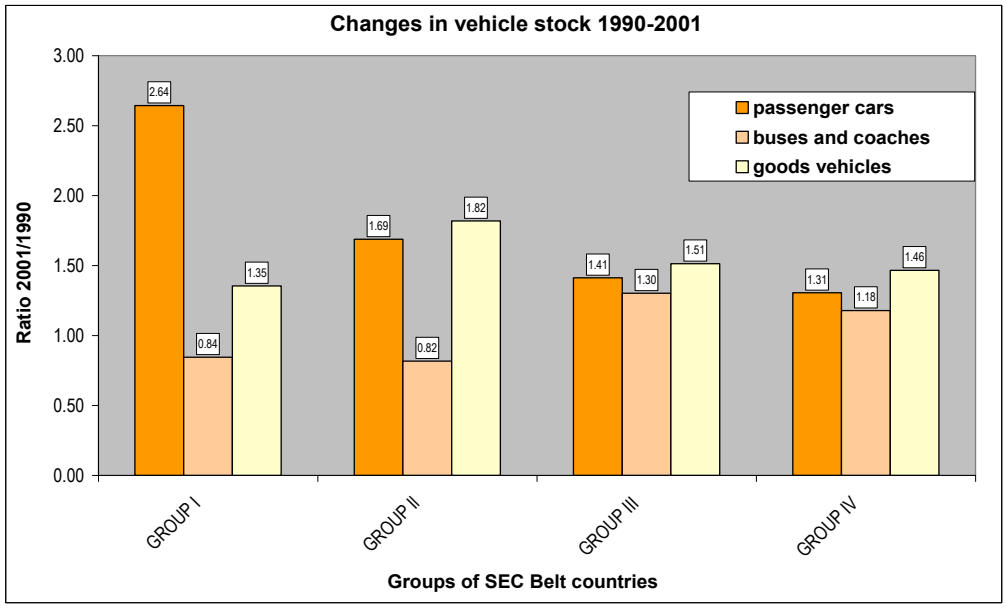


Fig. 1.8 Changes in vehicle stock

Fastest development of road infrastructure is observed in the Baltic region (Group I), with rapid development also in Group IV (Figure 1.9).

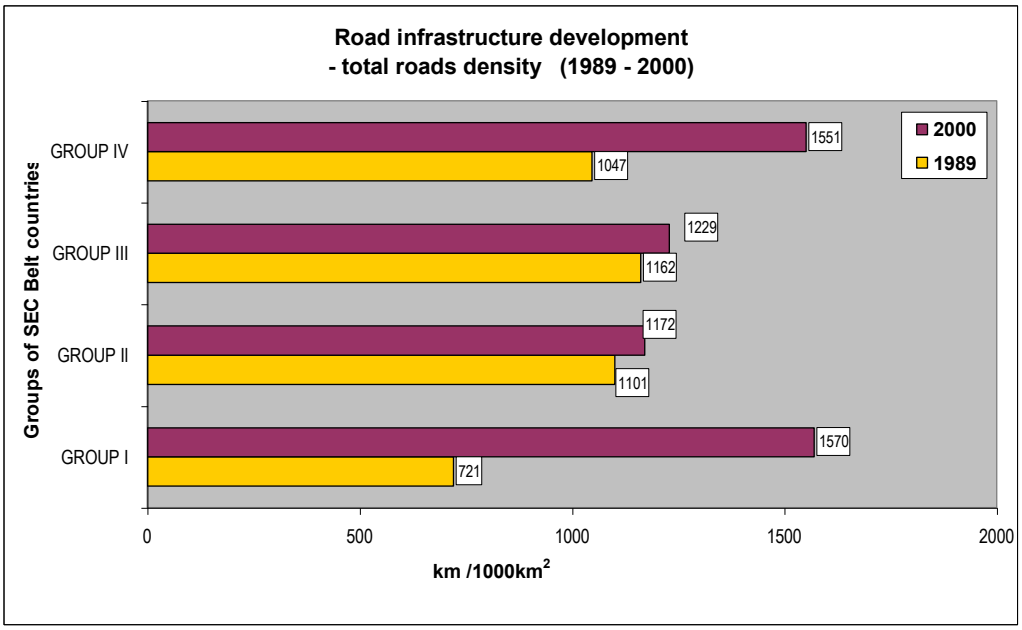


Fig. 1.9 Road infrastructure development

Group I shows a more rapid increase in motorisation than the other groups of SEC Belt countries (Figure 1.10).

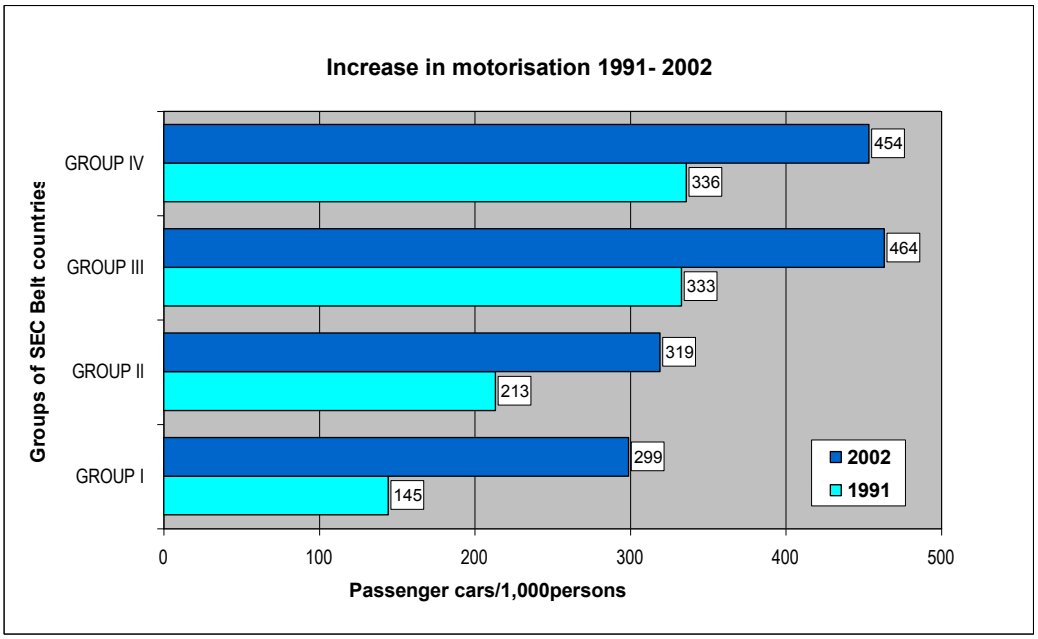


Fig. 1.10 Increase in motorisation

Development of the safest form of road infrastructure is demonstrated by motorway density in Figure 1.11.

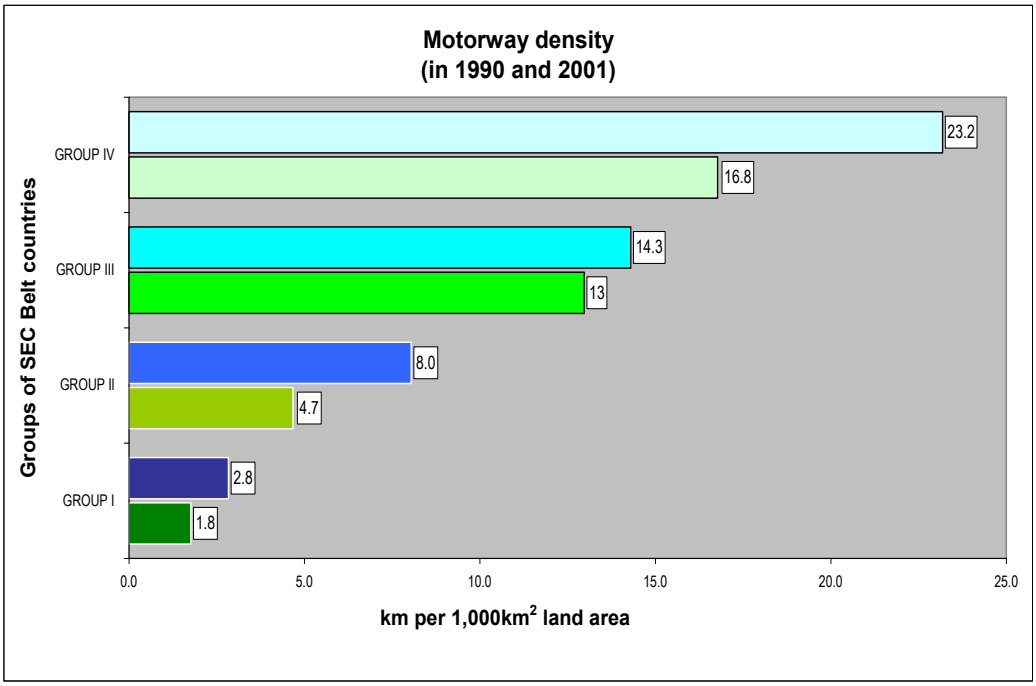


Fig. 1.11 Motorway density

In general, the historical background of road safety in the new EU member countries in Groups I and II differs from other SEC Belt countries. Most of them had, after gaining independence, emerged from the period of economic transformation and liberalisation with growing GDP, though still behind the EU average. Transport systems encountered modal shift, from rail and public transport towards road goods and dominating private car transport. Increasing mobility on inadequate road infrastructure contributed to aggravated road safety conditions. As a consequence, depending on political awareness and will, road safety measures have been applied to the extent of the existing organisational ability. The effect of previously delayed motorisation resulted in aggravated road safety levels in Group I and II countries. Furthermore, a need for replacement or adaptation of transport infrastructure and vehicles can be inferred indirectly from the foregoing graphical comparisons. The specific road conditions of Cyprus and Malta with high density of population and limited land use possibilities require considerable investments and time. For the Group IV countries infrastructure seemed to be less of a problem.

In general road traffic laws in the SEC Belt countries were promoting road safety, though speed management in the urban areas was not yet an issue. The prevailing problem was the level of road users' compliance with the laws. Enforcement gave priority to monitoring speeding and driving under influence of alcohol.

While most of the countries had school road safety education programmes, the problem of personal acceptance of risk has mainly been tackled through the penal approach.

Finally, government can contribute to the road safety learning process of individual road users and society as a whole by taking a do-nothing approach that prolongs this process or by activating appropriate road safety policy that may substantially improve safety. The historical background can be seen as consistent with road safety in most cases not having been on the list of the primary governmental political issues of the SEC Belt countries in the early 1990s.

2. Road safety policies in four countries

In order to better illustrate existing road safety policies in some SEC Belt countries, four examples have been described of countries in Group II and Group IV.

The logical approach the four authors have followed is that of Chapter 4, which describes a framework for the development and implementation of road safety policies. Nevertheless each of them focuses on what they consider the most relevant issues.

The description of the developments in the four countries shows that they may still have more problems than successes in the organisational structures, in fund raising, legal conditions, technical schemes and professionalism.

In the last few years all these countries have introduced a number of schemes, thanks partly to participation in European funded projects and benchmarking with other more successful countries. Nevertheless, different approaches and attitudes to road safety are still present, and the results of the country's road safety management system are sometimes far from the outcomes to be hoped for.

The four contributions in this Chapter, and the best practices examples that will be described in Chapter 3, are offered as illustrations of specific instances of what was outlined in Chapter 1 for the SEC Belt countries as a whole.

The views presented in these contributions are solely those of the authors, and are not to be understood as an official position of their countries, a collective output of the authors of this review, or the view of ETSC itself.

2.1 Evaluation of road safety policies in the Czech Republic [1]

The way of treating the road safety problem in the Czech Republic has been historically neither sufficiently complex, nor analytical. Recent breakthroughs in the system as a whole must, however, be seen from both negative and positive sides.

The awareness of the road safety problem in the country is rather low, as strong political support and commitment have historically been insufficient. Although the current Minister of Transport declares road safety to be a key part of his politics, the actual support which his policy receives from the Government is definitely insufficient. This applies not only for objective financial needs, but also for political support in approving new legislation. An example is provided by a lengthy process of approving amendments to the Road Traffic Act including among others the introduction of a penalty point system.

[1] By **Jaroslav Heinrich** and **Vojtech Eksler**, CDV, Brno (CZ).

Because road safety has been always understood as a government responsibility, the active involvement of other stakeholders is almost imperceptible. As exceptions can be seen some initiatives coming from the public and private sector, like the sponsoring of different media campaigns (usually prepared and driven by the Ministry of Transport). Some fruitful partnerships exist between the Ministry and insurance offices or alcohol producers. Various other professional groups have made contributions to road safety practice through the dissemination and distribution of good practices. The campaigns introduced by the government in the last few years have, however, not been addressing effectively enough the target groups of road users and their real impact on behaviour changes is marginal. Important roles have begun to be played nowadays by journalists, who have understood the philosophy of "shared responsibility" and contribute by giving enough space to serious discussions on particular road safety problems.

A relatively small number of non-governmental organisations are involved in the road safety debate in the Czech Republic. Although the country has, unlike most other EU 25 countries, its own research institute dealing systematically with road safety issues, its influence on traffic safety policy is rather marginal, since the acceptance of scientifically based studies among policy-makers is very small.

It might be that the experts are not given enough space to present their conclusions, although some of them are of a high quality, being based on international knowledge and exchange of best practice. For the involvement of the public, the following can be stated: people are typically as much concerned as the problem affects them personally, which actually happens rather rarely.

At the national level, the Czech Governmental Council for Road Traffic Safety (CGCRTS) is a governmental advisory body established to coordinate traffic education at all levels, to prepare relevant publications on road traffic safety, to promote the importance of road traffic safety and to coordinate activities of various bodies. After reorganisation in 2000, it has come under the responsibility of the Ministry of Transport and has changed from being solely an advisory body to an advisory and coordination body. This change was brought about through a recommendation of a report from World Bank Experts and other international experts.

In the second half of the 1990s, work started on a System Programme on Road Safety, and as a result, the first national road safety programme for the Czech Republic has been unveiled. This contains the proposal for different measures to be taken to reduce a rapid increase of road accidents which started in 1986. Based on the System Programme the new Action Programme on Road Safety was approved in 2002, but only some of the proposed measures were taken into account. Later, in the light of a common European Road Safety Policy, the Government has approved the National Road Safety Strategy (NRSS) in April 2004 as a key document defining the future work in the different key

dimensions of road safety work. The strategy did set both short and long terms goals and in its nature can be seen also as a government philosophy about the safety of the future transport system. One-year goals are then defined in Road Safety Action Plans, which exist at both national and regional level, as the regions are encouraged to set their own targets within the NRSS.

Regarding the NRSS, the following management model was applied to efficiently coordinate work of all interested organisations: the Ministry of Transport has the leading function, including the responsibility for allocation of resources. The Ministry should provide a complete know-how base for work at the local levels. Non-governmental as well as other non-profit organisations should be directly subsidised by means of state grants. Recently, the Road Safety Council has been set up to coordinate its implementation. Furthermore, a new Road Safety Foundation has been established to support particular road safety measures requiring allocation of financial resources.

The strategy aims to halve the number of road deaths over the period 2002-2010, which is in accordance with the goal of the EU set in its White Paper. It provides an indication of how a 50% reduction in the road death rate could be achieved, based on plausible estimates of the effects of known measures. After allowing for increases in vehicle use and for the overlap when different measures are implemented in combination, indicative estimates were provided for the contribution of different types of measure to the overall target.

Not only have long-term targets been set, but also intermediate goals were defined within the document. The strategy itself is very precise and elaborate in details, as it allocates countermeasure responsibilities and defines reasonable funding of its particular parts. However, it does not provide sufficient insight into the sharing of funding among the different administrations and other actors and fails to delegate full responsibility for their roles to the stakeholders.

The choice of particular measures to be applied, whether as a part of the NRSS or the National Road Safety Action Plan, is based first of all on international experience and particularly on sound evaluation studies, taking into consideration cost effectiveness of the measures. However, the use of the cost-benefit and cost-effectiveness analysis at all the governmental levels is exceptional.

Police enforcement throughout the country used to be ineffective until 2003, because the authority of the police was slight, the fines small and the reputation of the traffic policemen low. Some improvements in this field have been achieved by increased police checks through regular unannounced traffic police actions covering the whole country. Effective enforcement systems for the issues with the highest death reduction potential such as alcohol screening, automatic speed cameras, and seatbelt and restraint enforcement, have not yet been adopted in the Czech Republic, partly due to legislative obstacles, partly due to the limited capacity of the traffic police.

Poor communication and legislative barriers between stakeholders have to be emphasised as they represent major restraints on effective work towards road safety improvements. This can be demonstrated by the limited possibilities to evaluate and to monitor the actual progress made in the field, where the experts have to face problems with access to the accident data and with their reliability. This applies especially to in-depth accident analyses of data containing personal information on participants.

The process of monitoring and evaluating progress in reducing the road casualty toll is limited by the basic reporting of traffic accident data, which is not scientifically-enough based and is not made transparent by making public its results.

Nevertheless, the problem comes from the lack of reliable exposure data and of consistent road safety performance indicators. The recent knowledge base is limited and does not provide enough information for both researchers (and, a fortiori, policymakers) and other stakeholders. A road safety information system began to be built in 2004 in connection with the EU 6th FP project SafetyNet and the Czech national project "Observatory".

There are few positive points in the road safety system, for example there is no effective emergency response chain positively mitigating crash consequences, nor is there a well-established system of recording road accident data. As the public starts to see speeding and drink driving as antisocial and the public awareness systematically grows, the way is open for new fresh ideas and further improvements.

2.2 Evaluation of road safety policies in Hungary[2]

In accordance with the chapter on "Road Safety Improvement" of the "Hungarian Transport Policy from 2003 to 2015" approved by the Government in March 2004:

"It is a goal to reduce the 2001 number of personal injury accidents by 30%, and of the accident deaths at least by 30% by the year 2010. By 2015, these numbers should decrease by 50%, the percentage of reduction of the number of victims the EU White Paper prescribes".

This goal is not well known to Hungarian society, not even among some experts. On the one hand, these targets are very modest in comparison with the EU or ECMT ones and they imply further deficiencies in comparison with them. On the other hand, unfortunately, it has to be said that they are realistic at the moment, when road safety is not really of a high priority.

[2] By **Péter Holló,** Institute for Transport Science (KTI), Budapest (HU).

In this assessment of Hungary's road safety policy, efforts are made to call attention primarily to deficiencies and problems.

It is essential for the improvement of road safety to make the public and the decision-makers sensitive to road safety problems, and to try to make the countermeasures appear in such a way as to get the public to demand actions and exert pressure on the decision-makers and authorities.

Maybe the greatest backlog can be found in this field. In fact, neither the public nor the decision-makers are really interested in road safety problems. The acceptance of measures that are "popular" in the short-term (e.g. increasing of the speed limits) is higher than that of real countermeasures.

It would be important to use for the improvement of the situation the results of the national and international research programmes. Here too, the backwardness is considerable. Decisions are made without impact analyses; it is not rare that independent expertise is only taken into consideration if preliminary decisions (popularity-based political viewpoints) are supported by them. Consequently, co-operation and communication among researchers and decisions-makers must be improved. An independent body should be created in order to monitor the measures taken and compare the real results and the objectives laid down in the road safety programme. Unfortunately, this organisation is missing. The establishment of a high-level co-ordinating organisation independent of the ministries would be necessary.

An efficient management and enforcement system must be implemented for the execution of those countermeasures which make possible the maximum decrease in the number of deaths in road accidents. Severe deficiencies can be found in this field also, as shown by the fact that the supply of staff and equipment to the traffic police is insufficient in relation to the number of vehicles and population and the length of the public road network, so that the probability of catching in the act is not adequate. As a result, the demerit point system has become stricter: higher and differentiated numbers of points in accordance with the severity of traffic offences. It is also a positive change that the non-wearing of safety belts can have the consequence of getting points.

The decreasing trend of wearing rates has been broken; from 2000 on there is a slightly increasing trend (Figure 2.1). In spite of the increasing number of personal injury accidents in 2004, the number of people killed as car occupants decreased from 640 (2003) to 606 (2004). This may be the result of the increased safety belt wearing rate.

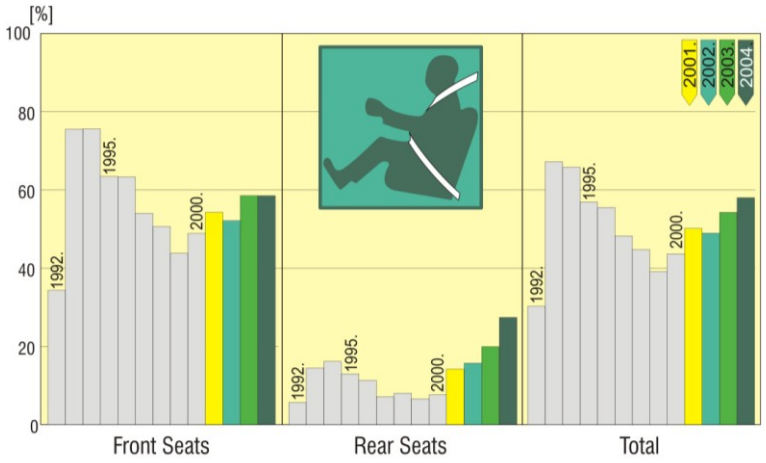


Fig 2.1 Changes in the safety belt wearing rates from 1992 to 2004

In spite of the improved demerit point system it can be said that without enhanced presence of the police no major result can be expected. However, it is unfortunate that in connection with EU accession, on the spot withdrawal of the driving licence by the police has been encumbered.

Taking account of the unsatisfactory level of police enforcement, it would be very important to create the legal framework for the application of automatic speed cameras. For the moment, this is impossible in Hungary, because not the owner, but the driver of the vehicle is responsible for traffic offences. It would be also very important to introduce the new and cost-effective ways of police control (for example section control).

Notwithstanding the fact that Hungary has already proved once that it is not impossible to reduce the number of killed in road accidents by 50% within 10 years (from 1990 to 2000 the number of road deaths decreased from 2,432 to 1,200), on the basis of the data of the last 4 years the feasibility of the current EU objective in Hungary seems beyond all credibility (Figure 2.2).

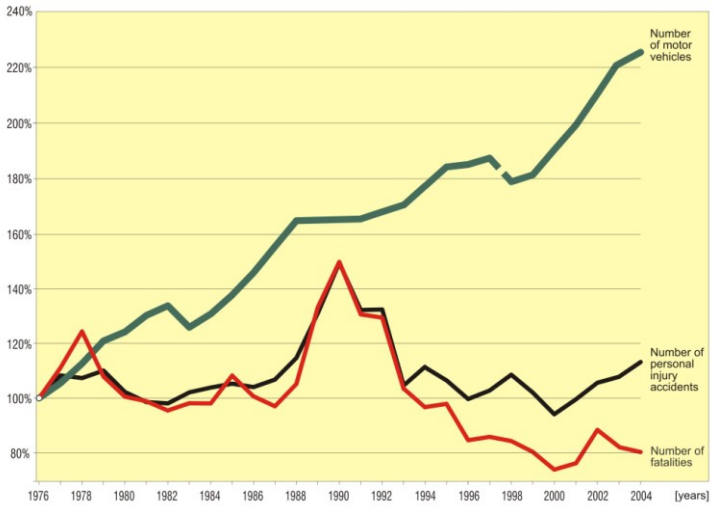


Fig. 2.2 Changes in the number of vehicles, personal injury accidents and road accident deaths between 1976 and 2004.

On the basis of this assessment, the following suggestions can be made for the improvement of the road safety situation in Hungary:

1. Evaluation of the National Road Safety Programme approved in 1993 was carried out some years ago with clear proposals for the future activities. Accordingly, the earliest possible decision should be made in connection with the Programme's revision, the setting of a new quantified target, eventually the national adoption of the EU's or CEMT's goals. To this end, the EU programme needs to be adapted to Hungarian circumstances. The elaborated programme – together with quantifiable targets – has to be widely disseminated and accepted.
2. The institutional and organisational background engaged at present in management and responsibility is not optimal. In many countries, one of the ministries (of home affairs or transport) is responsible for road safety; in Hungary it is not obviously defined on which of the ministries the main responsibility in this field falls. This causes a basic problem that the ministries assess their own activities and no emphasis is laid on detailed, objective and independent analysis of the road safety situation. Just as the evaluation of the different ministries' work is a matter for professional interpretation and presentation, so the co-ordination of their activities would also be the task of a high-level organisation, independent of the ministries.
3. Resources for road safety improvement should be increased, and the principles of cost efficiency should be applied during utilisation.
4. Dialogue between decision-makers and researchers should be improved. Basically, the tasks should be determined by professional concepts and decisions.
5. Of course, in the subject of drivers' training also – being the efficient element for influencing the behavioural factors – road safety considerations, basically the selection of the safe speed and in general the strict requirement to obey the rules must be given a greater role.
6. Nowadays, in the field of road safety the "letting the genie out of the lamp" is witnessed. For example the "message" given by increasing the speed limit severely worsens drivers' behaviour; an impatient, aggressive driving style is spreading widely. Previously, the situation could still be influenced positively notwithstanding the insufficient number of the police force. This is less the case now. Development of effective speed management would be of primary importance.
7. The presence of police needs to be enhanced considerably. Determined, severe policing is required which consistently enforces the most important rules (speed limits, ban on alcohol consumption, wearing of safety belts).

2.3 Evaluation of road safety policies in Poland [3]

Over the last 15 years more than 98,000 people died on Polish roads and more than 1 million were injured. Poland continues to be among Europe's high risk countries. Its road safety record is best described by the indicator deaths per

[3] By **Ilona Buttler,** Motor Transport Institute, Warsaw (PL).

million population: 150 killed annually per million population in Poland while Europe's top performers in safety have reached the level of 62 (the Netherlands, United Kingdom, Sweden).

Since 1997 (with small exceptions) Poland has seen a gradual drop in the number of accidents, killed and injured (Figure 2.3). The number of recorded damage-only accidents, however, keeps growing.

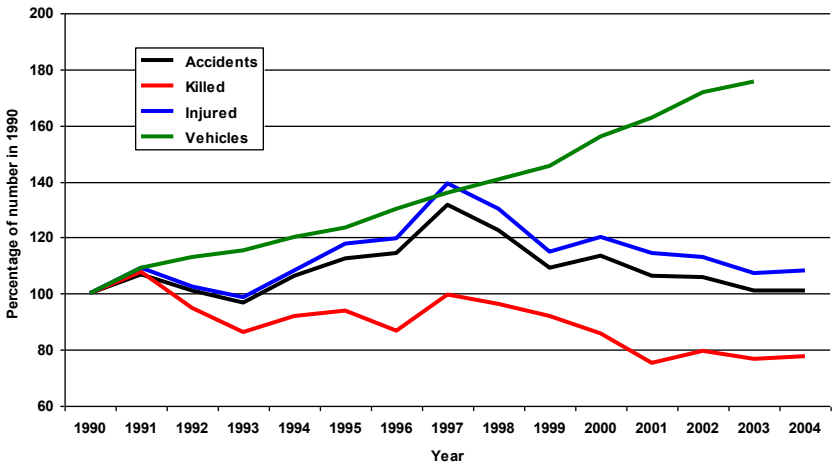


Fig. 2.3 Changes in the numbers of road vehicles, accidents, and people killed and injured in Poland between 1990 and 2004 (1990=100%).

With passenger cars being gradually replaced with more modern and safer vehicles and protective devices used more widely (safety belts, airbags), the severity of accidents drops but the sources of risk remain the same. Specialists believe that economic factors also play a role (e.g. high unemployment rate, low income) and predict that in the years to come, as the economy gets better and the number of accidents goes up again, the level of risk on Polish roads could continue to grow. Data from 2004 seem to confirm the prognoses and show that the progress Poland was making in reducing casualties has lost impetus. Last year there were 51,069 road accidents, 9 (0%) less than in 2003. The death toll in these accidents was 5,712, which was 72 (1.3%) more, and 64,661 people were injured – 761 (1.2%) more. The police received reports of 424,938 collisions, compared to the previous year's 367,700. Consequently, if Poland wants to continue its involvement in the EU's road safety programme, it must make some radical changes to its road safety policy.

The road safety management structure

Responsibility for road safety rests mainly with two ministers: the Minister of Infrastructure (who is responsible for the national transport policy, supervises the Director General of National Roads and Motorways and the Chief Inspector of Road Transport, and is also the Chairman of the National Road Safety Council) and the Minister of the Interior (who is responsible for public administration and the immediate authority for the Chief of Police). In Poland, as in many other European countries, road safety is the responsibility of other ministries as well.

Since 1993 Poland has had the Road Safety Council, an inter-ministerial body assisting the Council of Ministers on road safety issues. In January 2002 the Council and its functions became regulated by an act (Road Traffic Law Act), and some of its activities were modified. The National Road Safety Council (NRSC) is chaired by the Infrastructure Minister, his deputies are under-secretaries of state at the Ministry of Infrastructure and the Ministry of the Interior. Members of the NRSC are nominated by the Prime Minister and represent the Minister of National Defence, Minister of Justice and ministers appropriate for public administration, the state budget, public finance, the economy, spatial planning and housing, education, the environment, transport, labour and the Chief of Police, Chief Commander of the State Fire Service, Director General of National Roads and Motorways and the regional representatives of central government. The NRSC and Regional Road Safety Councils (RRSC) can also involve representatives of non-governmental organisations, researchers and independent experts, but these can only act as advisers. The NRSC works through a Secretariat, which is part of the Ministry of Infrastructure.

The NRSC is the policy-maker and coordinates the government's road safety efforts. Its tasks include proposing governmental policies, developing road safety programmes, initiating research, developing and evaluating acts of law where they cover road safety, collaborating with voluntary organisations, non-governmental bodies and international bodies, analysing and evaluating schemes, and reporting annually to ministers.

RRSC are established in the sixteen regions. Their job is to coordinate the work of regional authorities at various levels. They have responsibility for developing regional road safety programmes, for approving the budgets of regional driver examination centres, which have the power to spend some of their fee revenue on road safety improvements, for analysing and evaluating schemes. Every year by the end of January the RRSC are required to submit their reports.

One reason why Poland chose this road safety management structure was the need to obtain a stronger involvement from the government and local authorities in road safety work. However, Poland's changeable political situation and the variety of problems it faces meant that road safety never became a priority issue for the top state authorities (Parliament, Government). The interest regional authorities take in road safety varies from region to region. Those regions which successfully developed regional road safety programmes (5 of 16 regions) show some more involvement. There is minimal involvement from non-governmental organisations and local communities in the delivery of the governmental road safety programme. It seems that Poland has not developed a way to involve these communities and the governmental programme itself has not provided for such involvement. Finally, getting the interest of the private sector in accident prevention has not been much of a success.

The basis for Poland's accident prevention policy

Poland's efforts to reduce the negative effects of motorisation have a long history, with some of them going back as far as the sixties, i.e. before motorisation really took off in this country. In the seventies and eighties a number of more or less detailed road safety programmes were developed in Poland.

Some of the programmes were elaborated by central bodies with an overall responsibility for road safety, others by ad hoc consultation bodies and still others by some of the numerous voluntary organisations. The result was a specific road accident prevention philosophy that neglected the need for systemic solutions to help with programme implementation (organisational structures, funding, legal conditions, technical arrangements).

First attempts to change the situation began in the nineties. In 1996 Poland's first integrated road safety programme GAMBIT was developed. Looking back, the biggest advantage of the proposed programme was its road safety philosophy, a novelty in Poland at the time. In general terms, the new approach:

- gave a clear quantitative target for the programme. GAMBIT set a target of reducing the annual number killed to 6,000 over the next 5 years despite growing motorisation;
- concentrated on problem solving rather than on preventative measures. GAMBIT identified seven problem areas: speed, young road users, drunk road users, vulnerable road users, severity of accidents, through traffic roads passing through small towns, accident concentration sites; a set of preventative measures was developed for each problem area;
- tackled problems comprehensively; when planning preventative measures account was taken of education, legal regulations, enforcement and engineering solutions to create coordinated schemes. In practice the idea was to deliver 3 Es (Education - Enforcement - Engineering) schemes, because they are more effective and efficient with the final outcome greater than the sum of individual projects;
- helped select preventative measures in a uniform manner. Of the wide range of measures the ones proposed had to be effective, efficient, feasible in Poland and acceptable for the public;
- helped deliver schemes in a uniform manner; the following sequence was to be followed where possible: diagnosis of the problem, pilot implementation, evaluation of effectiveness, promotion of the scheme among the public, comprehensive delivery of the measure, increased police enforcement, monitoring and more comprehensive evaluation of effectiveness with possible modifications.

Another important advantage of GAMBIT was its proposed road safety management system and the fact that it pointed out the need for public acceptance of road accident preventative measures. There is no doubt that

GAMBIT was a strategy programme and one that aimed to regulate a number of different issues around road safety in the broad sense. The programme was approved by the National Road Safety Council (1996), however it was never adopted as a governmental programme or implemented. Despite that, some years later many of the official documents were happy to quote the programme and a number of Poland's schemes were regarded as part of GAMBIT delivery. Therefore, it is probably safe to say that developing the integrated road safety programme fulfilled a marketing role, but was unable to change the way preventative measures were run in Poland.

In May 2001 the updated programme, called GAMBIT 2000 was approved by the Council of Ministers. GAMBIT 2000 puts forward two targets for preventative measures:

- a short-term target (to reduce road accident deaths to 5,500 in 2003),
- a long-term target (to reduce road accident deaths to 4,000 in 2010).

Although the figure has not been met (in 2003, 5,640 people died on Polish roads), the first three years of this millennium (compared to 2000) saw a reduction in the number of road accidents by 10.9%, the number of killed by 10.4% and injured by 10.8%. What seems much more difficult is the question whether the reduction is the result of a consistent state policy and programme or whether we should look for the reasons elsewhere. A careful analysis of the documents available shows that a definite majority of what GAMBIT 2000 planned to do has not been implemented at all. The programme has not gained more government support or involvement. The situation in Poland seemed quite simple – the government had a road safety programme with clear targets, but real prevention was happening outside the programme framework. Over the last few years the situation was not seen as a cause for concern, the prevention policy was recognised as effective, because of the gradual reduction in deaths over the last few years. The increase in road accident deaths in 2004 and in the first months of 2005 came as a reality check.

In April 2005 the government of Poland adopted a revised road safety programme, GAMBIT 2005. The programme's target is that by 2013 Poland will reduce the number of deaths by 50%, to 2,800 people (2003 is the year of reference). The problems of road safety have also found their way into other proposed governmental documents: the National Transport Policy 2005 – 2025 (it proposes the adoption of Vision Zero in Poland), National Development Strategy and Strategy for Transport Development 2007-2013. The new policy papers are necessary but cannot replace a consistent action to implement preventative measures, a problem Poland is not tackling sufficiently.

Funding accident prevention schemes in Poland

For years Poland's accident prevention efforts have been funded from a few unrelated sources, i.e. from ministries, central agencies, local authorities,

insurance companies and state-owned enterprises. Recently, some of the accident prevention efforts have been receiving funding from World Bank loans, from pre-accession and EU money and from private companies (e.g. Renault, Shell or the Polish Zywiec brewery). The funding is not coordinated and the measures ordinarily chosen include low cost road schemes, equipment purchases for the police and promotional and educational measures mainly addressed to children. The decision which preventative scheme to choose is usually made by the entity that controls the funds. The result is a lack of consistency in the measures applied, hardly any reliance on research and very little correlation with the governmental road safety programme. The system Poland has for funding accident prevention work makes the implementation of long-term, integrated road safety programmes almost impossible. It is not helpful in monitoring Poland's road safety developments or evaluating progress. Despite many attempts Poland has not succeeded in establishing a separate Road Safety Fund. It seems that one of the reasons for the lack of success is that governments are reluctant to come up with an organised funding system and allocate public funds for road safety work. Another reason is the lack of interest from Poland's major insurance companies. Poland's accession to the European Union has not had much effect on the situation. An initial analysis of the funding criteria of the European Regional Development Fund and the Cohesion Fund shows that the funding would be available to pay for only some of the elements of the road safety programme. In other words, the problem of road safety funding is still very much an unsolved one.

The substantive basis for the schemes

Poland underestimates the role of road safety research and there is hardly any money available for research, with the effect that in recent years Poland has conducted little research to analyse the various road safety problems. As regards real road user behaviour research the most important study was commissioned by the Ministry of Infrastructure and covers regular speed and safety belt usage studies. It started in June 2002. Speed is measured on major rural roads only where the speed limit is 90 km/h, on major streets of regional capitals and major cities (60 km/h), and in small towns crossed by through traffic roads (60 km/h)[4]. Safety belt usage is studied only on main roads of regional capitals. There are very few public opinion polls. Recently, Poland has been involved in the SARTRE project and had a few public surveys (e.g. to study aggressive behaviour, use of safety belts and child restraints). The results of the studies are only used ad hoc, as part of promotional efforts. Most of the studies in Poland covered road infrastructure. The results are not easily available and offer a varying degree of reliability. Most of them were funded by the General Directorate of National Roads (on national roads) or were conducted by university students as part of their practical training. There is no doubt that one of the most serious deficiencies of Poland's accident prevention work is that there is no strict correlation between research results and the delivery of the government and regional road safety programmes.

[4] The 50 km/h speed limit in built-up areas was not introduced in Poland until May 2004.

System for monitoring and evaluating the effects of accident prevention measures

Poland has been collecting road accident data since the mid fifties. This is the job of the Police. Although Poland uses the European definition of road traffic death, its definition of injury is imprecise. Poland has no scale of injuries either. Since 1991 the road accident database has been computerised. Source data are kept at the Motor Transport Institute, among others.

The data collected by the Police are hardly ever verified, which leads to errors and missing information; the database does not include information from the health care system or insurance companies. Access to more detailed information in the database can be difficult (one reason is that the software the Police use can only perform certain analyses).

For a few years now regional databases have allowed records of damage-only accidents. But the number of records really depends on the motivation of the police officers and how much staff is available for the job. The result is that the regional databases may differ from region to region. Accident data are collated at the central level. Poland has a database for the penalty point system, but it is used by the Police only. Under way are vehicle and driver databases. Another problem still to be solved is collecting safety performance indicators and exposure data. It seems that while some of the data are collected by organisations in Poland, they are not used for practical work.

There is practically no such thing as an independent evaluation of measures and their effectiveness with both the delivery process and effects evaluated by those running the scheme. The result is that nearly every scheme is considered as a success. In recent months, the Motor Transport Institute began work on a project to launch a Polish road safety observatory. If established, the observatory would solve at least some of the problems, but it is still very much in the fledgling state.

Conclusion

This abridged description of the developments in Poland shows that the country still has more problems than successes. In the last decade Poland introduced a number of schemes other countries use, there is a different approach and attitude to road safety and road safety awareness has grown, but the effectiveness and results of the country's preventative policy and its road safety management system are far from the expected to be hoped for. The only comforting thing about it is that more and more people in Poland realise that.

2.4 Evaluation of road safety policies in Spain[5]

In a synthetic way, a medical doctor could state that "Spain is one of those countries that has suffered from a motoring intoxication caused by a fast and

[5] By **Jesús. Monclus** , FITSA Foundation, Madrid (E).

late motorisation boom". A similar phenomenon occurred in Germany after the reunification and could be threatening several of the new accession countries (Winston, 1999). The combination of an augmented mobility freedom, economic prosperity, insufficient prophylactic educational and awareness measures and time lag in infrastructure improvements are the reasons underlying this "intoxication". The number of registered vehicles in Spain multiplied by a factor of 6 between 1970 and 2003, while the number of licensed drivers increased by 400% during the same period; on the other side, the number of deaths increased by a comparatively small 10% (Colás, 2004). Figure 2.4 shows the evolution of these factors between 1970 and 2003.

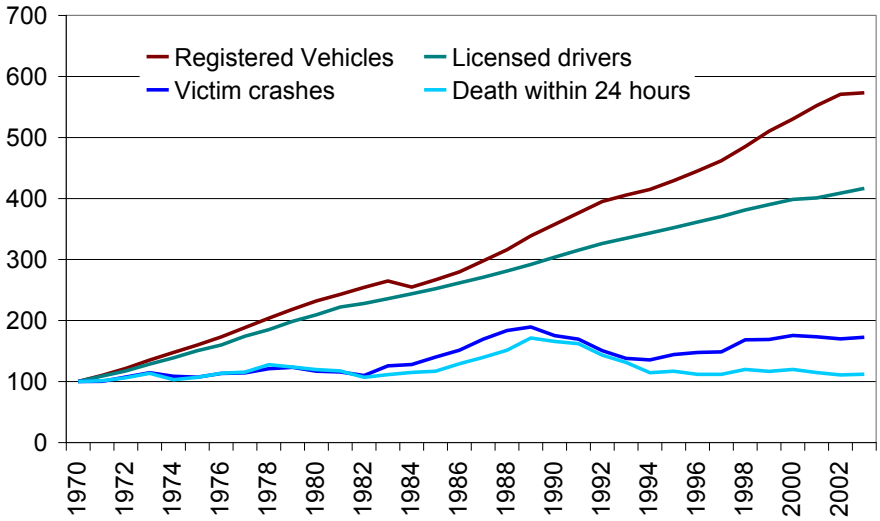


Figure 2.4 Road safety trends in Spain between 1970 and 2003

As for the total number of deaths (lowest line in Figure 2.4), the graph clearly shows the peak value that was reached in 1989, when 7,188 persons lost their lives in traffic accidents in Spain. This year represented a turning point in many aspects: there was a first major awareness awakening in the society and the administration and political spheres also reacted accordingly. The media brought the situation into main headlines at that time, major legislative changes were introduced in the basic traffic safety laws in 1990 and a substantial length of divided roads (partially financed by European cohesion funds) were brought into use in the early nineties.

In 1990 a special commission was created in the Spanish Congress and after 28 hearings with administration representatives and road safety experts this parliamentary commission produced a report with numerous recommendations. One of the main conclusions was the need for a national strategic traffic safety plan.

Reacting to this conclusion, a document was expeditiously prepared based on the measures included in the commission's report and the plan was approved by the Council of Ministers in 1993. This Plan included 61 different actions and, should it have been fully implemented, would have represented a major

milestone in road safety policy in Spain. However, the 1993 Plan lacked some well known vital elements for success: a clear allocation of responsibility for its implementation, in the first place, and enough resources to carry out the measures. It was more a shopping list of desired measures than a true plan with deadlines, budget, and numerical intermediate and final goals.

Without these critical elements any plan, not only a road safety one, becomes almost impossible to manage and monitor. The result was the partial implementation of many of the measures, while others were not put into practice at all. One example of the latter is the penalty point system, already included in the 1993 Plan but still under development after a relaunch of this measure ten years later (the Spanish Congress finally approved the penalty point system in April 2005). Experts estimate the efficacy of the penalty point system as approximately 10%: this means that 10% of the deaths occurring on the roads between 1993 and 2003 (more than 5,500 lives) could have been saved during this period. It is often said that when history is forgotten the chances that events will happen again are much higher: a different parliamentary commission in 2003 suggested again some of the measures already included in the 1993 Plan. The fact that only a fraction of the recommendations proposed by these commissions were finally put into practice clearly shows that a strong link between the work of these commissions and political action is obviously missing.

The Spanish road safety system

Main central government responsibilities for traffic safety are separated into two different Ministries: the Ministry of the Interior and the Ministry of Infrastructure. Directorate General for Traffic (DGT) in the Ministry of the Interior is in charge of vehicle registration, driver licensing, rural traffic management, police enforcement in most of the 17 Autonomous Communities (Spain's second highest administrative level) and updates of general traffic legislation. DGT holds general road safety responsibilities (or powers). The Ministry of Infrastructure is in charge of commercial transport regulations and also of construction, maintenance and operation in the national road network. Other road networks include the regional, provincial and municipal ones. Vehicle technical standards are the responsibility of the Ministry of Industry, Tourism and Commerce; the Ministries of Education and Science, Health and Consumption, Justice and others also play their role in the overall picture.

During the last decade of the 20th Century, two Autonomous Regions assumed full powers on traffic safety: Catalonia and the Basque Country. Powers include their own police agencies in charge of traffic safety law enforcement. The efforts of these two regions to tackle the road safety problem have been remarkable, constituting best practice examples in many areas: both of them have implemented comprehensive multi-year road safety plans, just to mention one. And probably not by pure chance, the Basque Country was the Spanish region that showed the largest reduction in rural deaths in Spain in 2004,

according to DGT's data: a remarkable 42% reduction from 173 deaths in 2003 down to 100 in 2004 (deaths within 24 hours).

In 1997 a Traffic Safety Interministerial Commission was created with the following two objectives: to define the governmental road safety policy in the first instance, and to ensure the implementation of that policy in the second. Currently, nine ministries are represented in the Commission, which meets a minimum of once a year. The Commission approves the National Traffic Safety Plan, on an annual basis.

It becomes clear that a meeting every twelve months to approve a plan with a time horizon of only one year can be considered insufficient in order to steer and monitor a problem so complex as traffic risk (accounting for 5,400 deaths a year).

The National Traffic Safety Plan, as indicated above, is prepared on an annual basis (except for a couple of multi-annual attempts at the beginning of the last decade) by the Traffic and Road Safety Superior Council. This Council was created in 1989 building upon the Traffic Safety Commission that had already existed since 1976. Administration and society meet together in this large gathering of approximately 50 different institutions once a year to approve the proposal of the Plan to be submitted to the Inter-ministerial Commission. Between plenary sessions, the Council interacts mainly by mail. The Council is more active through different working groups, the penalty point system being one of the latest. Supporting the national Council, there are regional Traffic Safety Councils in the autonomous communities (except for Catalonia and the Basque Country, with their own Traffic Departments), but their activities remain in most cases unnoticed, which could be a symptom of low levels of activity. The national Council has very limited human and budgetary resources to conduct its own research, and therefore must rely in many instances on "in-kind" contributions from the working group participants.

As opposed to other countries such as Sweden, Norway and the United States, Spain has not had during the 70s and 80s a national public institute for traffic safety either coordinating or supporting the policy making process. The situation nowadays is substantially different, with several world-class research centres, various private companies, associations and university departments actively conducting road safety research in many areas, although the general task of permanently coordinating, evaluating and implementing that research is still missing. Spain is also the only European country with a strong car industry, a sector absolutely vital for the prosperity of the Spanish economy generating around 12% of total GDP, which has not implemented an in-depth car accident investigation policy: an instrument in place during the last few decades in Germany, France, the United Kingdom, The Netherlands and the Nordic Countries.

Current challenges

Three key current challenges for an effective road safety management in Spain must still be confronted with determination: horizontal and vertical cooperation between the various administrations, medium to long term planning and investing in road safety, and more science instead of opinions and "social opportunities" becoming a more central part of the decision making process.

Cooperation should be further strengthened between central ministries with road safety responsibilities, and what in some instances may seem competition between regional and central administrations should be translated into a much more productive mutual support. The quick transfer of all emergency number 112 administrative responsibilities to the regions without anticipating solid and tight coordination and support mechanisms is just another example of a clear step back in coordination, for instance, with European Commission's projects on e-Call.

Next, more attention should be focused on measures that do not necessarily offer quick political gains, but that on the long term represent the greatest opportunities for deeper and less volatile societal gains: while every single life saved should be regarded as an enormous human victory, and therefore there is no excuse to postpone action, this urgency should never be a substitute for the establishment of sounder basis for future work. Government high level officials under pressure from their top political leaders have in some instance to concentrate more on results to be provided at the end of the year than on medium term, longer range initiatives.

Finally, more transparency and scientific evidence should be brought into the policy making process, in order for citizens and road users to increase acceptance of, confidence in and, as a final goal, support for (sometimes even radical) traffic safety interventions: some of the most recent decisions taken in Spain, such as the automatic recognition of driving licences from non-EU countries with lower levels of driver training, or the possibility of riding mopeds (some of them capable of reaching 120 km/h) with just a passenger car driving licence and no further specific training are not fully understood by many experts and citizens, since they have not been accompanied by independent road safety impact assessments. In fact, an independent body continuously monitoring and overseeing road safety policy in Spain is absent from the general picture; just as non-existent have also been the availability of risk exposure and safety performance data in the last twenty years.

But the light at the end of the tunnel is starting to be perceived. In 2004, a total of 3,511 people died outside urban areas (death within 24 hours), representing the lowest figure in the last 25 years. The death toll was again reduced in 2005, when a total of 3,329 people died outside urban areas (24 hour count). With respect to 2003, the cumulative reduction during 2004 and 2005 represents a

remarkable 17% reduction, percentage that can be compared with other "best performers" during the last few years, such as France. Many actions have contributed to this: a renewed interest from the media partially triggered by a more visible role of the road victims associations but also by other activities in connection with the WHO 2004 Traffic Safety Day and the first signature event for the European Road Safety Charter; the debate and expectations raised after the announcement of the imminent penalty point system (the penalty point system will start in Spain on July 1st, 2006), a renewed style in the Spanish Directorate General for Traffic arising after the general elections in March 2004 (focusing on a variety of actions: highly publicised targeted enforcement, a comprehensive automated radar speed camera deployment, risk awareness campaigns) and some changes in the existing road safety legislation (including higher penalties).

The involvement of the public health community has also been increasing in Spain during the last few years: the Health Ministry signed the first collaborative agreement with the Directorate for Traffic in 2004, reacting (late) to the largest epidemic of the last part of the 20th century in Spain for the young age groups. In brief, improvements in the last few years can be regarded as remarkable, but the time for complacency has not yet arrived because the starting point in many areas was not satisfactory. One more example, enforcement pressure (fines issued per 1,000 registered vehicles) during the first half of last decade decreased substantially (DGT, 2004), as shown in Figure 2.5, surely contributing to the high level of indiscipline still exhibited by many drivers in Spain. Although more impetus is currently being given by the renewed Directorate General for Traffic since 2004, the challenge now is to maintain high levels of enforcement as long as necessary.

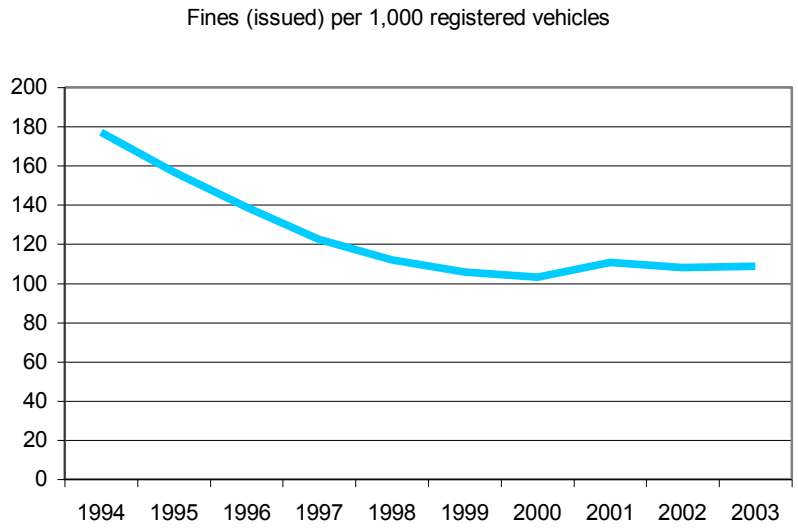


Figure 2.5 Number of fines per 1,000 registered vehicles (excluding data from the two Spanish jurisdictions with autonomous traffic police: Catalonia and the Basque Country).

High level political support should still achieve higher societal visibility in Spain. A general objective of reducing the number of deaths by 40% before 2010 was included in the election programme of the now-ruling party; however a high-profile legislative document accepting and committing to that reduction (such as the Swedish Vision Zero or Dutch Sustainable Safety) is still missing, bringing again the policy back to the old familiar errors. The promise during last general elections of a much-needed traffic safety coordinating agency seems also to have been put off, as the government is currently concentrating on enforcement and road user behaviour: a clear systemic approach to road safety (vehicle, road, user, environment, legislation) is still missing at this point in time.

3. Examples of best practice

Full comprehensive policies are implemented through specific initiatives. Illustrating best practices of both SEC Belt and non SEC Belt member countries may help to better understand the way road safety improvements have been achieved. This chapter shows how single measures are already applied with success and how much these can be relevant to improving road safety. At the same time it is clear that only integrated approaches can result in better achievement of road safety goals and targets.

Firstly, the road safety activities of the best performing EU members, the so-called SUNflower countries (Sweden, United Kingdom and the Netherlands), are shown in order to illustrate a set of measures that have proved to be effective.

Best practices from France, Belgium, Austria, Hungary and Czech Republic follow with the description of single measures or policy applications that contributed to the improvement of road safety.

3.1 Road safety strategies in the SUNflower countries

The SUNflower project is one of the most recent efforts to assess the background of successful strategies in road safety work and constitutes a comparative study of the development of road safety in **S**weden, the **U**nited Kingdom and the **N**etherlands. These three countries currently feature the best road safety levels in the European Union, at a number of 62 deaths per million population (whereas the average for the European Union in 2003 ranges around 114).

The methodology of the study has been designed in such a way that it can be used as a basis for comparative studies among other countries. The risk indicators for the SUN countries can be used as benchmarks for the performance in different areas of road safety, taking into account the different national problems.

Special attention was given to the characteristics of each of the SUN countries (past, present and planned safety policies, quantitative developments) and to specific measures in the fields of drinking and driving, seat belts and infrastructure.

Interestingly, and despite macroscopic similarities such as quantitative targets, the strategies which have produced the comparatively favourable safety performance levels are quite different in these three countries. However, much of the progress has been achieved through directing improved policies to all three areas – road users, infrastructure and vehicles.

One of the major findings of the project was that a direct relationship between enforcement intensity and law violation levels or its consequences in terms of

deaths could be established, specifically for seat belt use and driving under the influence of alcohol (Figure 3.1).

The results from the SUNflower project[6] suggest that EU and all Member States should foster large scale implementation of infrastructural measures as well as intensified enforcement on speeding, drink driving and use of seat belts and child restraints.

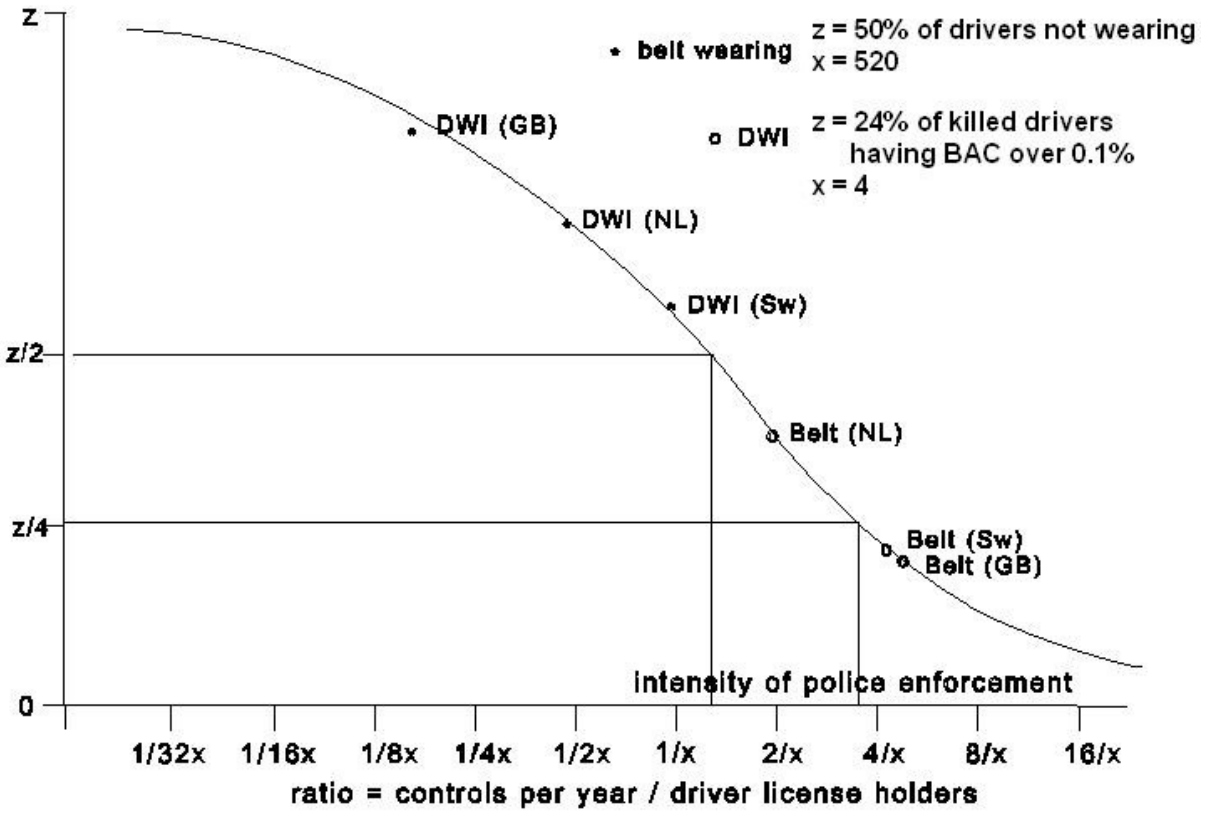


Figure 3.1 Relationship between enforcement intensity and law violation levels or its consequences in terms of deaths in the SUNflower countries (adapted from Koornstra et al, 2002) – DWI = drink driving

[6] http://europa.eu.int/comm/transport/road/publications/projectfiles/sunflower_en.htm

Table 3.1 An overview of some exemplary road safety activities between 1970 and 2004 in the SUNflower Countries

	Sweden	UK	NL
1970-1975	Differentiated speed limits; seat belt obligation cars (front); helmet obligation.	HGV driving test + registration of trainers; new lorry driver working hours; training engineers in accident reduction techniques; helmets obligatory.	Seat belt use and head rests in cars (front) mandatory; helmet obligation; new speed limits (100/80km/h); training demands for driving instructors; BAC limit 0.05%.
1976-1980	Driving test motorcycle; daytime running lights; moped helmet; cycle lights during night time.	Mini-roundabouts; new standards for safety helmets; mopeds 30mph max speed; 60 and 70mph speed limits; tachographs for lorries.	Regulations for seating and seat belt use for children; "Woonerf" (home zones) introduced; reflectors for bicycles; tachographs for lorries.
1981-1985	30km/h sign as recommended speed in 50km/h areas with e.g. speed humps; qualitative safety targets in safety work; seat belt mandatory in taxis (front); C-licence for heavy lorries (instead of B).	Two part motorcycle test + 2 years provisional driving licence; seat belt obligation cars + light vans (front); learner motorcyclists must have <125cc; road hump regulation; code of practice on loads on vehicles.	30km/h zones introduced; periodic vehicle inspection for cars older than 10 years.
1986-1990	Reflectors on cycles; seat belts in back mandatory (adults); 110km/h→90km/h during summer; 90km/h on motorways around cities after summer; 2 years probationary driving licence; blood alcohol limit 0.05→0.02%; trials with automated speed enforcement; child restraint obligation.	DoT sets target of 33% reduction in casualties by 2000 (1987); all new cars to be equipped with rear seat belts/child restraints; special mirrors on HGVs; more penalty points for careless driving, failing to stop or report an accident; seat belts obligatory for children on rear seats; Code of Good Road Safety practice by Local Authority Associations; special scheme for problem drink drivers including medical examination; government funding for local safety schemes; guidelines road safety audit.	Minimum age for theory test (car)=17; licence valid until age=70; periodic vehicle inspection for cars older than 3 years; evidential breath testing; differentiated speed limits for cars and motorcycles 100/120; seat belts required on rear seats.
1991-1995	110km/h on all motorways; "seriously intoxicated"=0.01%; number of breath tests doubled; laser speed cameras introduced; National Traffic Safety Programme 1995-2000 (target: less than 400 killed in 2000); steel wire median barriers introduced on motorways.	All coaches must have speed limiter 70 mph (1/4/1992); first 20mph zones; safety audits mandatory for trunk roads and motorways; seat belts obligatory for adults on rear seats; vehicles >7,5t speed limiter 60mph, later 56mph, 65mph for coaches; speed cameras; retesting of dangerous drivers; wider range of traffic calming measures.	Mandatory use of seat belts (lorries, vans) and on rear seats (cars).
1996-2000	**"Vision Zero"** presented; airbag "standard" in new cars; local communities can prescribe 30km/h; first 2+1 lane road with cable barriers; seatbelt obligatory for taxi and lorry drivers; winter tyres obligatory; trials with winter speed limits 110→90, 90→70; priority for pedestrians on zebra crossings; reduced number of zebra crossings.	Gloucester safer city project; driving theory test (car, motorcycle); withdrawal of licence + retesting for drivers who acquire >6 points within 2 years after test; Transport White Paper published; new road safety strategy **"Tomorrow's roads, safer for everyone"**; "New Directions in Speed Management".	Strategy **"Sustainable Safety"** presented; speed limiters for lorries >12t and buses >10t; theory exam for moped riders; administrative sanctions for alcohol infringements; mopeds use carriageway instead of cycle paths; mopeds and cyclists have right-of-way when coming from the right.

3.2 The new speed enforcement strategy in France

In 2002, road safety was declared one of three major focuses of President Chirac's second term of office and, consequently, a new road safety strategy was worked out. Fully-automated speed control is a central issue of the new strategy, the implementation of which was accompanied by extensive media coverage.

Stationary and mobile radar speed cameras across the country transmit data (digital images) on speed violators to a data centre in Lille, where licence plates are fully automatically retrieved. The work is carried out under the supervision of the state attorney of Lille. Speed tickets are then sent to car owners within 48 hours after the infringement. After completion in 2005, the system will cover 700 static and 300 mobile units. In 2006, 500 new radars will be added.

At the heart of the new speed control strategy is a major modification in the French legal framework. In a joint effort, the Ministries for Transport, Interior, Justice, Finance and Industry agreed to make the car owner financially responsible for many kinds of infringements committed with their car, including speeding, violation of headway, traffic light and bus lane regulations as well as non-payment of tolls. As an obvious consequence, local courts are largely relieved from the burden of issuing tickets. Car owners have the right to name another driver or appeal, but an amount of 135 Euros is to be deposited before the case is transferred to the car owner's court of residence for further processing. In less than 1% of all cases an appeal is brought forward.

Drivers are advised of speed camera sites via road signs. A digital map of all camera sites is available on the Internet and Michelin regularly produces a speed camera map of France.

The system was well received by the public, as revenues are exclusively spent for the financing of the system or other road safety measures and any kind of remittal of a penalty – prior common practice in France – is rejected.

The rate of speeding violations observed over the whole network in 2003 was down by 10% when compared with 2000. Specifically the rate of very heavy speed infringements has decreased significantly.

The new French strategy includes also a modification in the penalty points driving licence system (including more points for failing to wear seat belts or crash helmets, use of handheld mobile phones or driving under the influence of alcohol) and an overall increase in police enforcement. As a consequence, the number of deaths and serious injuries dropped by 20.9% and 20.3% respectively (2003 compared with 2002).

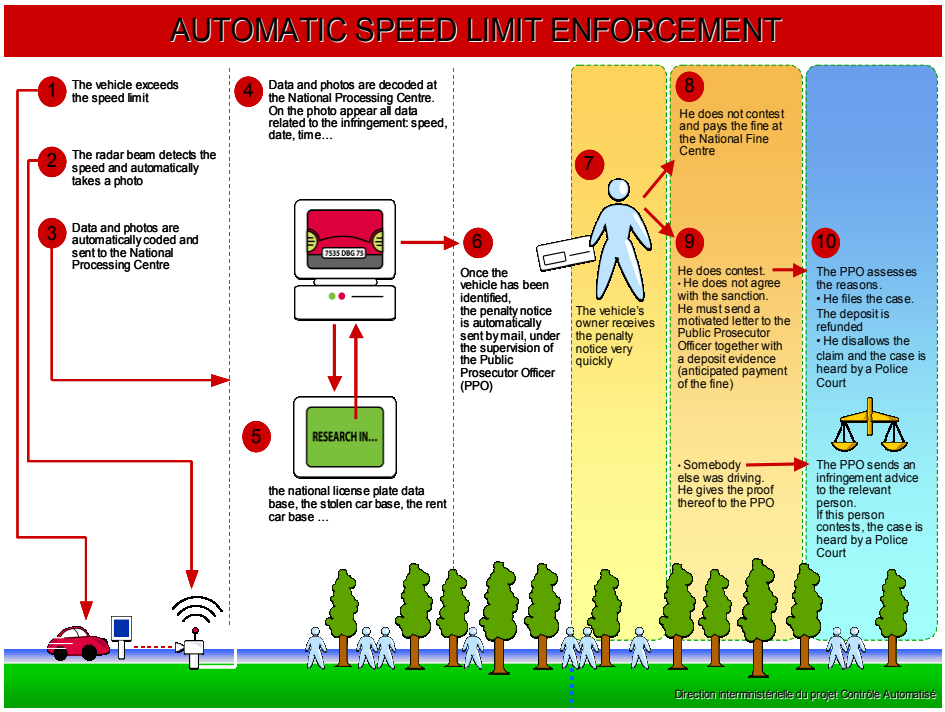


Figure 3.2 Functional diagram of the new speed limit enforcement in France

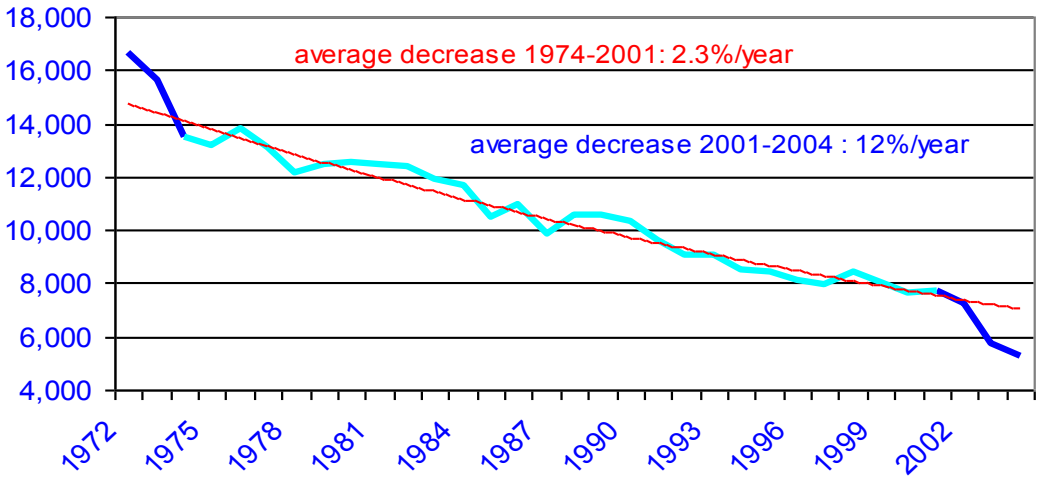


Figure 3.3 Evolution of the number of deaths in the long term, 1972 to 2004 (Observatoire national interministériel de sécurité routière - Bilan de l'année 2004)

3.3 Bob in Belgium: preventing and deterring drink driving

Since 1987, the Belgian police forces and the Belgian Road Safety Institute (BRSI) have been joining efforts in organising the end of year campaigns to prevent drink driving. The main objective is to reduce the number of alcohol-related accidents by deterring and preventing drink driving. In 1995 Bob, the person who does not drink when he has to drive, was introduced. Right from the start, this prevention campaign has been a real success. For the enforcement part of the campaign, the BRSI asks the police forces to increase the number of alcohol

controls and to organise random breath testing (objective risk of being caught) and the prosecutors are asked to give special attention to drink driving. The drivers with a negative result are rewarded with a Bob key ring. During the campaign the results of these actions are announced to the press, in order to influence the subjective risk of being caught. The coordination of all this is prepared during a meeting with representatives of the police forces and of the prosecutors.

Evaluation based on a comparative study of the breath tests carried out by the police during the end of year campaigns shows that the number of tests and the number of positive alcohol breath tests seem to be strongly negatively correlated: while the number of tests decreases, the number of positive alcohol breath tests increases and vice versa. This goes to prove one more time that publicity and enforcement have to go hand in hand. When there is little risk of getting caught (objective and subjective risk) a publicity campaign, however good it may be, cannot be effective. To achieve a real behavioural change, deterrence is necessary. Nevertheless the number of impaired drivers during the end of year campaign (between 4.2 and 6.6%) is lower than during the rest of the year (around 10%). The success story of Bob has allowed him to pass the Belgian borders: supported by the European Commission Bob, or the designated driver concept, is now present in 13 European countries. Hungary, Poland and the Czech Republic will join the other Member States to make up 16 countries in total running a Bob campaign in 2006.

3.4 Section control in Austria

The application of fixed radar speed cameras has a long tradition in Austria: currently there are about 100 moveable units in operation at more than 400 sites. Despite their obvious contribution to raising safety levels in Austria, the spatial effectiveness of speed cameras is limited. As shown in Figure 3.4, the impact ranges from 500 to 800 metres on motorways, whereas in urban areas the observed range is only from 50 to 250 metres.

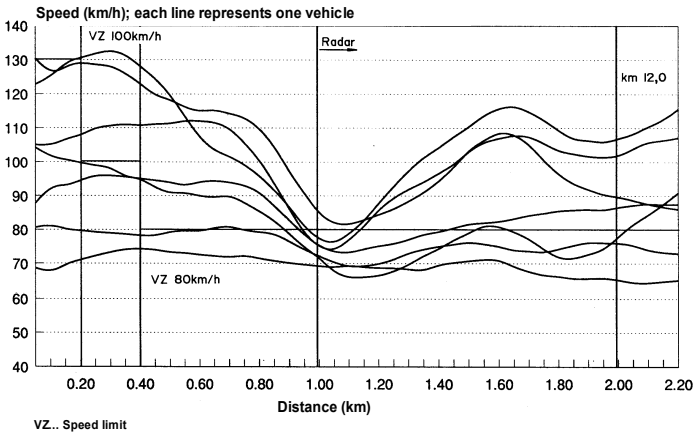


Figure 3.4 Example assessment of the spatial impact of an automatic speed camera on an Austrian motorway; each line represents speed level of one vehicle (A7 near Linz, km 12)

Building on the Dutch Section Control experiences, the Austrian Authorities decided to implement a new speed enforcement technology[7] that is based on the calculation of average speeds of individual vehicles along a road section of about 3 km. Video images, including time stamps, are taken from vehicles entering and exiting the section and, after comparison of images, average speeds are calculated (see Figure 3.5). After some minor adaptations of the Austrian Highway Code, the first unit was installed in 2003 on the A22 motorway in Vienna, in the Kaisermühlentunnel.

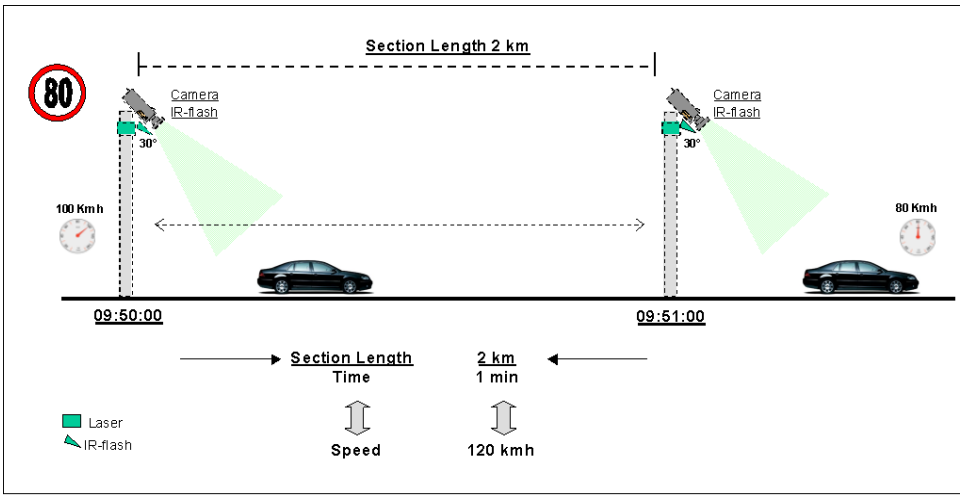


Figure 3.5 Section Control in the Vienna Kaisermühlentunnel (A22)

Average speeds in the tunnel have decreased by more than 10 km/h and are now well below the local speed limit of 80 km/h. Only some 2% of vehicles exceed the speed limit and the number of injury accidents has been reduced by 31%.

3.5 Introduction of a 50 km/h speed limit in urban areas in Hungary

The decrease from 60 km/h to 50 km/h of the speed limit inside built up areas – in agreement with international experiences – proved to be an effective road safety measure in Hungary too. The greatest effect could be achieved in the short run, which – along with other factors – was due to an intensive publicity campaign and police enforcement accompanying the introduction.

The effect of the measure has been analysed in Table 3.2 through a so-called control-group test (Holló, 1999).

7 http://www.asfinag.at/sicherheit/section_control.htm

Table 3.2 Analysis of statistical significance of the effect of intervention

	INTERVENTION ↓		
Number of people killed in road accidents	"Before"-period: (01/03/1990-28/02/1993) [a]	"After"-period: (01/03/1993-29/02/1996) [b]	[b-a] / [a]
Test group (roads inside built up areas)	3,106	1,947	-37.3%
Control group (secondary roads outside built up areas)	1,181	905	-23.4%
Total	**4,287**	**2,852**	

χ^2 with 1 degree of freedom = 14.39 $p < 0.001$

Since (1,947x1,181)/(3,106x905)=0.818, the estimated percentage reduction in deaths is 18.2. In other words, this indicates that the decrease from 60 km/h to 50 km/h of the speed limit in force inside built up areas reduced the number of accident deaths in the "after" period by 18.2%.

The number of killed as a result of road accidents inside built up areas in each month of the year 1993 was below the corresponding value in 1992 (Figure 3.6). However, as of 1995 the accident data and results of speed measurements show well already that the initial effect of the 50 km/h speed limit is fading away gradually, and speeds, as well as the number of deaths inside built up areas, are increasing again. All this calls the attention to the fact that also inside built up areas far more intensive speed monitoring than before and, as a consequence, a more probable and severe sanctioning of excessive speeding would be necessary to maintain the effect of the 50 km/h limit.

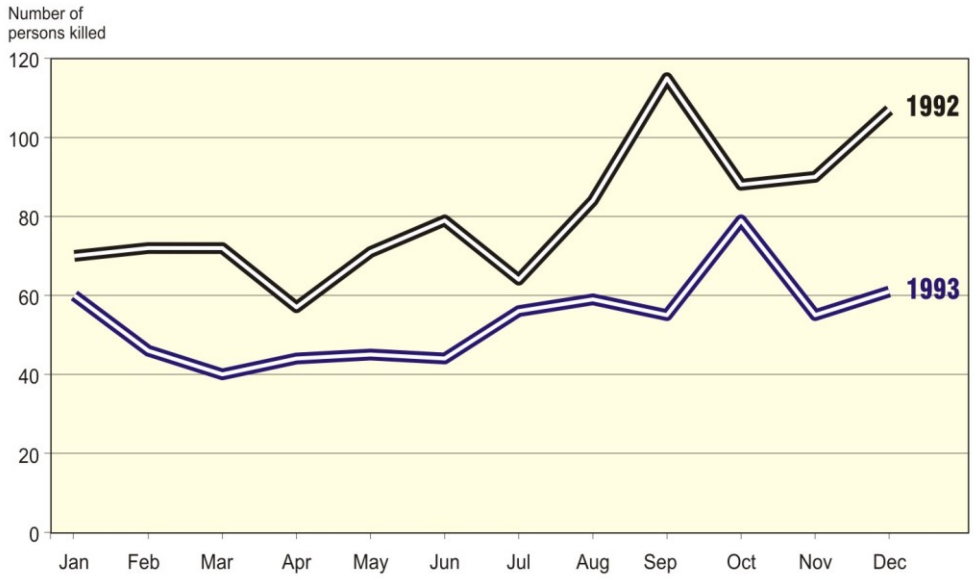


Figure 3.6 Deaths due to road traffic accidents inside built-up areas in 1992 and 1993

3.6 Introduction of a 50 km/h speed limit in urban areas in the Czech Republic

Facing a steep continuous increase of road accidents and their consequences over a period of 10 years, the Czech government decided to change the speed limit in urban areas from 60 km/h to 50 km/h. The edict Nr. 223/1997, coming to force in October 1997, contained only speed related measures and introduced new speed limits in urban areas and on motorways, where the limit was increased from 110 to 130 km/h. No other significant road safety measures were introduced in the Czech Republic in the late 1990s, as major changes were only made by the Road Act 321/2000, which came to the force in January 2001.

The speed limit of 60 km/h in urban areas was quite common in most European countries until the late 1970s, when the first attempts were made in several cities (e.g. Alençon, France) to limit the speed to 50 km/h in order to protect vulnerable road users against continuously increasing motor traffic. In the mid 1980s several governments decided to lower the speed limit in all cities in their countries (e.g. Denmark in 1985 and Switzerland in 1986), while some other countries followed in the 1990s (e.g. France in 1991). The experience of speed moderation was positive in all of these countries, serving as an example for the Czech government to introduce the same measure some years later.

The introduction of the new speed limit had been announced by media campaigns, including TV spots and posters and accompanied by a wide public discussion among the driving population and policy-makers. Other stakeholders were rarely invited to participate in sessions of this kind. However, the public awareness of the new measure was very high at the time of its introduction and its effect on driving habits was transparent, despite the fact that police enforcement did not increase significantly in the short period after its introduction.

It is well known that the speed of traffic tends to decrease in the months after the introduction of new speed regulation; however it is likely to increase again slightly in the longer term. In the Czech Republic the situation was not different, as can be seen from the Figure 3.7. While the reductions in the average mean and average 85^{th} percentile speeds demonstrate a community willingness to reduce speed voluntarily, there has not yet been sufficient understanding that 50km/h is now the maximum legal limit in most urban areas.

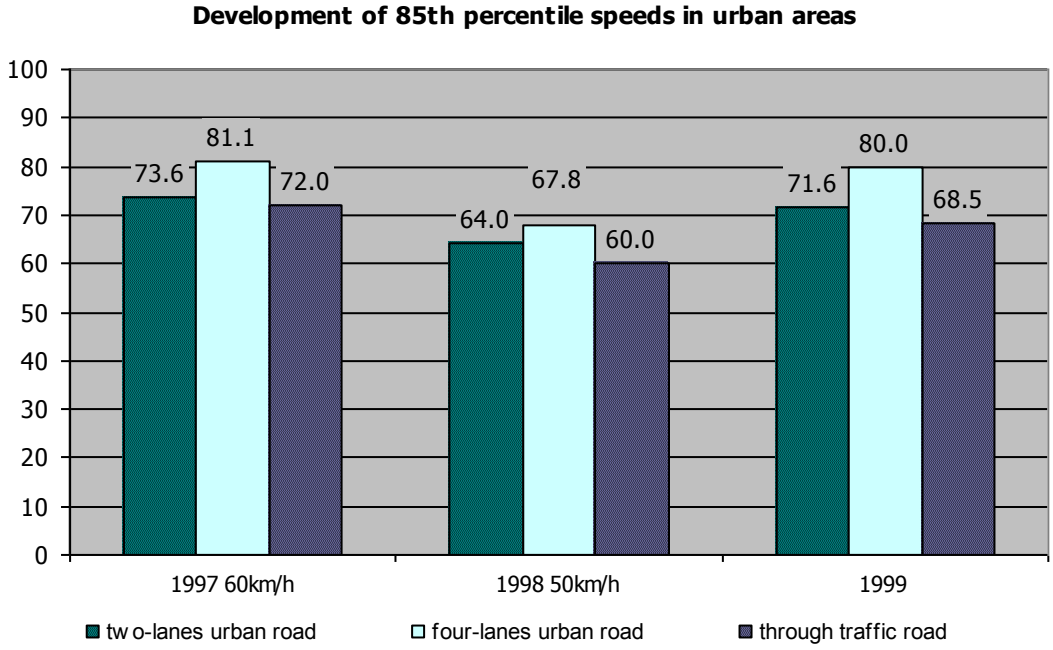


Figure 3.7 Development of 85th percentile speeds on urban roads before and after the introduction of 50 km/h speed limit

Figure 3.6 shows the results of comparable speed observations made by CDV in November 1997 and November 1998 in order to assess the change in speed. The change was very positive in the first year but it then started to worsen. At the same time, the number of injury accidents decreased by about 10.0%, and this reduction has been largely maintained over several years. More precisely, the statistics showed a reduction in deaths of 11.0% in the first year, while the serious accidents decreased by 12.0% and slight accidents by 11.0% respectively.

This can be seen in Figure 3.8, which shows the general road deaths data for the Czech Republic in the period 1995-2000. In urban areas, a decrease in the number of killed of 16.5% (82 fewer persons killed) and a decrease in the total number of accidents of 4.2% (5,480 road accidents) have been experienced.

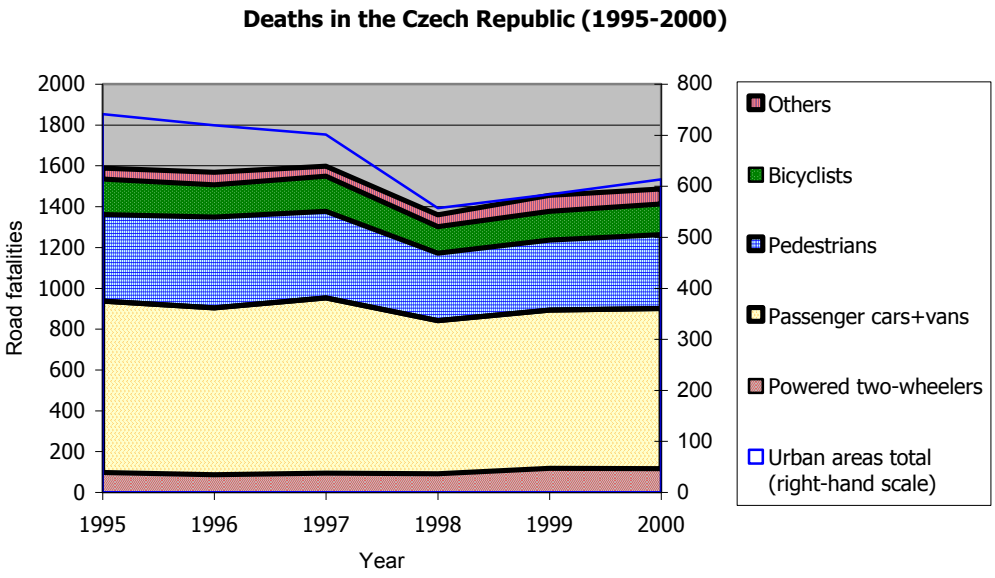


Figure 3.8 Trends in deaths for different road user groups in Czech Republic (1995-2000)

For the assessment of the road safety effect of this measure, the observational before and after study has been chosen, based on comparison group performance and taking traffic growth into account (Hauer, 1997).

To assess the road safety effect of the new speed regulations, the count of road deaths has been considered for the two 3-year periods, one before and one after the date the measure was put into effect. Other injury accidents have not been taken into account based on the assumption that they are not so strongly related to speed (Nilsson, 2004). As the traffic growth might influence the level of road safety, it has been considered whether to allow for it explicitly. Since the relevant increase in deaths over the 6-year period (estimated by the road administration separately for all roads 5% and for motorways 9% yearly) is likely to have been almost the same for both test and comparison groups, however, it has been assumed to be taken into account by the use of the comparison group.

As the national road accident forms do not record the speed limit at the accident spot and the speed limit cannot be explicitly addressed by other variables, some simplifications had to be applied. All road deaths were treated according to their location of occurrence (inside or outside built-up areas) and among those outside built-up areas the deaths on dual physically separated carriageways were extracted. The three groups were assumed to have specific speed limits, which is not true in practice, but it is not possible to extract those road sections where the speed limit is lower.

The control group in this case stands for all inter urban roads with general speed limit 90 km/h. As the road death toll increased on this type of road by 7.0%, the expected growth of deaths in urban areas was 2,380. However, only 1,764

deaths were registered, i.e. a 26.0% reduction compared with the previous period of 3 years. In other words, the estimated reduction in the annual number of deaths was 205 with a 95 per cent confidence interval <166; 244>.

Table 3.3 Analysis of statistical significance of the effect of intervention

	INTERVENTION ↓		
Number of people killed in road accidents	"Before" - period (01/10/1994 – 30/09/1997) [a]	"After" – period (01/10/1997 – 30/09/2000) [b]	[b-a] / [a]
Test group (roads with 50 km/h speed limit)	2,222	1,764	-20.61%
Control group (roads with 90 km/h speed limit)	2,410	2,583	-7.18%
Total:	**4,632**	**4,347**	

Since (1,764x2,410)/(2,222x2,583)=0.740, the estimated percentage reduction in deaths is 26.0. In other words, this indicates that the decrease from 60 km/h to 50 km/h of the speed limit in force inside built up areas reduced the number of accident deaths in the "after" period by 26%.

Conclusions

The introduction of the 50 km/h speed limit in urban areas in the Czech Republic was perhaps the most effective road safety measure taken in the country in the second half of the 1990s as it led to a reduction of about 25% in annual road deaths in urban areas. Its positive effect has since been paradoxically reduced in 2001 by the Road Safety Act, which has introduced a series of new measures, among which the priority for pedestrians on zebra crossing has increased the road death toll in urban areas. A lack of enforcement in the first year of its introduction led to low compliance by drivers after the first few promising months. The successful introduction of 50 km/h speed limit in urban areas must be understood as a first step towards further speed reduction on chosen urban roads with the objective of creating a safer road environment for vulnerable road users in towns.

4. Framework checklist for national road safety policies

Analysis shows that road safety performances vary significantly between Member States. There have been countless efforts to explain the differences between countries or to identify the key factors that make a country safer, but so far no stringent recipes are available: there is simply no single way to success and – given the various political and legal frameworks – a strategy that was successful in one country could well fail when applied to another without being adapted to national requirements.

In the 1990s, many countries have set up road safety programmes with their scope ranging from political lip-service to stringent catalogues of measures accompanied by numerical targets together with financing and evaluation plans. There are strong indications that the existence of sound road safety programmes together with quantified targets contribute positively to road safety performance and this chapter presents a number of common prerequisites for successful road safety work.

The following checklist can help decision makers and practitioners at national level to assess what they have achieved so far and to detect potential deficiencies. It is worth noting that most of the items in the checklist can also be applied to regional, municipal, or even corporate levels (replacing in this case, for instance, the "Head of Government" by the elected head of the relevant level of government or chair of the relevant corporation). The list is partly based on recommendations by the ECMT (Rumar, 2002), the WHO (Peden et al, 2004), the UNESCAP (1998), the World Bank (2004), the OECD (2002) and the ETSC (2003a, 2003b).

The checklist can be regarded as a "step ladder", encouraging decision makers and practitioners to climb to the highest levels of achievement in road safety by adding step by step to their achievements so far or by revisiting earlier steps. The checklist should be seen first and foremost as a set of suggestions and advice rather than a "one size fits all" solution.

Therefore, the absence so far of one of the listed items – for example a common vision or philosophy on road safety – does not imply failure of the current efforts: taking the same example, there are many European cases of successful safety measures that have been implemented without an explicitly stated philosophy behind them.

On the other hand, establishing all items in the checklist will facilitate success but will not guarantee it!

Most of the items are not simply a YES/NO matter, but are normally matters of degree: for instance a high level of public awareness, a medium level, a low level or none. Considering as an example the "performance targets" item: although it specifically refers to long-term, ambitious but realistic, nationwide targets, it is

nevertheless possible that a country may adopt medium-term national targets, or targets specific for some high risk groups (like vulnerable users), or that targets have been proposed only by some Ministries, or for some road networks, or in some regions.

The items considered in the following table are:

- Political support and commitment
- Public and private sector awareness and involvement
- Road safety legislation
- Traffic safety vision or philosophy
- Strategy
- Performance targets
- Public health approach
- Systemic perspective
- Road safety action plan
- Scientific choice of measures
- Institutional roles and responsibilities
- Allocation of responsibility for countermeasures
- Funding
- Monitoring and evaluation
- Accident data
- Safety performance indicators and exposure data
- Research
- Best practice exchange
- Training
- Enforcement
- Emergency response
- Holistic approach

Table 4.1 Framework Checklist for the Evaluation of National Road Safety Policies

Key element	Explanation	Examples
Political support and commitment	Building **political support and commitment** at the highest possible level is almost a pre-requisite to coordinate different national and regional administrations (health, transport, education...) and to mobilise the public budgets that will later be necessary for the implementation of the measures. Awareness of the problem needs to be raised not only amongst individual road users but also amongst policymakers who are responsible for the safety of the transport system as a whole and who aim at achieving a balance between safety, mobility and environmental objectives in transport policy. This requires definition of the scale and characteristics of the problem, the bringing together of key parties who may be able to contribute towards solving the problem (for instance through a national conference on the topic of traffic safety), and finally quantifying the necessary funds to tackle road safety issues. A political 'champion' is very helpful in maintaining support for the programme, so time spent in bringing together supporting facts about accidents and convincing the important politicians to support the programme is time well spent[8]. Support from the Head of Government is sometimes more effective than that from the heads of ministerial or regional administrations, since the first one, for instance, enables legislation at a national level. It is also important that the national leaders set examples of safe practices in road transport: use of seat belts, compliance with speed limits, safety equipment of official car fleets...	Jacques Chirac´s declaration on July 14th, 2001. Road Safety is one of three major focuses of president Chirac's current term of office (F). Tony Blair´s announcement in 2000 of the new road safety strategy and targets (UK). President Kekkonen's new year's speech declaring road safety as a priority issue in 1973 (FIN).
Public and private sector awareness and involvement	Road safety cannot be the responsibility of governments alone. It is in fact a "shared responsibility". Therefore it is essential to build **public and private sector awareness** for the programme in general and particularly for key countermeasures, through adequate campaigns and lobbying. In order the gain the support of the citizens – or still better, to let them demand action – the message of the traffic safety problem and the existing solutions must be passed	"Speak out!" road safety campaign in Sogn og Fjordane in 1993 (N). The UK THINK! Campaign. Parliamentary Advisory Council for Traffic Safety – PACTS (UK).

[8] Dumas Project: http://www.trl.co.uk/dumas/dumas.pdf

	and reach the individual road user. In doing so, the commercial sector, service organisations and non-governmental institutions may play an important role. Community action or involvement can also play a key role in many road safety interventions. In this regard, WHO recommends supporting the creation of safety advocacy groups. Of particular importance in the support and acceptability of safety measures is the participation of the citizens and the private sector in the development of traffic safety policies and their monitoring and evaluation, thus creating a feeling of joint ownership and a sense of commitment.	German Road Safety Council – DVR (D). "Safe Communities"[9] in many countries around the globe, such as Sweden, Norway, Denmark, UK, Austria, Australia, USA, Canada. Mothers Against Drunk Driving –MADD.
Road safety legislation	The presence of a sound legal framework that regulates key risk factors is a prerequisite for a good safety performance: it must be clear to every road user what is considered an adequate behaviour in traffic. This also implies that contents of (new) legislation be effectively communicated to the public, including those who obtained their driving licences decades ago. In addition, technical issues in road safety work need to be clearly established, such as the definition of a high risk site (to be treated by the relevant road operator).	
Traffic safety vision or philosophy	Create a **vision or philosophy** about the safety of the future transport system (optional, but helpful in providing momentum for the implementation of the strategy and in removing specific obstacles in order that vision yields its expected changes in mentality and organisations). A vision can be regarded as a leverage point to generate and motivate change. The vision or philosophy needs to be far-reaching and long term, looking well beyond what is immediately achievable.	"Vision Zero" (S). "Sustainable Safety" (NL). The British pragmatic vision: risk on the roads being no higher than the average level of risk in the rest of everyday life[10].
Strategy	Create a **strategy**, structured along key dimensions of road safety work. The strategy should include details of the future characteristics of safe road transport, what are the basic lines of work (or priorities) and the main actors to make that future become a reality. The strategy must also provide insight into the sharing of funding among the different administrations and other actors. Its timeline should never be shorter than five years, although target periods of 5 to 20 years are normally required for national strategies.	The three factors of traffic: behaviour, vehicles, infrastructure. The Haddon Matrix adding a second axis and therefore building his famous matrix[11]: before, during and after the crash.

[9] http://www.phs.ki.se/csp/safecom/default.htm
[10] http://www.cfit.gov.uk/mf/reports/roadsafety/ap/index.htm
[11] Haddon, 1970.

		The three dimensions of safety: exposure to risk, accident rate, injury rate[12], or other derived taxonomies combining the three dimensions and the three factors[13].
Performance targets	Set quantified long-term **targets** and intermediate goals, where necessary for specific target groups or areas, if possible at national, regional and even local level. Setting challenging, yet achievable targets can strengthen motivation to contribute to casualty reduction. It is important to use a sound statistically based methodology to set the targets. Targets should be based on forecasts of exposure, levels of risk, and the acceptability and effectiveness of policies and measures for risk reduction. Taking into account that very rapid increases in motorisation and mobility may result in increased deaths, it is vital to establish politically acceptable targets: it may therefore be better to talk in terms of "lives saved" as a result of particular interventions. The final aim, however, is always to reduce or eradicate the absolute number of death and serious injuries on the roads.	Reduction of 50% in the number of road fatalities by the year 2010 (EU). Reduction of 50% deaths between 2002 and 2010 (e.g. Austria). Reduction of 50% in children killed or seriously injured by 2010 (compared with the average for 1994-98) (UK).
Public health approach	Treat the lack of road safety as a **public health problem** and identify the problem areas by means of **crash and health statistics:** speeding, alcohol, seatbelt wearing, young drivers. The public health approach shares with the safety management approach developed mainly by engineers and psychologists the following prevention-oriented steps: problem diagnosis, countermeasure research and implementation, and evaluation of results. The support of the epidemiology and medical community is crucial in a comprehensive delivery of the safety measure. The public health approach can be expanded to become a "multidisciplinary one, although with a clear predominance of the public health perspective".	World report on road traffic injury prevention (WHO, 2004). European report on road traffic injury prevention (WHO, 2004).
Systemic perspective	Traffic safety must be approached from a **systemic perspective** in order to properly acknowledge the relative importance not only of its elements (the human factor, the vehicle, the road, the environment, the legal system and the society) but also the relations between its elements. If it is not duly considered how these elements interact with each other, the genuine impact of road safety measures on the level of safety will	"Aktion Sichere Landstraße" in Germany aimed at the reduction of crashes and injuries on interurban roads.

[12] Nilsson, 2002.
[13] Elvik and Vaa, 2004c.

	be much lower than potentially possible.	
Road safety action plan	Create a **road safety action plan** and either implement regionally as well as nationally or encourage regional (and local) authorities to create their own action plans. Whenever possible, a time scale of around three years should be allowed for the action plan in order to develop and implement the proposed road safety measures.	The European Union Road Safety Action Plan[14]. The Road Safety Action Plan of Catalonia (Spain)[15]. Road safety strategies and action plans as gathered by the WHO[16].
Scientific choice of measures	Make the **choice of measures** based on sound evaluation studies and – where applicable - cost effectiveness considerations. As it turns out to be in many countries, one of the most challenging issues in connection with the articulating of a knowledge-based decision making process is to build bridges between the research and scientific community and the politicians and other decision makers. Especially in countries with limited scientific research tradition, decision makers are not used to requesting and basing their resolutions on sound science.	See the best practice examples from Chapter 3. The 5th FP ROSEBUD project on cost-benefit evaluations of measures.
Institutional roles and responsibilities	No one sector working alone can effectively reduce the number of road casualties. Therefore it is of paramount importance to organise clear institutional **roles and responsibilities** and install a forum for continuous process communication and coordination between all stakeholders, from road user representatives to emergency services, including the regional and local level. The institutional arrangements may include an Inter-ministerial Transport Safety Committee with the Prime Minister as chairperson. Another body with a key role in may countries is the National Traffic Safety Council, which should meet periodically and act as an institutionalised round table for consultation with stakeholders. A single leading agency accountable and with enough powers is in most cases indispensable to avoid sub-optimal coordination of road safety responsibilities. In any case, the coordination role is best done by a multidisciplinary body supported by a permanent secretariat of road safety specialists and led by a senior government	The French "Délégation interministérielle à la sécurité routière" directly under the Prime Minister[17]. Swedish National Road Administration with overall responsibility of the safety of the road transport system. Role of Road Safety Division in UK Department for Transport implies ministerial responsibility to Parliament Role of German Road Safety Council (DVR) for

[14] http://europa.eu.int/comm/transport/road/roadsafety/rsap/index_en.htm.
[15] http://www.gencat.net/transit/pla.htm.
[16] http://www.who.int/violence_injury_prevention/road_traffic/strategies/en.
[17] http://lesservices.service-public.fr/national/index.htm.

	official or a high-calibre executive director. The Secretariat must have its own permanent funding. It is also crucial when defining the different institutional roles to ensure the "separation of powers" within the traffic safety system: evaluation (power to appraise) should be independent from operations (executive power), and operations independent from legislation (legislative power).	the co-ordination of road safety activities between public and private organisations.
Allocation of responsibility for countermeasures	Allocate **responsibility for countermeasures** as close to the problem as possible. At the same time that responsibility descends to the different levels, it is important to guarantee adequate communications and collaboration across the levels, in such a way that commitment and strategies at the national level are matched at the regional and local levels.	Gloucester Safer City Project (UK).
Funding	Provide adequate **government funds** that allow the target-oriented setting of measures and set up financing and incentive models for the regional and local level. Besides traditional funding, other alternative resources for sustained funding of safety measures should also be explored: road levies on insurance premiums (shifting the focus from compensation to prevention), road funds derived from fuel levies…	Incentive model (national funds) for the implementation of speed moderation measures on urban thoroughfares foreseen in the Austrian Road Safety Programme 2002-2010. Japan used to devote about 0.6% of its annual GDP towards the improvement of road safety in the knowledge that road crashes were costing the economy around 1.3% of the annual GDP.
Monitoring and evaluation	Make sure that an **independent body** with adequate research capabilities is in charge of **monitoring and evaluating** the process, specifically as concerns reaching the target(s) in the different sectors and assessing the cost-effectiveness of measures. The monitoring and evaluation process must be scientifically based and transparent through making public its results.	Road Safety Observatory of the European Commission.
Accident data	Data is the cornerstone of all road safety work and essential for the diagnosis and monitoring of the safety situation and initiatives. Make sure that **reliable and meaningful crash, death and injury data** are collected and that database tools for analysis are made available for all expert institutions involved in road safety work. Learning from accidents must involve an organisational learning that leads to necessary transformations within the road safety system.	The CARE database of the European Commission. The IRTAD database of the OECD. The internet-based query system of the Fatality Analysis Reporting System – FARS (USA).

	Conduct, as a complement to more general statistics, independent in-depth multidisciplinary crash investigations and use their results for policy and technical advancements. The establishment of a multi-modal independent transport accident investigation board is an approach successfully implemented by some countries.	The German In-Depth Accident Study – GIDAS. The Dutch Safety Investigation Board.
Safety performance indicators and exposure data	Collect consistent and reliable **safety performance indicators** and **exposure data.** Both accident data (previous item) and exposure data are key elements of risk and performance indicators. Performance indicators are in turn the key element for any monitoring or evaluation of the programmes or measures.	Seatbelt wearing rates, speed levels, alcohol rates, kms driven by vehicle categories (see EU 6th FP project *SafetyNet*). National Traffic Census and National Travel Survey for Great Britain.
Research	**Research in transport and traffic safety** provides the necessary basis for developments in this field of human activity. Sound policies are based on known, effective, science-based countermeasures, which in turn are grounded in good research. Multidisciplinary road safety research also provides the framework of knowledge against which better policy and resource allocations decisions can be made to ensure the most effective use of available resources. Research results must be easily accessible for all stakeholders, therefore enabling open access to knowledge and data. Research can be divided into a) strategic and basic research on, for example, the relevant cognitive limitations of the human brain or properties of tyre and road surface materials, and b) applied research, for example, into the crashworthiness of the vehicles or the safety implications of making transport less unsustainable. Research includes aspects such as governmental funding programmes, the existence of resources in universities and technological centres, industrial sponsoring, periodic conferences, networking... Various governments give support in their territories to a leading traffic safety research centre, acting as the authorised voice of the scientific community. The centre can be a closely-coordinated virtual network of existing research capabilities. The centre deals in many cases with all transport modes.	Transportation Research Board (USA). Full reports of research conducted in Swedish universities are available in their websites and of research funded by the UK Department for Transport through its website. Support to EuroNCAP given by various public administrations (D, F, NL, S, UK and Catalonia). The Institut National de Recherche sur les Transports et leur Securité - INRETS (F).
Best practice exchange	Disseminate knowledge about successful measures (**best practice)** and research results among decision makers and practitioners. The transfer of best practices from one organisation to another is a way to accelerate safety improvements. Dissemination can be achieved through newsletters, technical magazines, internet pages, conferences, seminars...	Best in Europe Conference organised by the European Transport Safety Council. Living and walking in cities conference organised by CeSCAm (I).

	International best practice exchange is also of paramount relevance for a rapid transfer of knowledge. This can be achieved through international project cooperation, international event organisation, presentations and attendance at international events.	Trafiksäkerhetskonferens i Örnsköldsvik in Sweden.
Training	The availability of highly qualified and motivated professionals (human resources) is recognised as a critical pre-requisite for effective programme design, management and evaluation. However, most of the road safety practitioners start their careers with a very limited formal training in the field. Training in traffic safety may include doctoral programmes, post-graduate training, university level courses and refresher seminars in subjects such as traffic safety management, biomechanics, vehicle safety, traffic psychology, vehicle trauma care and rehabilitation. Professional and scientific agencies should take charge of drawing up guidelines and issuing of certificates, hopefully with a pan-European validity, in order to achieve a qualified level of expertise and safety performance. Training is closely linked to the existence of career paths in the private and public sectors jointly for road safety professionals.	"Traffic Safety Science Detached Course", University of Lund (S). EC Project "Promotion Of Results in Transport Research and Learning" (www.eu-portal.net).
Enforcement	Create **effective enforcement systems** for aspects of behaviour with highest death reduction potential: alcohol screening, automatic speed cameras, enforcement of use of seatbelts and child restraints.	New automated system of speed control in France. Fully automated "Section Control" (speed surveillance) on motorways in the Netherlands and Austria. The safety camera partnerships in Great Britain.
Emergency response	Streamline the **emergency response chain** and increase **quality of trauma management** in order to effectively mitigate crash consequences.	Niedersachsen (Germany): response time should not exceed 10 minutes (first aid) in 95% of the accidents.
Holistic approach	**Integrate** the different **transport policies** towards sustainability, accessibility, mobility, safety and environment as far as possible: relationship between mobility and safety, importance of modal split from the point of view of road safety, road safety as a public health problem, occupant safety during downsizing of car fleet...	

5. Analysing road safety problems for developing targeted road safety programmes

5.1 Introduction

In order to develop an effective targeted road safety programme, a comprehensive analysis of road safety problems should be made. This chapter briefly outlines the essential elements of such an analysis. It is assumed that the analysis of road safety problems will serve as the basis for developing a targeted road safety programme at the national level of government. Moreover, it is assumed that the analysis of road safety problems has an applied objective: to understand in order to prevent, and not merely to satisfy intellectual curiosity.

The main questions to be discussed are:

1. What is a road safety problem? What do we mean by it?
2. How can road safety problems be analysed? What are the different perspectives that can be taken in such an analysis?
3. What are the basic characteristics of road safety problems? How can they be assessed?
4. What information is needed in order to perform a rational analysis of road safety problems?

The objective of the chapter is to show by means of examples how a rational analysis of road safety problems can be performed.

5.2 The nature of road safety problems

It is obvious that there does not exist any single right way of defining road safety problems. However, since the current number of road accidents and accident victims is nowhere regarded as acceptable, it seems reasonable to define *a road safety problem* as *any factor that contributes to the occurrence of accidents or the severity of injuries*.

According to this definition, a road safety problem may exist even if it is not recognised. Before the recent surge in research concerning driver fatigue (see e.g. Sagberg and Bjørnskau, 2004), this was not recognised as a major problem. Moreover, even if research has shown that a certain factor, such as speeding, contributes to many accidents, road users may not see it as a problem and may not want action to be taken against it. One should therefore distinguish between the statistical identification of road safety problems and the perception of such problems. This distinction is particularly relevant as far as the prospects of solving road safety problems are concerned: unless a problem is widely enough recognised to be a problem, it is not likely that it will be solved.

A multitude of factors contribute to the occurrence of road accidents and to the outcome of these accidents in terms of deaths and injuries. To make analysis manageable, the first step in it should be to try to sort the very many factors contributing to road traffic injury into a few categories. For this purpose, several taxonomies of road safety problems have been developed. Each of these taxonomies can be seen as representing a particular perspective, or point of view, regarding the main forces that determine the safety of the road transport system in a country.

One of the best-known typologies of road safety phenomena is the Haddon matrix, in which road safety phenomena are classified according to when they occur (pre-crash, crash, post-crash) and primary contributing factors (human, vehicle and equipment, road environment), forming a table of nine cells (Haddon, 1970). This typology is a useful starting point for analysing road safety problems.

A widely promoted ideal for road safety is to create a road transport system in which nobody is killed or sustains injuries resulting in permanent impairment. This ideal is known as Vision Zero. Vision Zero has wide ranging implications with respect both to the design of roads and vehicles and with respect to road user behaviour.

According to Vision Zero, the basic design parameter for the road transport system should be human tolerance to biomechanical impacts. No accident should expose those involved in it to greater biomechanical impacts than the human body can recover from without any lasting damage. Based on this concept, Vision Zero offers a contract for safety, which states that if road users comply with the rules for safe use of roads and vehicles, government will guarantee that the system is designed in a way that ensures that nobody will be killed or permanently injured. Vision Zero has advanced road safety policy making and practice immensely by raising the expectations of the informed public, lifting the sights of policy makers and bringing about a new realisation among road and vehicle engineers of their responsibilities for protecting the users of the roads and vehicles that they create. It has, however, also been recognised that there are few, if any, other areas of everyday life from which the risk of accidental death or lasting injury can be completely removed at affordable cost or in publicly acceptable ways, and this ideal is therefore unlikely to be affordable or attainable in ways that will gain public acceptance in road transport either. What can be expected is to bring the current disproportionately high levels of risk faced by road users much closer to the lower levels accepted in the rest of everyday life.

5.3 Major road safety problems

Major road safety problems can be categorised as shown in table 5.1, based to a large extent on an analysis of road safety problems in Sweden reported by Elvik

and Amundsen (2000). Table 5.1 lists a total of 20 road safety problems, which ought to be a manageable number of problems to deal with in a national road safety programme. Most of these problems are likely to be found in any country. Roadside hazards, for example, include trees and rock cuttings close to the road. Badly designed roadway elements may, as an example, include sudden changes in the standard of a road or sharp curves that surprise drivers. The use of traffic signs is guided by detailed guidelines in most countries; yet it is well known that not all traffic signs comply with these guidelines and that many old signs are difficult or impossible to read in the dark. Head-on crashes are a serious problem on high-speed rural roads that carry large traffic volumes. This problem can be addressed by the use of protective devices, such as guardrails or full separation by means of a median.

Table 5.1 Major categories of road safety problems (derived from Elvik and Amundsen, 2000).

Main categories of problems	Specific problems in each category (examples)
A. Unsafe system design	A.1 Roadside hazards and obstacles
	A.2 Badly designed roadway elements
	A.3 Incorrect or poor traffic signs
	A.4 No protection from head-on crashes
	A.5 Unsafe mixture of road users
	A.6 Complexity of traffic environment
	A.7 Inferior crashworthiness of cars
B. Environmental risks	B.1 Elevated risk at night
	B.2 Elevated risk in bad weather
	B.3 Risk of animal crashes
C. Vulnerability of road users	C.1 Safety for children
	C.2 Young drivers as a high risk group
	C.3 Older drivers as a high risk group
	C.4 Unprotected road users as a high risk group
D. Unsafe road user behaviour	D.1 Speeding
	D.2 Drinking and driving
	D.3 Not wearing seat belts or helmets
	D.4 Other unsafe behaviour
E. Post accident care	E.1 Notification of accidents
	E.2 Quality of treatment and care

Proven relationships between speeds of impact and severity of injury show that pedestrians and cyclists should never be exposed to vehicle impacts at a speed exceeding 30 km/h. Hence, the mixture of pedestrians and cyclists with motor vehicles must be considered as unsafe on any road where the permitted speed is higher than 30 km/h. A complex traffic environment is widely recognised as a factor contributing to accidents. Cars differ greatly in terms of crashworthiness; as long as not all cars provide the best impact protection, this must be regarded as a road safety problem.

Environmental factors, such as darkness, rainfall, snow or ice and wild animals contribute to road accidents.

Road users are excessively vulnerable to the extent that they cannot be held responsible for their own safety (children), have a high risk of accident involvement (young drivers), or are more susceptible to or less protected from injury than most road users (older drivers, unprotected road users).

Unsafe road user behaviour is a major factor contributing to road accidents in all countries. The three most important aspects of road user behaviour contributing to accidents are speeding, drinking and driving, and not wearing protective devices like seat belts or crash helmets.

Finally, it is likely that delays in notification of accidents may, at least in remote rural areas, prevent some lives being saved and worsen the consequences of injuries that are survivable. The quality of the treatment given will also influence the chances of full recovery.

5.4 Basic characteristics and dimensions of road safety problems

Some road safety problems are usually regarded as "bigger" or "more important" than others. What do we mean by such terms? A key element of an analysis of road safety problems is to identify the basic dimensions of such problems and develop indicators for these dimensions. It is proposed that the basic dimensions of road safety problems are:

1. *Magnitude* (importance), which denotes the size of the contribution to accidents or injuries.
2. *Severity*, which refers to the degree of injury or property damage occurring in accidents associated with the problem.
3. *Externality*, which refers to the risks one group of road users inflict upon another group of road users.
4. *Complexity*, which denotes whether a problem represents the contribution of a single risk factor, or a few easily identifiable risk factors, or the interactive effects of a large number of risk factors, each making a small contribution to the problem.
5. *Inequity*, which refers to how variations in risk relate to variations in the benefits of transport.
6. *Territoriality*, which refers to the geographical extent and distribution of a problem.
7. *Dynamics*, which refers to whether the problem is getting worse or getting better.
8. *Perception*, which refers to whether a certain problem is seen as important.
9. *Amenability to treatment*, which refers to the prospects of reducing a problem by means of road safety measures.

5.4.1 Magnitude

The magnitude of a problem can be indicated by the amount of risk attributable to it. In epidemiology (Rothman and Greenland, 1998), several measures of attributable risk have been developed. For the purpose of comparing the magnitude of different road safety problems, population attributable risk is perhaps the best indicator. Population attributable risk can be estimated by this formula:

Population attributable risk (PAR) = $\frac{PE(RR-1)}{PE(RR-1)+1}$

where

PE = the proportion of the population's travel that is exposed to the problem, and
RR = the relative risk associated with, or multiple by which risk is increased by, the problem.

As an example, suppose that 10% of travel is exposed to a risk factor that involves a relative risk of accident involvement of 3. The population risk attributable to this risk factor is:

$(0.1 \cdot 2)/[(0.1 \cdot 2) + 1] = 0.167$.

This means that if the excessive risk was eliminated, but the amount of travel remained unchanged, the number of accidents could be reduced by 16.7%.

5.4.2 Severity

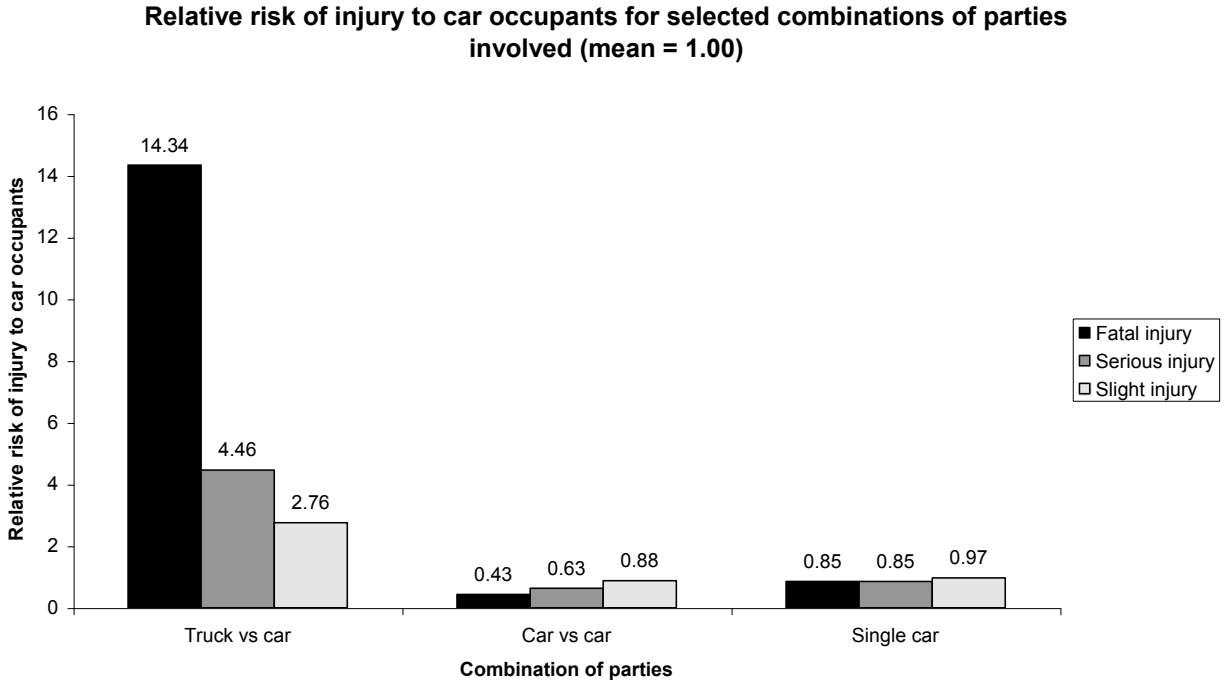
It is widely agreed that deaths are the most serious impact of road safety problems, serious injuries the second most serious impact and pure property damage the least serious impact of road safety problems. Hence, a road safety problem is severe if it makes a greater contribution to deaths and serious injuries than the contribution it makes to slight injuries or property damage.

In order to assess the severity of a road safety problem, one should compare the size of its contribution across levels of injury severity or, equivalently, estimate relative risk associated with a risk factor across levels of injury severity.

Incompatibility between vehicles or groups of road users in terms of mass or crash protection is an important road safety problem. The involvement of vehicles with a large mass in accidents is very often associated with more severe outcomes. Figure 5.1 gives an example of this, based on Norwegian accident statistics (Elvik, 2004). It shows the relative risk of fatal, serious or slight injury to car occupants in accidents involving truck-trailers, other cars or no other vehicle or road user. The overall risk of injury at a given level of severity for all road users in all accidents has been used as reference, given the value of 1.00.

Car occupants are less at risk of being killed in accidents in which the car crashes with other cars or no other vehicle or road user is involved than the average risk of being killed in a car accident, regardless of counterpart. If, however, the counterpart is a truck-trailer, death risk increases by a factor of 14.34. Involvement of a heavy vehicle contributes dramatically to making accidents more severe.

Figure 5.1 Assessing the severity of a road safety problem – injuries to car occupants.



5.4.3 Externality

Road traffic involves the interaction of several groups of road users. These groups differ in terms of size and speed, and thus in terms of the momentum and kinetic energy they possess. In general, groups that possess large amounts of momentum and kinetic energy represent a greater risk to other groups of road users than those that possess less momentum and kinetic energy.

To identify the external risk produced by a certain group of road users, it is instructive to form a table of injured road users according to the combination of parties involved in accidents. Table 5.2 shows such a table for Norway. In case an accident involved more than two parties, it has been assigned to the heaviest party involved. Thus, an accident involving a truck, a car and a pedestrian would, if car occupants and the pedestrian were injured, be listed as a truck accident with a car and a pedestrian involved.

Articulated lorries, that is a lorry pulling one or more trailers or semi-trailers, were classified as the heaviest type of vehicle. Next follow lorries, buses, vans

and cars. The first row of the table shows persons who were injured as occupants of articulated lorries. There were 480 injured occupants in total; 65 were injured in accidents in which the articulated lorry collided with a car. This can be interpreted as a risk imposed by cars. The first column of table 5.2 shows road users who were injured in accidents in which the counterpart was an articulated lorry. In total, 1,566 road users were injured in accidents in which articulated lorries were involved, of which 1,521 were not occupants of the articulated lorry. Hence, the external risk imposed by articulated lorries accounts for 1,521 injured road users, whereas the risk other road users impose on occupants of articulated lorries accounts for only 97 injured occupants of articulated lorries. The involvement of an articulated lorry in an accident therefore represents a large external risk.

5.4.4 Complexity

The complexity of a road safety problem depends on where it lies in the spectrum between being attributable to a single risk factor or to a multiplicity of risk factors that each make a small contribution and interact in ways that are poorly understood and difficult to measure.

The involvement of older drivers in fatal and serious injury accidents is likely to be a complex problem. Although the factors contributing to it are not fully known, they are likely to include at least the following:

1. Lower annual driving distances among older drivers than among other drivers: drivers who drive less, tend to have higher accident rates than drivers who drive more;
2. Risk factors that increase the probability of accident involvement, including (but not necessarily limited to):
    a. decreases in perceptual functions (vision, hearing, etc.) due to normal ageing,
    b. age-related diseases, in particular cognitive impairment.

    These may well outweigh the effects of older drivers' skill and wisdom in avoiding hazardous situations and driving conditions;
3. Fragility, which means that older drivers sustain more serious injuries from a given biomechanical impact than younger drivers. They also recover more slowly, and are more likely to develop complications, from a given injury than younger drivers.

The interaction of these factors makes the problem a complex one, which is not easily solved. Should one advise older drivers to drive more, in order to attain a lower accident rate? Hardly. Age-related diseases are notoriously under-diagnosed. Moderate levels of cognitive impairment may not affect driving performance greatly; determining the point at which a disease should disqualify a driver is not easy. Finally, there is little to do about fragility, but more adaptive protective devices and better management of osteoporosis may in time mitigate its effects somewhat.

Table 5.2 Injured road users in police reported accidents in Norway 1998-2002, by parties involved.

	Counterpart in accident												
Injured as occupant of	Articulated lorry	Rigid lorry	Bus	Van	Car	Large MC	Small MC	Moped	Pedal cycle	Pedestrian	Other	None	Total
Articulated	45	20	8	2	65	0	0	0	2	0	0	338	480
Lorry	50	64	26	25	117	3	0	2	1	1	13	306	608
Bus	105	75	39	36	230	1	0	5	0	8	21	417	937
Van	87	126	53	147	630	3	0	1	1	8	19	606	1681
Car	1150	1748	818	1745	20523	147	20	35	37	56	375	12832	39486
Large MC	26	57	38	80	1277	72	4	19	17	15	34	1532	3171
Small MC	3	5	5	25	259	4	6	10	3	2	5	197	524
Moped	14	39	31	74	1288	13	10	74	25	34	22	523	2147
Cycle	31	95	69	173	2860	33	6	51	172	34	62	400	3986
Pedestrian	42	155	212	262	3674	44	7	87	112	18	137	85	4835
Other	13	48	9	10	108	4	0	2	3	2	16	267	482
Total	1566	2432	1308	2579	31031	324	53	286	373	178	704	17503	58337

5.4.5 Inequity

The risk of injury is equitably distributed if we all face the same level of risk. Alternatively, one could argue, invoking the difference principle of Rawls (2000), that differences in risk can be regarded as fair if they are arranged to the greater benefit of the less advantaged groups of road users.

The advantage provided by a transport system is the opportunity to travel (or transport goods). As far as personal travel is concerned, the most advantaged group is therefore the group that gains the most from its travel. This group is the most advantaged by getting the greatest benefit from a transport system, which serves several groups of road users. The least advantaged group is the one that gains the least from its use of the system.

Differences in risk favour the least advantaged if that group has the lowest level of risk and the most advantaged group has the highest level of risk. This seems unlikely to be the case in any motorised country today. Vulnerable road users, who typically perform only about 10-20% of kilometres of travel, typically sustain about 30-50% of all fatal injuries. Although they may gain somewhat greater benefit per kilometre travelled than do users of motor vehicles, this may well not be enough to match their higher risk per kilometre travelled. Unless it is, it follows that to make the road transport system more equitable, differences in injury rate per kilometre of travel should be diminished.

5.4.6 Territoriality

Some road safety problems have a distinct geographic dimension other than those accounted for by demography and patterns of travel, some do not. It is typically problems related to the quality of infrastructure – roads, traffic control devices, etc. – that have such a geographic dimension. Hence, network screening should be a part of any analysis of road safety problems at the national (or regional) level of government. The objective of network screening is to locate as accurately as possible those places or parts of the road system that have the highest expected number of accidents or the highest incidence of fatal or severe injuries, having regard to the prevailing amounts of traffic.

An instructive guide to network screening has been developed by the Federal Highway Administration in the United States (Harwood et al, 2002).

5.4.7 Dynamics

The dynamics of a road safety problem can be examined in many ways. Tests have been developed to determine if there is a trend in a series of accident counts, or if there has been a sudden jump in the series (Hauer, 1996a, 1996b).

At the national level, a simple indicator of dynamics is the long-term trend in accident rates or injury rates for certain groups of road users.

5.4.8 Perception

One of the factors contributing to a road safety problem may be that it is not considered to be a problem.

The perception of road safety problems can be studied in many ways. One useful indicator is the level of support for stronger policy interventions. Table 5.3 shows the most recent findings of a Norwegian survey regarding this (Fyhri, 2002).

Huge majorities of the Norwegian public favour a law requiring cycle helmets to be worn, pedestrians to wear a reflective device in the dark, imprisonment to be used more often to punish drinking and driving and a speed limit of 30 km/h in residential areas. When it comes to policy interventions that deal more generally with speed or speeding, however, opinions are more divided. A majority are opposed to reducing speed limits on most roads in towns to 30 km/h.

There is also little support for requiring cars to have a device that will make speeding unpleasant (for example by means of an active accelerator pedal giving resistance when the driver tries to exceed the speed limit, or by means of a warning signal that gives an unpleasant sound when the speed limit is exceeded).

Table 5.3 Support for road safety policy interventions in Norway. N = 1999 for all questions.

	Percentage distribution of opinions (N = 1999)			
Policy intervention	**Support**	**Oppose**	**No opinion**	**Total**
Helmet wearing law for cyclists	84	14	2	100
Pedestrian reflective device in darkness	93	6	1	100
Imprisonment for drink-driving	79	19	2	100
Speed limit of 30 km/h in residential areas	82	16	2	100
Speed limit of 30 km/h in towns in general	36	60	4	100
Reducing speed limits to improve safety	46	51	3	100
Higher fines for speeding	43	44	13	100
Device in cars making speeding unpleasant	35	62	3	100

This suggests that at least some measures designed to curb speeding will meet with resistance and thus be difficult to implement.

5.4.9 Amenability to treatment

A road safety problem is not always easy to solve or reduce, even if it makes a major contribution to accidents or injuries. Amenability to treatment can be defined as the prospects of implementing measures that will reduce the size of a road safety problem, or, in the best of all worlds, eliminate the problem. One can try to assess the amenability of various problems to treatment by combining information on the size of these problems with information on the level of support for stronger policy interventions. Figure 5.2 shows such a combination of information for four road safety problems in Norway. The four problems are speeding, drinking and driving, pedestrian accidents in the dark and cyclist accidents. For each of these problems, the percentage of the public who support stronger policy interventions, from table 5.3, is shown on the abscissa. The higher the percentage, the easier one would think it would be to introduce the road safety measures that can reduce the problem. Also shown in figure 5.2 is the death risk attributable to each problem. This is an indication of the importance of the problem.

As can be seen from figure 5.2, measures designed to reduce drinking and driving, pedestrian accidents in the dark and cyclist accidents enjoy wide support. Measures to curb speeding, which is the most important of the problems shown in figure 5.2, are less supported. This suggests that speeding may be less amenable to treatment than the other three problems shown in figure 5.2. A treatable road safety problem is one for which there exist potentially effective measures that can be taken, the measures are not strongly opposed by a majority of the population and the measures are not prohibitively expensive.

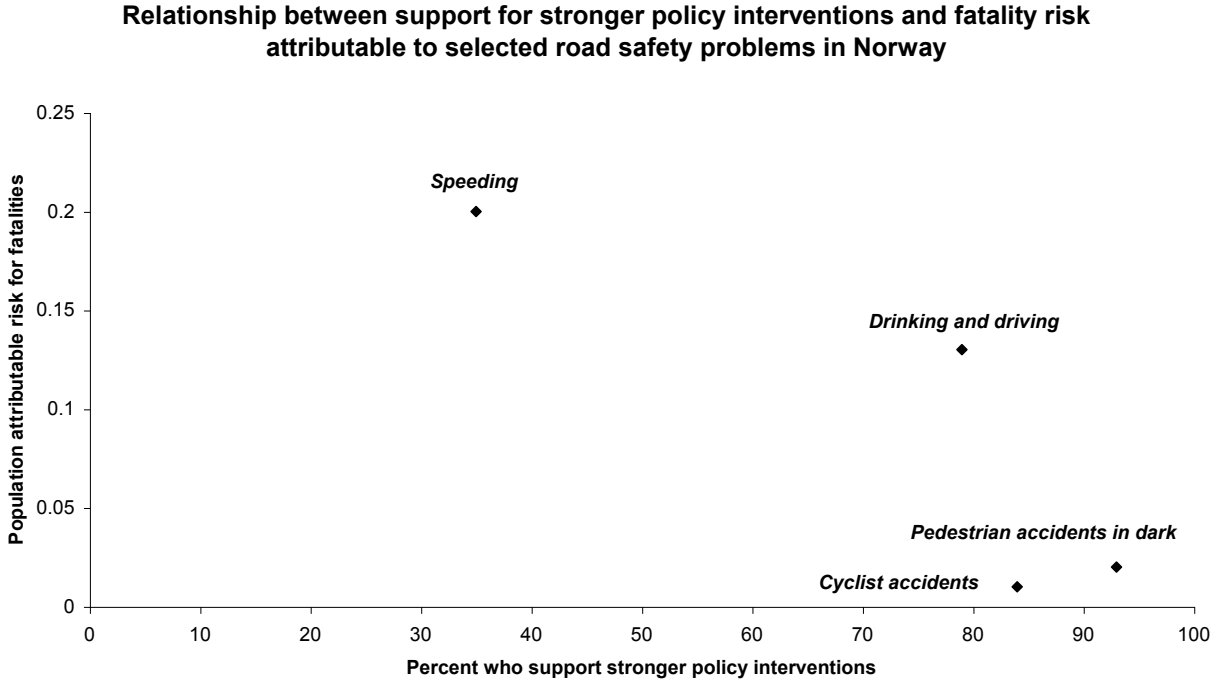


Figure 5.2 The amenability of road safety problems to treatment

5.5 Limitations of the analysis of road safety problems

Any analysis of road safety problems will be incomplete and will, in general, be subject to the following limitations.

- There are many important risk factors for which no meaningful estimate of attributable risk or other dimensions of their effects is possible. Inattention on the part of road users is a case in point. There is little doubt that inattention causes many accidents. However, trying to quantify the contribution of this risk factor to accidents is very difficult, because exposure to it is virtually impossible to measure (what is the proportion of kilometres driven by inattentive drivers?).
- Risk factors tend to be correlated, but these correlations are not very well known. It is in most cases probably not correct to add the risks attributable to two risk factors in order to find their joint contributions to accidents or injuries.
- Some road safety problems are not adequately described in terms of enhanced risk. Children, for example, do not have an excessive risk of injury in traffic compared to adults. However, it is a policy objective to provide a higher level of safety for children than for other groups of road users. As long as it remains possible to reduce the risk of injury to children, this policy objective has not been fully attained, despite the fact that estimates of risk will not identify children as a particularly vulnerable group.
- Accidents and injuries are not fully reported in official accident statistics. If the level of reporting is associated with a risk factor, an estimate of the risk attributable to that factor will be biased. This may apply to the risk attributable to being an unprotected road user, at least as far as injury is concerned. Injuries to unprotected road users, especially cyclists, are less completely reported in official statistics than injuries to car occupants.
- It is in some cases not possible to perform a complete analysis of road safety problems at a single level of government. In this chapter, the focus has been on road safety problems that can be analysed at the national level. Network screening is part of such an analysis, but a detailed analysis of the parts of the road system that are identified as needing safety treatment will usually have to be made at the local level of government, as familiarity with local conditions is essential in analysing local road safety problems.
- The availability of relevant data will set limits to any analysis. If, for example, the use of seat belts is not monitored regularly, it is not possible to know if not wearing seat belts is a road safety problem. The framework presented here can only be implemented if fairly detailed and extensive data are available.

5.6 Conclusions and guidelines

A comprehensive analysis of road safety problems is needed to develop effective road safety programmes. Analysis of road safety problems must be made both at the national level and at regional and local levels of government. The analysis of

road safety problems is complex, as these problems are multidimensional and tend to be interlinked. To ensure that the most important problems are identified, it is important to rely on a systematic approach to analysis. This chapter has explained the main elements of such a systematic approach. These elements can be summarised as follows:

1. Analysis should start by choosing a taxonomy to help classify problems. A tentative list of problems to be subjected to analysis should be made. It is impossible to analyse every conceivable road safety problem. Analysts should therefore confine analysis to those problems that are believed to be the most important. A realistic level of ambition is probably to aim for an analysis of around 20 road safety problems that are judged to be the most important.
2. Road safety problems are multidimensional. The most important dimensions of such problems are: magnitude, severity, externality, complexity, inequity, territoriality, dynamics, perception, amenability to treatment
3. The most important of the dimensions listed above are magnitude, severity and amenability to treatment. It is important to try to assess amenability to treatment as part of the analysis otherwise there is a risk that the road safety programme developed will be too idealistic or optimistic with respect to the prospects for solving the problems.
4. To be able to assess all dimensions of all road safety problems selected for analysis, very extensive data are needed. All relevant data will not always be available. In case new data need to be collected, the following guidelines are offered with respect to the data that are most important to collect:
   a. Systematic and consistent records should be made of accidents involving personal injury, covering accident circumstances, casualties, vehicles involved and their users (records of damage-only accidents are a useful supplement where these can be recorded reliably);
   b. Periodic travel behaviour surveys should be made in order to estimate the amount of travel for as many groups of road users as possible;
   c. Road user behaviour should be monitored regularly with respect to speed, drinking and driving and seat belt wearing;
   d. Surveys should be made to assess risk perception and the level of support for various road safety measures.
5. Analyses of road safety problems should be updated regularly. New problems may emerge – talking on the mobile phone while driving, driving when fatigued – and some old problems may become less important.

6. Safety policies, vision and management

The previous chapters have demonstrated where safety problems may lie, how to analyse them, how to implement well-suited actions and how to evaluate the effects. Application of these ideas in any particular country requires recognition of the complexity of road safety actions, and therefore the importance of taking that country's specific features into account. Aspects of visions and strategies adopted elsewhere (such as Vision Zero, sustainable safety and more relativist philosophies like those of Australia and Great Britain) can then be adapted to the specific cultural, social and institutional features of each country in question. The application of European Union Directives and Recommendations must also be understood as taking these specific features into account.

Systematic and strategic thinking and action on the lines recommended in this Review are vital for the sustained medium- and longer-term reduction in death and injury on the roads. But such action takes time and planning for it is not and should never become a substitute for action now and in the shorter term. In every country there are known, identifiable and highly cost-effective measures that can be taken now, by the existing responsible organisations, using existing skills and at affordable cost. Nothing that is recommended here should stand in the way of such measures

6.1 Vision and context

Managing safety actions requires taking local conditions into account, both in their technical dimensions and in their organisational and institutional aspects. The example of the SUNflower countries, summarised in Table 3.1, shows how over more than three decades those three countries have arrived at similar levels of road safety, but in different ways, each following its own route in the light of its own circumstances while learning from the other two and from further afield.

6.1.1 Taking each country's specific road safety problems into account

The history of the road safety struggle in each country will determine the level of prevention and the observable rate of risk. The strategies implemented cannot all be at the same levels of maturity, consistency and integration.

The problems posed must be analysed within the specific context of each country. Thus, alcohol consumption and attitudes to it differ from one part of Europe to another. The characteristics of the automobile fleet, bicycle riding, the use of motorcycles and mopeds are obviously to be taken into account in road safety assessments. It is just as obvious that the characteristics of the networks need to be taken into account. Some more densely populated countries have sprawling urban areas. In other countries, however, the length of the local rural networks explains the high level of seriousness of the accidents observed.

The good practices which various countries have contributed to developing need to be adapted to these local characteristics.

6.1.2 Taking institutional organisation into account

Obviously, all road safety actions are undertaken and have an impact on the national level, the regional level and the local level. Certain levels can be stressed, however, depending on the type of action.

Thus, automobile standards are defined on the international level, which is where the main concerns lie. The same holds true for road signs and standards for them, but their effective application will also depend on particular local conditions. Road design and law enforcement are determined nationally and locally.

Moreover, a country's political organisation (its constitution and institutions) must be considered to necessitate certain observable differences in safety planning practices.

This holds true for the federal or centralised structure of the country. In some countries, the regional or provincial level may play a determining role: this is the case of the Belgian Regions or the German Länder, for example. The responsibilities and relative importance of the various institutional structures - from the national level all the way down to the most local level, with all the other levels in between - must be taken into account. The consequences, particularly in terms of imposing strategic actions, are not the same depending on the country's degree of federalism.

The political organisation of countries makes it advisable to stress the consistency of actions used in devolved strategies for which the national government clearly sets objectives, while federal and/or decentralised structures tend to require a concentration on efforts in stakeholder participation based on the involvement of local governments and associations by emphasising their responsibility toward society.

These two trends are necessarily complementary in modern democracies, but the institutional context plays a significant role in defining strategies of action and in organising implementation.

With a view to including road safety in more global policies, ministerial responsibilities should also be taken into account insofar as they are able to facilitate such inclusion. Thus, the dispersion of ministerial responsibilities for spatial planning, public works, transport, safety and the environment may facilitate or hinder an overall picture of the spatial and transportation

dimensions. In Great Britain, a single department has sometimes been in charge of all of these fields of action.

6.1.3 Strategies for action

The way road safety is thought out and the philosophy behind the action obviously influence the strategies adopted.

First of all, the present state of understanding has made it possible to pinpoint actions that have been shown to improve road safety. Organising road safety actions requires a strong involvement on the part of all concerned stakeholders who are able to influence the application of these particular measures. Quite often, efforts are concentrated on just one or a few aspects of road safety. There are several reasons for this; the first is a functional dispersion among administrations and other stakeholders; the second is the large number of disciplines concerned (road techniques, vehicles, human factors, etc.); the third is the large number of functions within the administrations in charge of road safety, which means compromising on the allocation of limited resources.

While major progress has been possible in this way, and while further increases in safety are thus still accessible, certain measures are nonetheless hindered by questions of their social acceptability, by existing conflicts between social objectives (mobility, environment, social inclusion, etc.) and between social objectives and individual desires.

A distinction is usually made between two types of strategies for action. In the first, road safety acts as the principal stimulus. Actions then influence activities in other sectors of local or national interest.

The second strategy is developed in reaction to certain sector-based activities which have consequences for road safety or which offer opportunities to include road safety in other policies. This is why a "multi-annual road safety programme" is felt to be a necessity so as to take advantage of all opportunities. Some countries make a point of including this programme in a wider policy. Thus, road safety is sometimes included in an overall public health policy or in transport policy. The Netherlands provides a good example of a sustainable transport policy which includes a strategy for developing sustainable safety.

Lastly, an integrative philosophy is appearing which calls for intrinsic safety in road transport systems. Applying this viewpoint to concrete situations requires a clear sharing of responsibilities among the people in the design and the application of rules. In Sweden, the "Vision Zero" approach uses such principles:

1. The designers of the system are always ultimately responsible for the design, operations and use of the road transport system and are thereby responsible for the level of safety within the entire system.

2. Road users are responsible for following the rules for using the road transport system set by the system designers.
3. If road users fail to obey these rules due to a lack of knowledge, acceptance or ability, or if injuries do occur, the system designers are required to take the necessary further steps to counteract people's being killed and seriously injured.

This type of vision strongly influences the overall design of the road transport system. "There need … be no contradiction between a far-reaching long-term vision or philosophy and a challenging but achievable, and thus necessarily more modest, shorter-term target associated with a strategy for the foreseeable future. If properly communicated and understood, both the ultimate vision or philosophy and targets for the next foreseeable steps towards it can serve their respective purposes side by side" (ETSC, 2003a).

6.1.4 Safety target management

The road safety struggle increasingly uses *management by objectives*. National road safety plans use quantitative targets at a very general level, and if these targets are focused more closely, they deal with specific road user groups or specific countermeasures. Results are thus stressed more than the means used to achieve them; quantification of the target level (number of accidents, risk level) is used to define guidelines.

"Two different approaches could be used to define targets: a top-down approach and a bottom up one. In a top-down approach the target is set first. This target must be attractive enough to be adopted by politicians. Such an adopted target legitimises the policy process (manpower, funds, etc.) for the measures to be taken. It is to be hoped that enough effective measures will be or become available.

In the bottom-up approach, all relevant data and information have been collected and an assessment has been performed leading to a realistic target. This approach is by definition a realistic one and is to be recommended when a rational approach is chosen, but to accelerate road safety policy the top-down approach could be advisable as well.

When a targeted approach has been chosen, a combination of the top-down and bottom-up approaches will be normal practice, because this will make it possible to choose between realism and idealism" (OECD, 1994).

"Both nationally and locally, management teams formed to be responsible for formulating the agreed strategy and setting casualty reduction targets can also provide the starting point for leading the subsequent implementation of the resulting policies and measures. A strong alliance between the political leadership and professional management team is crucial" (ETSC, 2003a).

6.2 Framework for a safety policy

6.2.1 Bringing skills together

A road safety policy is based on intentions that are present and on readiness to act to prevent accidents and to mitigate the consequences of those that still occur. These intentions may be brought together specifically around the idea of prevention (often around the idea of enforcement), but they can also be part of wider fields of concern.

- Current concerns in favour of sustainable development, which may lead to a change in the paradigm in terms of economic and urban development on the one hand, and in how the road network is designed on the other. This in turn leads to a broader and more critical, but certainly more consistent, view of motorised travel on the political agenda. Moreover, European towns are highly sensitive to the quality of their public spaces for many reasons related to their quality of life, historical heritage, tourism or property value. In consequence, the levels of foreseeable nuisances caused by the general growth in motorisation should, in the future, occupy an ever more important place in decision making and forceful policies are being implemented for a more rational management of motorised traffic.

- The medical profession has also become alarmed by the increase in the number of traffic victims. Thus, risk on the road is developing into a recognised public health issue requiring preventive processes from healthcare actors.

- Other fields of public or private action could also be mentioned: awareness among police forces toward questions of personal security and safety or individual delinquency. Associations – often made up of victims – can play the role of lobbyists with the public authorities. Economic interests related to the automobile or two-wheeled vehicles are also sensitive to road accidents.

- Many commercial organisations depend heavily on road transport and its reliability, and are concerned about disruption caused by accidents - and they should be concerned about the implications of driving by their personnel in the course of work for the safety of the personnel themselves and of other road users who may be put at risk by their driving.

Bringing skills together can be helped by a political initiative by elected officials capable of holding up road safety as an essential value. In doing this they are transmitting an often highly diffuse social demand, as well as the EU recommendations which now set objectives for reducing the number of victims in Europe.

As this report has tried to show, this mobilisation of skills is being undertaken by taking into account the historical and organisational context in each country and

the state of our understanding of the risk of death or injury. This requires technical and organisational expertise to make a policy of real prevention and mitigation possible, and while this expertise is being developed, existing efforts to implement known and cost-effective safety measures should continue and be reinforced.

6.2.2 A dynamic process

Action in favour of road safety first of all entails *articulation of the problem*. Experience has shown particularities and specificities depending on the time and depending on the country. This type of articulation is based on the state of social demand; for example, it may stress better vehicle design or greater regulation, or it may emphasise road layout.

This articulation also evolves according to the level of risk. Technicians and the media thus play the role of alerting public opinion. But recognising the problem is not enough. Certain possibilities for action are usually stressed by the technicians or the media who call for their implementation. There is then a focus on following the rules, combating drunken driving, speed reduction, protection of urban residential zones, educating young adults, driver training, verifying the abilities of the elderly, vehicle performance, etc.

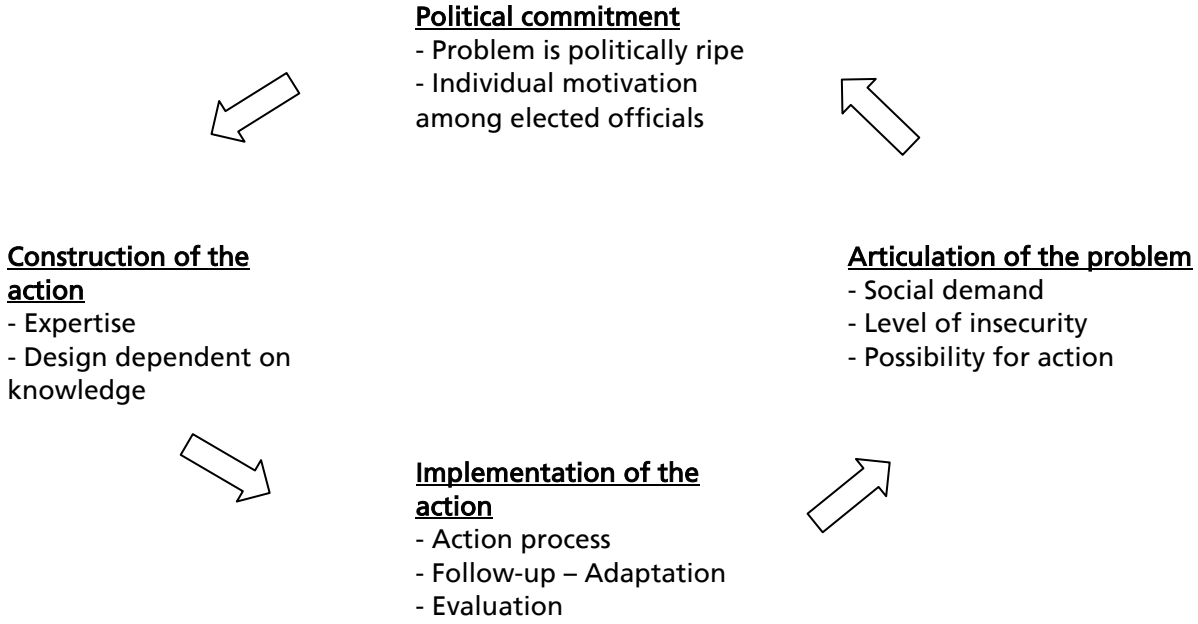


Figure 6.1 Definition, implementation and continuing evolution of a road safety policy

No matter how technically well-founded it may be, no action can really be implemented without *political will and commitment*. It is therefore necessary for a number of politicians to be militants for the road safety cause, considering that it is within their power to act and to gather together a small core group of technicians from various areas who can propose actions and implement them. They need to work together to move up the agenda, at the highest levels of

policy-making, proposals for effective political actions to improve road safety. This involves skilful placing of such actions in the context of wide political concerns of the day so that they acquire high priority and commitment from the top.

Their motivation has several origins but it is also the result of maturity toward this question as a political problem, in other words the effects of these actions – which often impose constraints and restrictions – have to be acceptable to the elected officials without unacceptable political consequences.

Construction of the action should be based on strong technical expertise using robust knowledge, often drawn from experiments that have been carried out in other countries. Care must be taken to ensure that the users' ability to adapt in the medium term does not produce results that fail to match up to reasonable expectations. This is why researchers today are publishing meta-analyses to take stock of a subject based on numerous more specific studies published in scientific journals. These summaries can be very useful in predicting the consequences of actions and thus in adapting them.

Implementation then requires effective political management, a follow-up of the action being used to adapt and improve upon it and an evaluation providing an assessment of its effectiveness.

6.2.3 Management and evaluation

Safety policy management will thus take into account particular social contexts in which certain measures are called for on the social level. In France, in 2001, a change in the attitudes towards road safety was noticeable. The French President himself promoted a policy aiming at preventing road accidents. A subsequent enforcement and public information effort in 2003–2004 made possible a spectacular decrease in the number of casualties.

Certain targets are then favoured over others. On the other hand, part of society may find it difficult to accept some actions.

The public is increasingly being involved in decision-making and in actions, whether in the legislative texts which create obligations for local authorities or in actual practice. But this kind of involvement is not easy and this is where the social management of safety policies must be applied in various forms depending on the country, the institutional context, the degree to which implementation of safety measures has developed, etc.

From a more technical point of view, when the action is implemented, a monitoring of its impact should be performed. This follow-up should be carried out in the short term, by direct observations to assess any deviations from the safety objectives laid down in the programme of action. This can lead to a

refined adaptation of intervention strategies and corrections when measures do not work in the intended way.

A quantitative evaluation of the long-term effects (over several years), notably in terms of the number of accidents and victims, must be carried out. This makes it possible to assess the usefulness of a particular action, of course, but also to improve the general understanding of its effects. By bringing several experiments together, through meta-analyses, more light can be shed upon the quantitative evolution of road safety.

Political management makes for the success of a preventive action and helps to maintain consistency of direction and purpose, especially at times when progress seems slow and circumstances give rise of unexpected setbacks or difficulties. Quantitative evaluations provide assessments of the policies implemented and of whether the pre-set objectives are met, and help in the process of learning from experience.

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