

ON THE WAY TO INTEGRATED ROAD SAFETY PROGRAMMES

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1. INTRODUCTION

After a continuous rise the number of traffic fatalities in the industrialized countries has enormously decreased since the beginning of the seventies. This favourable development seems to have stopped in most countries. Have effective measures lost their effectiveness, has the time gone by for simple, far-reaching measures? We entered a period of reconsideration, especially if we have to take into account that the mobility will increase even more. Can a further reduction of the yearly number of fatalities be accomplished if we assume that no simple, far-reaching measures will be available in the near future ?

The road safety problem in developing countries is growing along with mobility and the entrance to the motorized world. Here the question is which measures are most cost-effective, with special attention to maintenance problems in the future, given the social, cultural and economical context of these countries.

The development of mobility in industrialized countries has been stormily after the second world war and more slowly in the latest decennium, though in the last few years it has been relatively strong. If we look at traffic as a system, a period of strong changes requires a reactive policy, output-controlled, to effectively influence developments in the right direction. A more systematic control is obviously needed in a more stable system, directed at future developments. On the system itself and on the nature and causes of its developments little is known. However, a growing interest is shown in the system itself and its safety aspects. This appears from the development of scenario's for the future for mobility and the connected road safety. Many countries are reconsidering their approach to deal with road safety.

It is generally agreed that a more integrated approach is necessary. The question is how to deal with integration. Before answering this question it is necessary to describe and to characterize the road safety problem. Millions of (near) accidents happen in a country. Every accident is the result of a unique combination of factors. For every accident there are generally several causes. An example: A young driver goes home from the disco on Saturday night. He drives home some friends. Of course they drank some glasses of beer. The boy bought a second-hand car. The way

home leads over a winding dike along a river. It is raining. The boy wrongly assesses a bend. Because he is driving too fast he cannot correct himself on time and the car ends up in the river. As the boys did not use their safety belts they were thrown out of the car and drowned. The next morning a passer-by discovers the accident. Cause? A young, inexperienced driver, not using his safety belt, after the use of alcohol, driving home in the rain, at night, on a road without crash barriers, on bald tyres. All those factors may have helped. The wish to indicate one cause only limits the range of possible measures.

Some research reports indicate a percentage of 95% of accidents in which the human factor was involved, 25% for the road and 5% for the car as if this would be a measure for the importance of the different factors. This conclusion is not correct. These figures do not show which changes to which factors would be most important to improve safety. It is an error in reasoning to decide on the basis of these figures about measures to be taken. Are changes to the road e.g. not made to prevent human errors? And what to think of a (still science-fictionary) fail-safe automated vehicle, in which the human decision maker and acting intermediary is replaced by a computer ?

It is recommended when analysing and managing road safety to use a phase-model of the accident process, in which all factors have their place. Figure 1 shows in short such a model, of which the order of the accident process in time is an important aspect.

There are many possibilities to intervene in this process. The earlier probabilities-of-failure are diminished, the better the effect of the measures. In the end the individual road-user himself has to do this, but others (authorities, safety organisations etc.) can influence the circumstances to diminish the possibility of an accident or the consequences. To keep human errors to a minimum is not only the responsibility of the individual himself, but also of the collective decision makers (actors). Several actors are involved when dealing with road safety and it should be kept in mind that the actions will be more effective as they are more attuned.

2. MORE ATTENTION FOR ROAD SAFETY

Road safety does not score high as a social and political problem. This is not only true on the individual, but also on the political level and in the media. Nobody is against road safety, everybody in fact is in favour, but in practice it does not show.

The possibility to get involved in an accident is thought to be relatively small, though it has been calculated that two out of three Dutch persons will get injured in a traffic accident in a life-time. This probability is thus not really very small. If one is confronted with it it usually means a human tragedy. The acceptance of individual limitations for the sake of safety often meets with problems such as speed limits ignored in mass, safety belts not worn, alcohol used before driving etc. Legal measures to improve road safety are not popular and are often considered to unnecessarily affect personal freedom. Even if at the individual level the probability of an accident is relatively small, at the collective level it is a question of a national disaster, but it does not lead to a massive attention for the problem. Many reasons are given: it is impossible to influence the system, or because of the lack of knowledge it is uncertain which effect measures will have, or effects are hardly visible, or it is the price to be paid for mobility, or it is the mentality of the road-user etc.

It is necessary that the indifference, individual and in society, to the road safety problem disappears, in order to further improve road safety otherwise integrated programmes do not have real possibilities to improve safety. The actual safety programmes in the United Kingdom (Road Safety: the next steps), in France and in the Netherlands support our vision by explicitly fighting against indifference. It is a long but inevitable road!

3. POSSIBILITIES FOR INTEGRATION

On the basis of a description of the nature of the accident process and of the control of that process the following ways of integration can be distinguished:

- Interaction of the different phases of the phase-model, which may be important in the analysis and in the handling of the problem; this is to be denoted as integration within the road safety system.

- Road safety is one of the factors to play a role in the traffic and transport processes, in which size and nature of mobility are more or less given facts and arguments of road safety are directed at the possibility of an accident and the seriousness of the accident.
- Transport (on the road) cannot be missed in our society; decisions in this field have to be balanced against the policy of deregulation, attention of the police and the judicature for the criminality, care of our environment, physical planning etc., integration with other fields of policy thus appears necessary.
- If integration is discussed, attention should be paid to the organisation of the Government, horizontally and vertically, between the different levels (national, provincial, local) and to the relationship between politics, policy-makers and the influence of lobbies in the field.

Point of departure is a rational view on the policy to be executed. It means that, departing from well formulated (and analyzed) problems, specified aims are to be strived for with specified means in a certain order. The policy process is cyclic: preparation, decision, implementation, evaluation, to be the starting point for a new cycle. The policy must be problem-oriented.

There apparently are functional reasons for integration when dealing with road safety problems in other fields of policy. The expectation is then that promotion of road safety will be more efficient and more effective and that the quality of the (political) decision making will be better. This expectation is probably general, why then did not the integration come about? This is not only true for the field of safety policy, but the lack of integration is apparent in other fields as well, especially if there is an international component.

This takes us to the questions which possibilities are being used in practice and which might be used to give meaning to integration. In this contribution a number of possibilities will pass in review. First the possibilities will be discussed to obtain a basis for an integrated road safety policy by formulating goals, combined with the setting of priorities. Next practical possibilities will be indicated to make arguments in the field of road safety play a role in other fields of policy. Characteristic for this input will be, we think, the use of a scenario-approach and so to take road safety arguments in serious consideration.

4. QUANTITATIVE GOAL SETTING AS A TASK FOR SOCIETY

Last year the Dutch national road safety plan for the years 1987-1991 was published, called: "More kilometers, less accidents". In this plan a clear goal is given: 25% less casualties in the year 2000. For 1990 this means: a reduction of 200 killed casualties and 1500 in-patients compared to 1985. In 1985 1438 persons were killed on Dutch roads and 14,520 injured people taken to hospital.

The Netherlands is not the first country to set quantitative goals. Recently Japan set a goal of under 8,000 killed in 1990, France under 10,000 in 5 years and Finland set the goal of a reduction of 15% in 5 years recently. In the "Inter Departmental Review of Road Safety Policy" from the U.K. it is suggested to set the goal of a reduction of one third casualties in the year 2000 on the basis of "vigorous application of known measures, together with the smaller contribution made by unproven measures assuming a background of stability".

Why would a country do this, if the goal-setter is not capable of achieving the goals by himself. In spite of the fact that politicians sometimes do not have the faintest idea whether an expectation will come true, even less how the goal should be achieved they assume that the non-attainment of the goal will call for a reaction. A reaction of authorities, road-users, organisations to achieve the goal by putting in even greater efforts instead of removing responsible politicians from office. The setting of (quantitative) goals may thus be considered to be a means to bring about a collective want to put road safety on the political agenda and to keep it there for a certain period of time.

Apparently it is essential that the goals are set collectively and are vivid in society. The setting of goals can thus be considered as an important but insufficient condition by itself for integration. Or like someone said: "The setting of goals opens doors that would otherwise remain closed".

In Japan in a "Road Safety Fundamental Plan" quantitative goals have been set several times already, even though the authorities admitted the danger of such an action. They immediately added that "Japan is a nation which could set goals for itself".

The most important fact is that a country, a province, a town, a fleet-owner, a private company sets a road safety goal for itself. The concrete formulation of a goal is important in the long run. If the goal is set

too low it will be achieved without real exertions and if it is set too high it will annihilate the attractiveness of this way of decision-making. Knowledge is needed to formulate canvassing goals.

5. WAYS OF GOAL-SETTING

There are two ways of (quantitative) goal-setting that are often applied. The first one expresses the goal in the number of casualties, mostly killed casualties. This has been done in the Netherlands, Japan and France. The second way is to set the goal in the number of casualties per 100,000 inhabitants or per thousand million vehicle-kilometers. The indicator per 100,000 inhabitants offers the possibility to compare traffic accidents with other threats to public health. Switzerland compared road safety to industrial safety and decided that the chance to become a casualty in traffic should not be greater than that of becoming one in industry. Thus the goal would be a reduction of two thirds of the number of traffic casualties. In the beginning of the seventies in Canada the goal has been set to diminish the chance of a mortal accident (per kilometer travelled) in 5 years by 15 %. This goal may mean, however, an increase of the number of casualties, if mobility would rise very much (e.g. by more than 15 % in a proportional relation). This indicator can also be used when different ways of transport are compared.

A ratio goal-setting is less canvassing than an absolute one, but the ratio goal-setting is more realistic on the basis of extrapolation. If we describe road safety at the highest level of aggregation the bell-shaped tendency in the development in time of the number of mortalities can be described as a result of two underlying developments. On the one hand the development of mobility (number of vehicle kilometer per year) and on the other hand the fatality rates (the number of fatalities per vehicle kilometer per year) (Figure 2). The first curve can be very well described with a logistic curve, like they are often used for production and sales figures. The second development can be described as a negative exponential function, characteristic of many learning processes, for individual and for institutional learning e.g. in the case of improvements in production processes.

Both developments are monotonic in time. The first one is S-shaped and

rising, the second curvilinear and going down. The product of these two explains the bell-shape in the development of the number of fatalities. The speed of development of the curves is different in different countries. It is slower in the U.S. than in England, Germany or the Netherlands (Figure 3). The development of the curves seems related. When mobility grows fast, the fatality rate decreases fast. The number of fatalities appears to be a function of the derivative of mobility. It means that changes in mobility have more influence on the development of the number of fatalities than the absolute level. It is not clear whether this is an autonomous development or a higher collective effort in a growing increase of the problem; either factor can play a part in this.

There are no reasons to assume that for future developments of the fatality rate the description of the past would not be usable. Then an estimation can be made of the number of fatalities in the future (in the case of unchanged efforts in this field) on the basis of estimations on the development of the mobility. We think that this would be a realistic basis to reach a (political) goal setting. To prevent misunderstanding these fatality rates are not going down automatically. It is the result of effective road safety measures.

It is recommended to set absolute goals based on knowledge of ratio goal-setting.

6. PRIORITIES IN ROAD SAFETY POLICY

From different view-points priorities in road safety policy can be formulated:

1. Setting up conditions to make the population, the road users, governmental bodies, private organisations and private companies interested in the problems and bring them to taking action or getting "public acceptance" for unpopular safety measures.
2. To indicate the greatest problems to be solved first.
3. Implementation of measures proven to be effective.

6.1. Setting up conditions

In a number of countries this category of measures is gaining higher priority. Japan, e.g., made a law in 1970 (Road Safety Policies Law)

obliging lower authorities (prefectures) or inviting them (municipalities) to occupy themselves with road safety by yearly organizing a "Road Safety Measures Conference" and the planning and implementation of a "Road Safety Programme".

France also pays special attention to this type of policy by implementing the programmes "Reagir" and "Minus 10%". The Reagir programme is executed by local employees of the governing bodies, the police, fire brigade, hospitals and private organizations. They make teams to investigate every serious accident and to give recommendations for measures. The analyses and solutions are stored in a central computer and are then searchable. Besides taking measures the programme is meant to build a network of interested professionals in road safety.

This aim to sensitize experts and the population is the same as that of the "Minus 10%" programme. Towns and regions (arrondissements) can take part in this programme. Enlistment gives the right to a motivating sum. Enlistment obliges to analyse accidents, to the installation of a committee of safety and to spend a certain amount on measures to improve road safety. If this leads to a decrease of 10% of the number of casualties a sum is awarded for every spared casualty by the national government.

This last idea to stimulate lower authorities by incentives to activities in the field of road safety has been taken over by Austria (Aktion Minus 10%) and by the Netherlands. The Dutch plan has been named after the national goal set for the year 2000: "Action -25%". In the three countries this approach appears to be successful considering the number of lower authorities enlisted (90 - 100%). Whether the growing interest actually will lead to less accidents has to be established. In the Netherlands such research will be carried out.

Another activity in the Netherlands is the foundation of "Regional Bodies for Road Safety" in every province. Without having much money available and without having real authority or veto, these bodies, composed from several interest groups, may be considered as the booster of activities and as the hatch of knowledge to local and regional policy makers. In other countries (Sweden) too comparable bodies have been installed.

It is too early to definitely judge these initiatives. They have real possibilities to become a success, but it remains to be seen whether after some years the interest will still be there. Successes obtained and expected regarding the number of casualties will be the best bases for

local and regional initiatives. It means that not only interest and enthusiasm are important, but also that knowledge and the transfer of knowledge will be the keys to success.

No success stories can be told yet on the interest of the public, the media and politics. Only when a serious accident has happened the attention for road safety increases and then there is a basis for new initiatives (the accident with the bus near Beaune in France is an example). This is a very cynical and unstable basis for a safety policy. Campaigns where modern communication techniques are professionally used may result in some improvements in the long run.

6.2. Most important problems

A number of countries developed methods to determine the most important problems. The approach in the Netherlands is as follows. Taking as starting points the way of participation in traffic and the age of the casualties, taking in consideration developments in time, the most important problems have been determined on the basis of three criteria: share in the total amount, the risk (casualties per km driven) and the vulnerability of different kinds of road users (seriousness of the injuries in collisions between two different kinds of traffic participants). Thus we found as the main problem categories: aged cyclists and pedestrians, young moped riders, young cyclists and pedestrians (especially in collisions with cars) and young car drivers.

It is not always clear from documents how other countries determined their main problems. But if we look at road safety programmes from different countries the similarity is striking. Coming back are:

- young, unexperienced drivers
- children and aged persons as pedestrians and cyclists
- driving under the influence of alcohol
- speed adaptation to road, traffic, weather conditions.

6.3. Effective measures

It always remains to be seen how road users react on safety measures and how this reaction will develop in the course of time. Often there is a relatively high effect at the beginning that disappears more or less later. To determine the effectivity of a measure the methodological problem has to be solved of the elimination of alternative explanations

of the effect found. Following the instruction books most questions seem to be "unresearchable". Hardly any unchallenged measure can be found. The following ones are among the best:

- crash helmets
- safety belts
- improvement of vehicles (active and passive safety)
- reduction of speeds and homogeneity of speeds
- improvement of black spots
- public lighting
- reconstruction of residential areas
- construction of motorways
- separation of different traffic participants

The striking aspect of this list is that there are hardly any measures to be considered to directly influence behaviour, meaning education and information, though such activities have been executed for a long time and on a large scale. It is not possible to draw an equivocal conclusion.

7. INTEGRATION IN TRAFFIC AND TRANSPORT POLICY

In the fields of traffic and transport policies other priorities than safety are predominant nowadays. In many developed and developing countries we see that the available net of roads and streets does not grow as fast as the mobility, which causes congestion. Congestion means economic costs and inhibits possibilities of economical growth. At present, a difficult period economically seen, the solution of the congestion has a high priority. It is understood that more is needed than only constructing more roads in densely populated areas.

Besides the economic interest of transport concern about the environment has grown. Gradually a great number of people has come to the understanding that the mobility has to be restricted, and that more technical solutions for vehicles and roads to limit noise pollution and air pollution have to be taken.

The two interests combined with scarce financial means determine traffic and transport policy and the investments in roads.

It is only realistic for those who try to make traffic safer to accept and use these conclusions. In the period that road safety was politically more important, however, the situation was not very different. Integra-

tion of road safety may be successfully effected along the following three lines (see also the described phase-model):

- a certain size and nature of mobility are given fact and strived for is:
 - o as much as possible of the mobility is taking place on the safest roads;
 - o the traffic volume of roads is as safe as possible, keeping in mind the characteristics of the roads or the roads are adapted to the traffic volume.
- with a certain extent of mobility the safest modal split is used.
- the extent of the mobility is limited.

It is to be expected that impulses in the field of transport policy and decisions regarding road planning will originate from the three mentioned fields of interest: economic attainability, environment and scarce financial means. On the basis of scenario-like calculations the consequences of certain variants for road safety would have to be determined. It means that data have to be available of the developments in certain accident rates to indicate the consequences of changes of the extent of the mobility, questions of route choice, investments in roads, modal split etc. for road safety. Then the argument of road safety can play a role in the decision making process. "Hitch-hiking" we would like to call that.

8. INTEGRATION IN OTHER FIELDS OF POLICY

"Traffic accidents happen because in physical planning road safety has not sufficiently been taken into account" is an often heard statement. Residential areas sometimes have a poor local area traffic management, ideas on compact towns, causing less and shorter movements are published only now that planning has produced dormitory-towns and that public transport does not have a fair chance. Road safety was not discussed, or sideways at most.

An other important field of policy is that of public health. Traffic accidents not only take up a great amount of attention (and costs) of the public health apparatus, but the organization and quality of medical aid could have certain positive effect on the seriousness of accidents, while improvements also serve other patients. More than 10% could be gained here, depending on the point of departure.

On police and judicature often a strong appeal is made, also on behalf of road safety. The police can influence drivers' behaviour by enforcing the wearing of the safety belt and measures to prevent speeding and too high a use of alcohol. Research proved that police enforcement has a better result if public acceptance has been positively influenced by information and if enforcement also goes together with information.

Likewise in many other fields activities are set up with their specific aims, but also influencing road safety. Safety experts must play a role here to show that there is a relationship and try to influence the final decisions.

This will only happen incidentally, we think.

9. CONCLUSIONS AND RECOMMENDATIONS

1. The problematic nature of road safety, the limited possibilities to deal with it together with the conclusion that the time of simple, far-reaching measures is over, lead to the conclusion that more integrated programmes have to be implemented to improve road safety. For developing countries it is a question of how to learn from experiences in developed countries, given the cultural, social and economical context of these countries.
2. In integrated programmes the point of departure is the interdependence of the different phases of the accident process. Furthermore the fact that measures to improve road safety can also be found in other fields of policy (physical planning, infrastructure, public health, police, judicature etc.).
3. As long as the road safety problem does not score high as a social and political problem the possibilities to integrate with other fields remain relatively small. The elimination of the actual individual indifference and the indifference in society toward the problem needs more attention in research and in policy.
4. A very promising way to get more attention in society and politics is to use a quantitative goal setting, leading to goals which are widely accepted, and means a real challenge. A realistic goal can be set on the basis of expected developments in mobility and the fatality rates.
5. A second method is to set and to use generally accepted priorities. The adoption of a favourable policy to draw road users, private organiza-

tions and governmental bodies more into this policy and to improve public acceptance of measures has been neglected and needs more attention.

6. With integrated programmes the most important problems (young, unexperienced drivers, children and aged people on foot and on the bike, etc.) will be dealt with. These programmes must exist of potentially effective measures to reach a further reduction of casualties.

7. The influence on safety of measures in the fields of traffic and transport will have to be calculated using a scenario-approach to give a role to the safety argument in the decision making process on those fields.

8. Integration in other fields will be more difficult, the safety argument will be more qualitative and obvious.

9. There are hardly any reports on integrated programmes to improve road safety, if these programmes exist at all. It is recommended to build a circuit where integrated programmes are reported, also the unfinished or unsuccessful ones.

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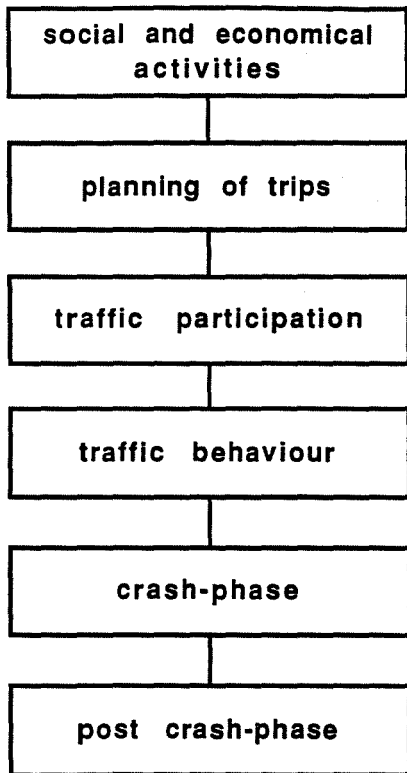


Figure 1. Phase-model of the accident process

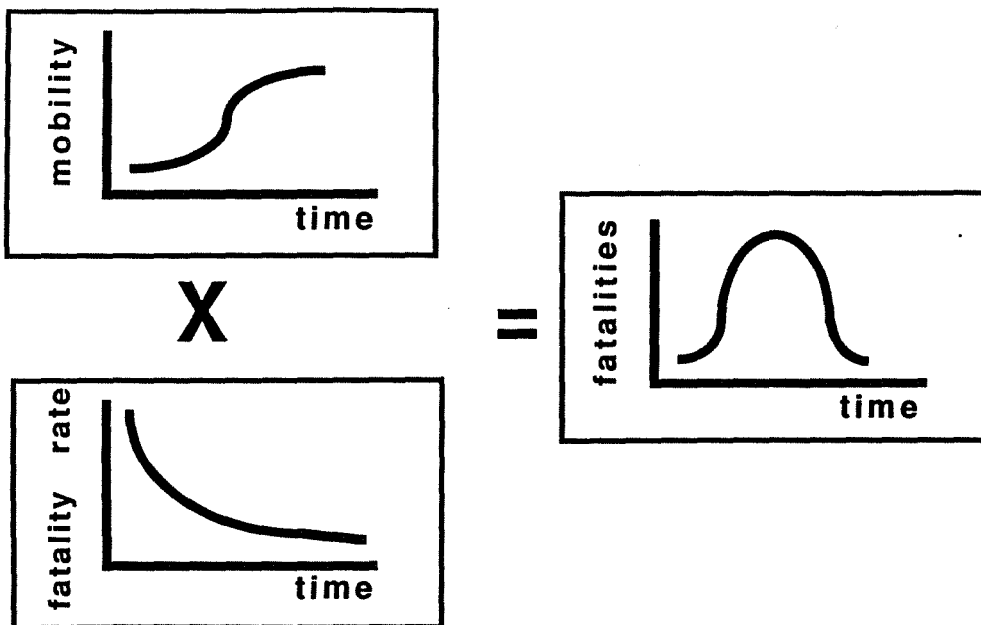
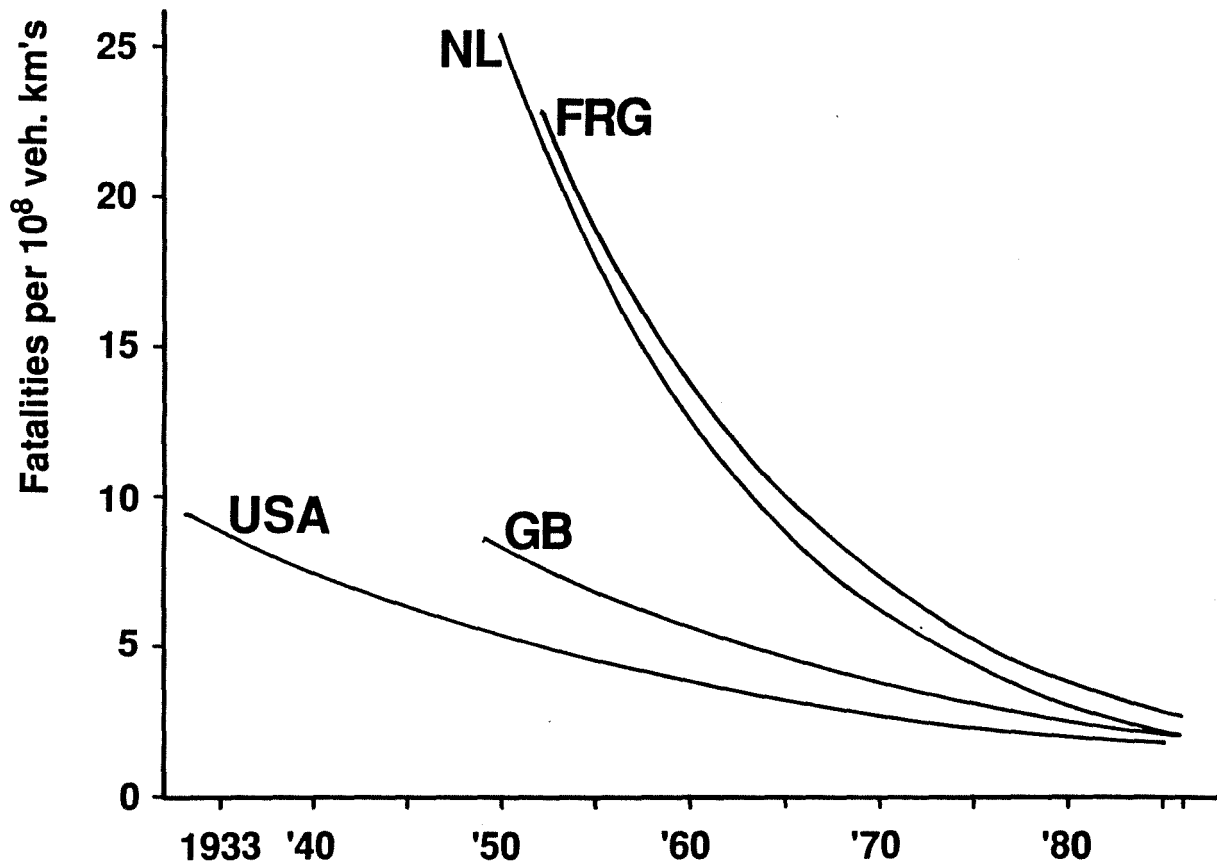


Figure 2. Trend in fatalities as result of trends in mobility and fatality rates



Absolute levels of rates not strictly comparable due to definition and measurement of traffic volume

Figure 3. Comparison of fatality rates in 4 countries