PAST, PRESENT AND FUTURE ROAD SAFETY WORK IN ECMT

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ABSTRACT

Initially some simple measures of road safety are discussed. Then statistics concerning the road safety situation in the ECMT area are presented using those measures. The major problems in road safety work and the possible countermeasures are analysed in general terms. Previous road safety work within ECMT is summarised. Previous mistakes of a general road safety character are discussed and future priorities for successful road safety work are proposed. Finally conclusions are drawn concerning the future role and tasks of ECMT.

1. BACKGROUND

1.1 The ECMT Countries

The European Conference of Ministers of Transport (ECMT) was created by a protocol in 1953. After the fall of the Berlin wall, the number of members increased considerably. In 1989 there were 19 countries, in 1994 there were 30 and presently there are 41 countries belonging to the ECMT organisation. These countries are in alphabetic order: Albania, Austria, Azerbaijan, Belarus, Belgium, Bosnia-Herzegovina, Bulgaria, Croatia, the Czech Republic, Denmark, Estonia, Federal Republic of Yugoslavia, Finland, France, FYR Macedonia, Georgia, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Liechtenstein, Lithuania, Luxembourg, Moldova, Netherlands, Norway, Poland, Portugal, Romania, the Russian Federation, the Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Turkey, Ukraine, and the United Kingdom.

Often the ECMT countries are divided into three different regions, each with a more homogeneous history and background. These three regions are:

- Western European States (WES): Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Iceland, Italy, Liechtenstein, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, Turkey, and United Kingdom.

- Central and Eastern European States (CEES): Albania, Bulgaria, Bosnia-Herzegovina, Czech Republic, Estonia, Croatia, Hungary, Latvia, Lithuania, Macedonia, Poland, Romania, Russian Federation, Slovakia and Slovenia.

- Central Independent States (CIS) and other countries: Azerbaijan, Belarus, Georgia, Moldavia, and Ukraine.

1.2 The ECMT tasks

The original task was to create a forum in which Ministers responsible for transport, especially inland transport, can co-operate on policy. Within this forum Ministers can openly discuss current problems and agree upon joint approaches aimed at improving the quality, the use and the development of European transport systems of international importance.

Presently the two primary tasks of ECMT are:

- To assist in creating an integrated transport system throughout the enlarged Europe that is economically and technically efficient, meets the highest possible safety and environmental standards and takes full account of the social dimension.

- To build a bridge between the European Union and the rest of the continent at a political level.

In this report, the aim is to analyse the ECMT position and role in the effort to create the highest possible safety standards in the past, the present, but primarily the future.

2. DISCUSSION OF SUITABLE AND RELEVANT CRITERIA FOR ROAD SAFETY

In this report an effort is made to use the word “crash” instead of the traditional word “accident”. The reason is that the word “accident” leads the reader to think that such events happen by chance and cannot be prevented. We know by now that crashes can be prevented and injuries caused by crashes can be prevented.

The first problem is how to measure road safety. The second problem is how to measure and compare road safety among a number of countries, which differ in many aspects of relevance for road safety, such as the ECMT countries.

In this report we are looking for a few simple, available, reliable safety measures with acceptable validity which can be used to compare the road safety level in different countries and regions.

2.1 Basic figures

In most countries and regions, figures of crashes, fatalities, injuries etc. are based on police-reported events. The unreliability of such reports is high, if it is known at all. The highest reliability is found for the number of fatalities. Only about half of the road traffic caused injuries are reported. This is the main reason why the number of fatalities has been given a disproportionately large weight. It is its high reliability and easy accessibility, rather than its importance, which motivates its dominance in road safety analyses.

The police reported crashes show considerable underreporting, as well as bias in the reporting, both with area and with time. The reporting rate also varies with crash type and road user category. For instance the reporting rate of crashes with injury consequences in many well developed countries vary for pedestrians from 35 to 70 %, for cyclists from 10 to 40 %, for cars from 50 to 75 %. Collisions are reported almost twice as often as single vehicle crashes and day crashes are reported almost twice as often as night crashes. Despite these problems with underreporting, there is presently no alternative to using police-reported events for databases on accident statistics. In the future, it is expected that hospital reports will be used much more.

2.2 Risk measures

In order to be able to analyse the meaning of the number of traffic fatalities as a measure of road safety, it is necessary to relate the fatality figures to the size of the traffic exposure measured in one way or another. By dividing the number of persons killed on the roads by the number of person-kilometres travelled on the same roads, it is possible to obtain a fairly good picture of traffic risks faced by road users. For example, it is possible to compare the traffic risk of walking, cycling and travelling by bus or car. It is also possible to compare other transport risks - e.g. air, rail, sea, and road (Table 1).

The choice of an adequate measure of exposure is not simple and should be made in relation to the purpose of the study. If the purpose is to establish the size of the road safety problem from the public health point of view, a suitable road safety measure might be the number of killed and injured persons per million inhabitants. If the purpose is to determine the risk on a specific road, a specific transport

mode, a suitable measure might be crashes per kilometre of road or per unit of traffic volume. Alternatively, if the purpose is to find out how dangerous of specific crash types, e.g. single vehicle crashes, are on a particular road, a suitable measure might be the number of fatalities per crash type.

A restriction in the choice of a specific measure of exposure is the availability of the measure. The number of person-kilometres is probably the best measures of traffic exposure. However, for the present purpose it is necessary to choose another measure of exposure, which is available in all ECMT countries. Even if that measure is not ideal, it is still possible to obtain valuable information by using it.

2.3 Choice of measures

Measures are often ranked according to their capacity to measure the particular variable of interest. This capacity is often called "validity". Another important capacity is the precision of the measure, often called "reliability". We should then add another requirement – the availability or existence of the measure. On the basis of these three criteria (validity, reliability, and availability) we choose a measure, which could be used to evaluate and compare the national and regional level of road safety.

Let us first review what are often called "direct" road safety measures. These are directly concerned with the injury picture. They have a high validity but low reliability. Among these measures we find for example:

- Number of persons killed in road traffic.
- Number of persons seriously injured in road traffic.
- Number of persons slightly injured in road traffic.
- Number of road crashes with property damage only.

When we are looking for simple, available, reliable measures with acceptable validity, only the first, and in some cases possibly also the second measure can be used in countries with very different level of development. The reliability of the other measures is too low to be considered.

In regard to measures of risk, the situation is very much the same. Here the problem is to find a suitable measure of exposure. When considering availability, the measure of exposure must be simple.

Therefore the following two simple direct risk measures are suggested:

- Traffic Risk = number of fatalities per million registered motor vehicles/year.
- Public Risk = number of fatalities per million inhabitants/year.

The Traffic Risk gives an indication of how dangerous the road traffic (each motor vehicle) is in a country or a region. The Public Risk indicates how dangerous road traffic is for each person in a country or a region. The Traffic Risk has the disadvantage that it insensitive to traffic exposure. For instance even when the number of fatalities increase it shows a reduced risk if traffic (the number of motor vehicles) increases faster than number of fatalities. In other words it disqualifies reduced exposure as one of the major countermeasures. Furthermore the public (personal) risk is what is most interesting for each citizen in a country or a region. Therefore Public Risk is the preferred direct simple road safety measure. This definition also makes it possible to compare the health problems in transport with other health problems such as e.g. diseases.

These two simple measures of course only give very rough figures of road safety level. In order to get a deeper understanding it is necessary to carry out much more advanced calculations and analyses.

From experience we know that there is a very strong correlation between level of motorization and Traffic Risk. Consequently, it is not fair to compare Traffic Risk in countries and regions with very different levels of motorization.

Therefore it is suggested also to have as a basic measure:

Motorization Level = number of motor vehicles per 1 000 inhabitants.

This measure also gives a fairly good indication of the economic situation and development in a country, an important condition for road safety work. It has been suggested to separate between three levels of motorization, which offer very different possibilities to work with road safety (RetsNet 2002):

1. < 100 motor vehicles per 1 000 inhabitants.

2. Between 100 and 300 motor vehicles per 1 000 inhabitants.

3. > 300 motor vehicles per 1 000 inhabitants.

As already mentioned, direct measures of road safety have a high validity but low reliability. However, it is possible to choose indirect measures, which have a lower validity but a higher reliability. The indirect measures show a correlation with accidents, making it possible to obtain an indirect measure of road safety. Among the indirect road safety measures, we find for instance:

- Number of near accidents.
- Level of exposure to road traffic.
- Various behavioural measures indicating the level of road safety (e.g. average speed, use of seat belts and number of traffic violations).
- Measures of road and vehicle standard.
- Structural and organisational conditions.
- Traffic legislation and its enforcement.
- Existence of systematic traffic measurements.
- Citizens' awareness of road safety problems.

Measures such as these are often called "road safety performance indicators". They offer an indication, but not a final picture, of the road safety situation. They provide a quick picture of the level of road safety awareness and road user behaviour, and thereby an indirect picture of the road safety problems (ETCS 2001). They also say more about the reasons for the general level of safety reached in a country. Unfortunately, few countries presently have access to systematic indirect measures of road safety.

3. OVERVIEW OF THE GENERAL PROBLEM AND TRENDS CONCERNING ROAD SAFETY

3.1 Comparison of safety between transport modes

There are no hard data available to show the relation of safety between the different transport modes in the ECMT area. Therefore the existing data from the European Union are used. They are of course not possible to generalise directly to the ECMT countries. However, the broad pattern is most probably the same. The annual number of fatalities in passenger transport within EU are distributed in the following way (ETSC 1999a):

- Road users 42 500
- Train passengers 108
- Air passengers 190
- Ferry passengers 100

These figures show a shocking dominance of road victims. More than 95 percent of the transport fatalities are generated by road transport in the EU. Consequently most of the safety efforts should focus on safety in road traffic. At the same time there are probably lessons to be learned from safety work in the other three transport modes, which have been more successful.

Many journeys consist of a combination of different modes such as walking, cycling, driving, and taking a bus, a train or a flight. In order to estimate the total risk of a trip it is then necessary to combine the risks of the various modes. In Table 1 the transport risks for the various modes are calculated per distance and per time (see Table 1).

Table 1. **Fatality risks per kilometre and hours for each transport mode in the EU**

Transport mode	Road transport mode	Per 100 million person kilometres	Per 100 million person hours
Road	Total	1.1	33
	Bus	0.08	2
	Car	0.8	30
	Foot	7.5	30
	Bicycle	6.3	90
	Motorcycle/moped	16.0	500
Train		0.04	2
Ferry		0.33	10.5
Air		0.08	36.5

These results show that unprotected road users have a much higher risk than car occupants. Private transport has a much higher risk than public transport. It furthermore shows the large risk differences between road traffic and the other modes of transport. This means that from a safety point of view much is to be gained by a transfer from private transport to public transport. This is an area where ECMT could contribute. The other modes of transport have a totally different control of all the components in traffic, from operators and traffic control to infrastructure. Their safety work is therefore much easier and they have long had a Zero Vision without explicitly stating so.

3.2 Road safety in the ECMT area

In this section the simple measures described above are used on the data available in the ECMT statistical reports on road accidents plus some further data kindly made available through the ECMT statistical office and IRF World Road Statistics.

First a comparison is made of Motorization Level, Public Risk, and Traffic Risk between the ECMT countries and two different but good safety countries, the USA and Japan, using data from 1998 because that is the year of the last complete statistics report (ECMT 2001). The results are shown in Table 2.

Table 2. **Motorization level, Public Risk, and Traffic Risk for three different regions 1998**

Region	Motorization Level	Public Risk	Traffic Risk
ECMT (38)	335	135	404
USA	757	156	206
Japan	547	116	211

Compared to the USA and Japan the population size and the surface area are much larger in the ECMT countries, and the average motorization level is considerably lower in the ECMT countries. However, the motorization level must still be judged to be high (> 300 motor vehicles per 1 000 inhabitants) for all three regions and consequently the two risk measures are roughly comparable. The Traffic Risk is significantly higher in the ECMT area than in USA and Japan. Each motor vehicle is much more dangerous. The Public Risk of the ECMT area is in between the USA and Japan values. It is not possible to establish what may be the reasons for these differences. Most probably it has to do with the much lower motorization level in some parts of the ECMT area. It is enough to state that especially the Traffic Risk but also the Public Risk are unacceptably high in the ECMT countries as a whole.

The second comparison is made between the trends in the three measures (Motorization Level, Public Risk, Traffic Risk) for the three ECMT regions (CIS, CEES, WES) for the years 1990, 1995, and 1998. The ambition was to have a reasonably long period after the fall of the iron curtain with as many countries as possible. In all 38 countries are included. Several of them were not ECMT members in 1990. Bosnia-Herzegovina and Liechtenstein are the only ones missing from the list of present members. There are 19 countries in the region of Western European States (WES), 14 in the Central and Eastern European States (CEES), and 5 in the Central Independent States (CIS). Most of the statistics come from the ECMT Statistical Reports on Road Accidents from the 1990 to the 1997/98 publications. However, the reliability problem with the statistics is always there and some of the figures are estimates (e.g. Germany, Russia), some picked from other statistics (IRF World Road Statistics from 1990 to 2000). These are the reasons for the differences with official ECMT statistics. It should be observed that the larger countries (e.g. Russia, Ukraine) enter with a larger weight than smaller countries. Table 3 shows the results with all its unreliability.

Table 3. **Motorization Level, Public Risk, and Traffic Risk for 38 ECMT countries and its three regions for the three years 1990, 1995, and 1998**

Region	Year	Motorization Level (vehicles/1 000 inh)	Public Risk (killed/million inh)	Traffic Risk (killed/million veh)
CIS (5)	1990	71	201	2 824
	1995	84	145	1 740
	1998	97	115	1 194
CEES (14)	1990	159	213	1 341
	1995	161	193	1 200
	1998	195	179	915
WES (19)	1990	338	139	411
	1995	432	114	256
	1998	454	102	226
ECMT (38)	1990	249	171	684
	1995	306	144	470
	1998	333	129	387

The first thing that strikes the reader of Table 3 is the fact that the three regions are not quite comparable. As stated above it is not fair to compare regions or countries, which are too different in level of development. Motorization level (column 1) is a good indicator of the development and it was suggested above to separate between three levels (<100, 100 to 300, and >300 vehicles/1 000 inhabitants). As can be seen in Table 3 the three ECMT regions represent three different classes of Motorization Level and should be treated in different ways also concerning road safety work. The ratio between Motorization Level in the two extreme ECMT countries in 1998 (Luxembourg and Albania) is 1:16.

Secondly, it is obvious that the road safety work has been successful although traffic has increased steadily at similar rates in all three regions. In each of the three regions and in the ECMT countries as whole both Public Risk and Traffic Risks are reduced year by year. How large a part of this improvement, which may be attributed to ECMT is impossible to establish. However, if we compare again with the development in USA and Japan we find that their improvements from 1990/91 to 1998 in Public Risk are both about 5% and in Traffic Risk 5 and 9% respectively. ECMT as whole shows improvements in Public Risk by 30% and in Traffic Risk by 75% during the same period. Thus ECMT shows a comparatively remarkable improvement over these years. One of the reasons is of course that many of the ECMT countries started at a very low safety level, before the fall of the so-called iron curtain, which caused an explosive development of the Motorization Level.

As can be seen in Table 3 the Traffic Risk decreases faster than the Public Risk over time in all three regions. Consequently, once the first explosion of motorization level has passed Public Risk will not increase in spite of increased car ownership. The timing of the motorization explosion is hard to tell. However the region in which this is expected is primarily the CIS-countries.

The Public Risk does not differ by more than a factor two over the ECMT regions and the three years. The regional ratio of Public Risk in 1998 is 1:1.5 and the extreme national ratio (Latvia and UK) is 1:5. In fact the highest Public Risk is found in the middle class of Motorization Level (CEES) all three years. The explanation for this limited variation can be found in the Traffic Risk column. There are fewer motor vehicles but each vehicle is so much more dangerous in the less developed and motorised countries. The regional range of Traffic Risk in 1998 is 1:5 and the extreme national range (Albania and Sweden) is 1:18.

There are also other differences, which favour different treatment of the three regions. The problems are different. For instance, in 1998 the percentage of all road users killed who are two to eight times higher in the less developed countries. The number of fatalities per injury crash is also much higher in countries with lower motorization.

However, some countries with lower level of motorization (such as Hungary) have shown that it is possible by a systematic road safety work to reach impressive results in comparatively short time. Hungary should be an excellent benchmarking country for the less motorised countries. In the highly motorised countries the Netherlands, Sweden, and UK constitute good benchmarking examples.

4. A VIEW ON THE MAJOR PROBLEMS IN ROAD SAFETY WORK

4.1 Perspective

One of the major problems in road safety work is that road safety looks so very different from above and from below (Rumar 1988). The authorities collect crash statistics, which convincingly show that road traffic crashes constitute a large public health problem in most ECMT countries. Specific problems such as speed and alcohol prove to be especially dangerous for citizens. Therefore road safety authorities take decisions, which aim at reducing such high-risk behaviour as for instance speeding and drinking/driving.

However, the primary purpose of transport for each individual road user (drivers as well as other road users) is to get from point A to point B as quickly as possible. In that process they can test and prove at every moment that there is no immediate danger with speeding or drinking/driving. And they are right that the crash risk in every trip is microscopic, not worth mentioning and not worth calculating. What they tend to forget are that we make several trips every day, every week, every month, and every year of our life. And the sum of all these microscopic risks is therefore substantial over a longer period.

The effect of this contrast between the top down and the bottom up perspective is however that the road users do not sympathise with the authority on road safety rules and recommendations. Therefore they have a strong tendency to violate the rules and the recommendations, they do not use the protective devices available, they do not demand safety actions from the authorities, and many safety measures will be used to increase speed instead of safety (often called risk compensation). Consequently the road safety actions will seldom reach their full potential effect.

But what may be the most serious consequence of this low awareness is the fact that countermeasures which are well motivated and proved to be potentially efficient will not be implemented because the demand for road safety actions is so low. If we do not manage to make citizens aware of the substantial risks in road transport, road safety work will always have to work in a strong headwind and the results will never be what we hope.

4.2 The Human limitations

There are two major human limitations, which influence the way we must attack the road safety problems and which are important from a strategic point of view:

- Human behaviour is unreliable and errors very often trigger crashes.
- The tolerance of the human body to the physical violence released in crashes is limited.

4.2.1 Human errors

Many accident-in-depth studies indicate that in a majority of crashes one of the main factors is a human error (Rumar 1982). This is often taken as a strong argument for concentrating road safety work on changing human behaviour by information, education, training, legislation and enforcement.

When we argue like that we make at least two errors. First, we must realise that human errors normally trigger the incident or the crash, but they are not necessarily the real cause of the crash. Secondly, we tend to forget that human behaviour is governed not only by the knowledge and the skill possessed by the individual but also to an equally large extent by the social and physical conditions in which the behaviour takes place. Indirect influences such as the design of the road and street situation, the design of the vehicle, the design of the rules and the social control existing in road traffic are in other words at least as important to influence road user behaviour as the direct influence by e.g. training. If we call the human error an ”active” error we might call the other higher-level errors ”latent” errors.

Behind the active errors are either capacity limitation such as vision in night traffic, detection of targets in the periphery of the eye or estimation of speed and distance. The fact that we do not realise the danger of speed in the same way as we realise the danger of height is a key problem in road safety work. Another cause of active errors is motivational limitations such as there being no reward for correct behaviour and no or very rare punishment for incorrect behaviour (e.g. short headways, high speeds, not using bicycle helmets).

The latent errors influence the probability of active errors. They also influence the consequences of the active errors. Behind the latent errors are engineering failures in design of roads, crossings, signs, signals, lighting, rules on the one hand and on the other hand vehicle design such as car or two-wheeler performance, instruments, controls, lighting and signals. There are also higher level latent errors based on political decisions on the type of transport that society wants.

4.2.2 Fragility of the human body

Because human behaviour is unreliable we will never be able to prevent all crashes as long as the driver is the operator in the system. However, we may be able to prevent all fatalities and all impairments in road transport if we use the tolerance of the human body as the limiting parameter in the design of the transport system.

The human body can withstand the forces that can be imposed upon it at collision speeds corresponding to the speed of our ancestors -- that is 10-20 kilometres per hour. At higher collision or deceleration speeds the tolerance is low and the results are serious or even fatal injuries. Therefore the injury tolerance of the human body should be the dimensioning variable in what we often call “passive road safety” work (aiming at reduction of the injury consequence in crashes) as opposed to “active road safety” work (aiming at preventing crashes).

Seat belts, air bags, energy absorbing car fronts and rears are good vehicle examples. However, a collision frequently takes place between a vehicle and the road environment. Dangerous elements along the roads should be removed. Road safety audits is a promising method to identify and remove such elements. Another large and serious injury situation, which has long been neglected, is the collision between a car and an unprotected road user (pedestrian, cyclist, and motorcyclist). The quick rescue service and the adequate trauma care are two other elements, which reduce permanent injury, and which must not be forgotten.

4.3 Road safety problems on three levels

The problems of road safety may be split into three levels (Rumar 1999):

- Problems obvious even at a superficial analysis (First order problems).
- Problems revealed by a somewhat deeper analysis (Second order problems).

- Problems almost totally hidden (Third order problems).

Historically, there has been a clear tendency to focus too much of the road safety work too much on the first order problems and too little on the second and especially the third order problems. In the future it will be necessary to change the focus from the apparent problems to the hidden problems. This could be a task for ECMT.

4.3.1 First order problems

By first order (obvious) road safety problems are meant the road safety problems that come out directly from the way we analyse our accident and injury statistics. Most countries within the ECMT have a number of common first order problems, problems to which we give a very high priority. The ranking of the problems is not identical but they seem to be common problems, which each country tries to reduce.

An effort is made to list 17 problems that seem to constitute a group of common top priority direct road safety problems for the countries belonging to the ECMT. For the reasons just given they are not ranked. Furthermore, the first order problems listed below are to a large extent overlapping and interacting:

- Speeds especially in built up areas are too high.
- Alcohol and drugs are too frequent in road traffic.
- Road safety is too low in urban areas.
- Road safety of children is inadequate.
- Road safety of unprotected road users is too low.
- The crash risk for young drivers is too high.
- Driving of cars is too widespread especially in urban areas.
- The standard of the roads and streets is not correct in many places.
- The accident and injury risks for elderly road users are too high.
- Too many road and vehicle deigns cause unnecessary injuries.
- The usage of protective devices (belts, helmets etc.) is too low.
- The rescue service and medical treatment of traffic victims is inadequate.
- The conspicuity of road users is not enough in daylight. At night it is even worse.
- The crash risk in reduced visibility conditions (darkness, fog etc) is too high.
- The crash risk in winter traffic is too high.

- Heavy vehicles are over-represented in serious crashes.
- Some intersection types have too high crash risks.

Among these first order road safety problems speed is the most important one in ECMT as well as in most other countries. Almost all variation in fatality risk seems to be possible to explain by two factors: Average speed and motorway/no motorway. There are many reasons for this strong influence of speed:

- Speed influences both crash risk and crash consequence.
- Speed has an exponential effect on safety.
- Speed is not realised by drivers as a danger factor comparable to height.
- Speed is a key behavioural variable because driving is a self-paced task.
- Reduced speed has an immediate effect on safety.
- Reduced speed is an inexpensive (sometimes even beneficial) measure.

The second largest first order road safety problem in the ECMT area, as well as in many other countries, is road users being influenced by alcohol and drugs.

4.3.2 Second order problems

The second order road safety problems are not equally obvious but they show up at a closer analysis of the first order problems. One way of defining them is to say that they reduce the effectiveness of countermeasures aiming at solving the first order problems.

Such second order problems are e.g.:

- The road traffic rules (legislation) are not clear, not logical and not consistent.
- Enforcement of license requirements and traffic rules are not efficient enough.
- The control of road conditions from the safety point of view is insufficient.
- The control of vehicle conditions from the safety point of view is insufficient.
- Training and examination for drivers' licenses is not good enough.
- Traffic and traffic safety education of citizens is not adequate.

The way traffic offences and crimes are treated in court is irregular and not in harmony with the corresponding risks

4.3.3 Third order problems

By third order (hidden) road safety problems are meant to be problems which do not show up by studying the crash or injury statistics. These problems are often of a more general character, not dealing directly with the traffic situation but with underlying processes or conditions. These conditions may deal with the organisation and roles of road safety work such as central or distributed responsibilities, decision processes, and co-ordination. They may also concern the management of the road safety process. They may concern the awareness, the values and knowledge of road safety measures that are typical for citizens in a society -- decisions makers, politicians, and road safety workers as well as roads users.

The third order road safety problems are preventing or blocking the possible solutions of the first and second order problems. An improvement of the third order problems would facilitate the implementation of much of the knowledge we have today about efficient countermeasures, which for one reason or another are not implemented.

It is also expected that trade and industry will play a much more important role in the future. Today many progressive communities and companies have developed and introduced environmental policies and plans for their activities. In the future communities and companies should develop corresponding road safety plans for their activities. Then safety will be a variable for quality control. Some of the more important third order road safety problems are:

- The awareness of the seriousness of road safety problems and the value of road safety measures is too low among decision-makers and road users.

- The present management system for road safety work is inadequate. It is slow and inaccurate. A quick and efficient road safety management system requires result management based on performance indicators (ECMT 2001).

- When it is possible to create a vision of the future that most people in a company or a society stand behind, that is the most efficient way to lead people in the right direction and to create creativity and participation. Road safety work in ECMT lacks a good vision. The Swedish Vision Zero is one good example (SNRA 1996), the Dutch Sustainable Safe Traffic System another (SWOV 1993). Air, rail, and sea have long had Zero Visions without explicitly stating so. That is one of the reasons why they are successful in their safety work.

- At least as important as visions are quantitative targets. Experience shows that quantitative targets on national, regional and local level are beneficial for the success of road safety work (OECD 1994)

- The present information and diagnostic system for road safety is very crude and partly inaccurate. In most countries it is exclusively based on police reported accidents. Road accident injuries and fatalities are a public health problem. To get a true picture of the health consequences of crashes hospital statistics must be used in a better way.

- The relation between the various actors on the road safety scene is in many countries far from clear. Responsibility and resources should follow each other.

- Every country is carrying out more or less extensive road safety research. This is a complicated, demanding and expensive process. Road safety research within the ECMT should be more and better co-ordinated.

- We must make sure that the consumers, the communities and the companies get more actively involved in the road safety effort. If that is handled right it will be a strong, powerful and quick force to influence and improve road safety.

The third order road safety problems are not as eye-catching as the primary and secondary road safety problems. They are, however, probably more important problems in the ECMT road safety work than the first and second order problems for the following reasons:

- The first and second order problems immediately give rise to countermeasure questions and answers. The third order problems deal with the implementation difficulties, which we all are facing.

- Contrary to the first and second order problems people and politicians are not aware of the third order road safety problems.

- The first order problems are comparatively narrow. The second order problems are broader. If we solve some third order problems we will influence the whole road safety process.

- The first order problems are to a considerable extent of national character while the second and primarily the third order problems are more international.

5. THE COUNTERMEASURE PRINCIPLES

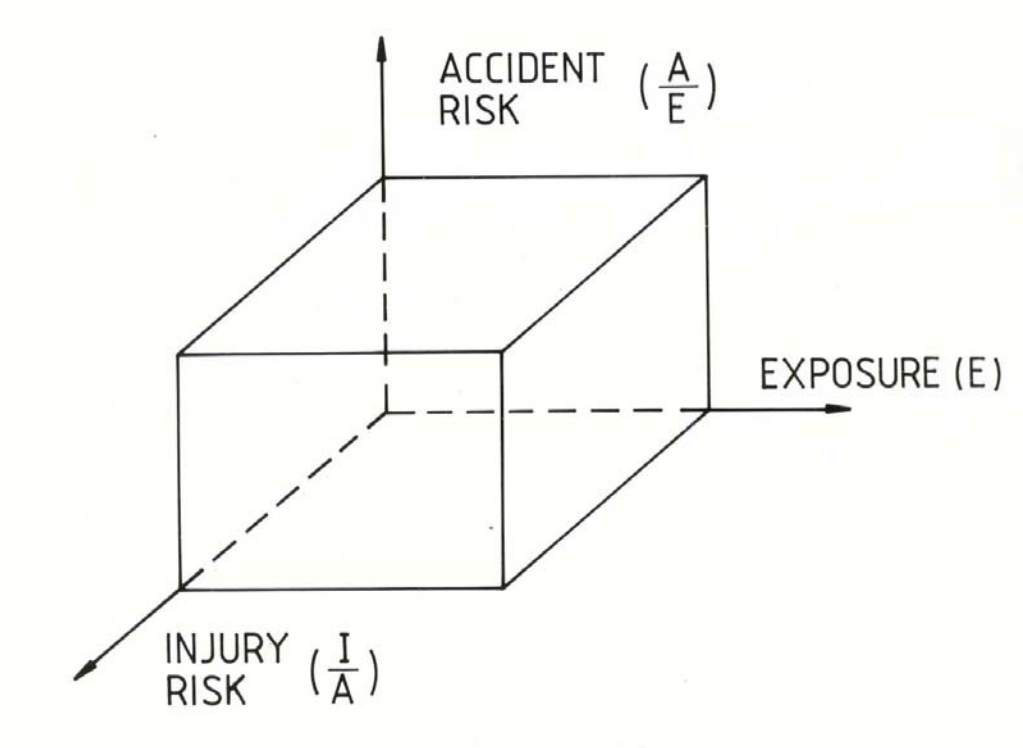
The principles of countermeasures are treated here on two levels. First a general overview is given. Then countermeasures specifically aiming at the critical human factors are described.

5.1 General principles

There are three basic variables or dimensions that decide the size of the road safety problem from public health point of view (Rumar 1985). This is illustrated in the three-dimensional Figure 1 where the volume represents the total **number of e.g. persons killed or injured in road traffic (I)**.

Figure 1. The three major ways to influence road safety (e.g. number of killed persons): I = E x A/E x I/A

1. By changing the exposure (traffic volume) (E)
2. By changing the risk of a crash given the exposure (A/E)
3. By changing the risk of an injury given the crash (I/A)



One important but often overlooked countermeasure dimension is **the exposure (E) to road traffic**. Many studies show that there is a very strong correlation between traffic volume and number of crashes. It is worth noticing that this is the variable where the proponents of better road safety and an imposed environment proponents have a common interest and should support each other.

Another countermeasure dimension is **the risk for a crash given a certain traffic volume (A/E).** The general problem here is to find measures that will reduce the crash risk in high risk situations such as darkness, fog, ice etc. and for high risk groups such as for young drivers, for unprotected road users, for heavy trucks, etc. In the history of road safety work this is the dimension that has attracted the largest interest and most efforts and resources.

The third countermeasure dimension is what we can call the consequence variable. By that is meant **the risk of an injury given a crash (I/A).** The general problem is to find out how the injury level can be reduced in crashes of various types – e.g. head on collisions with cars, side collisions, collisions between car and truck, collisions between car and unprotected road user, single vehicle crashes, bicycle crashes etc. During the last decade countermeasures along this dimension have been quite successful, at least in the highly motorised countries, where the car population is comparatively modern. Due to improved crash performance of cars and improved road side designs, the number of injuries per crash and the number of fatalities per injury have been reduced while the number of crashes and injuries have remained fairly constant. Road safety audits is a promising method to find and remove injury-causing elements along the roads. This countermeasure area has attracted considerable interest and substantial success during the last decades.

By multiplying the three dimensions we get the total number of killed, impaired or injured persons in road traffic

$$E \times A/E \times I/A = I$$

5.2 Countermeasures focusing on the human errors

There are three possibilities to reduce human errors in road transport. Figure 2 illustrates the three possibilities (see Figure 2).

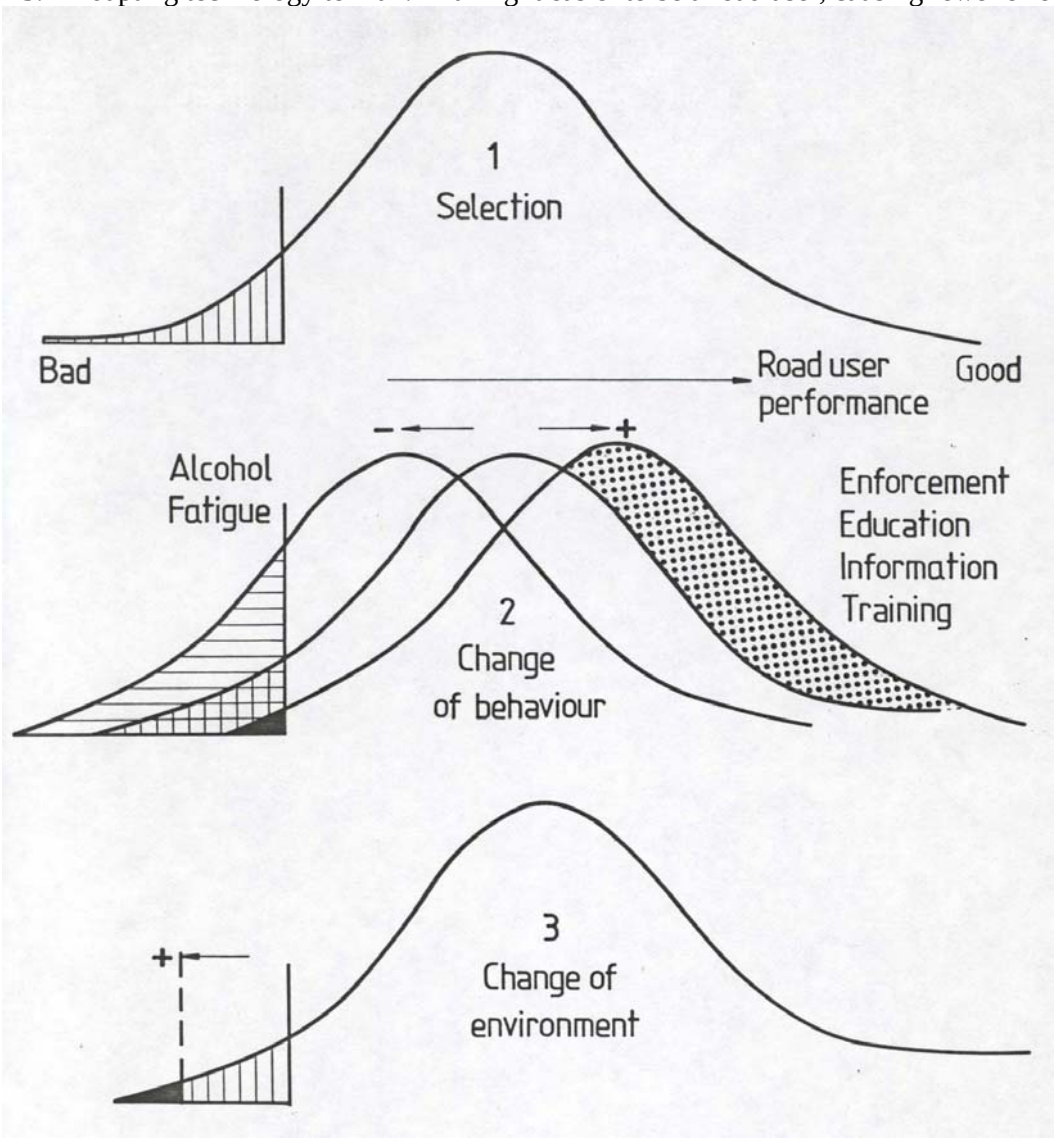
By **selection** we can remove from the traffic system those persons who commit many errors from the traffic system. This is possible for professional drivers, less possible for private drivers and not possible for other road users. In the figure a tougher selection is illustrated by moving the vertical cut off to the right.

By **information, education, training, legislation and enforcement** we can try to influence road users to behave in a safe way. At the same time we have to avoid influences that work to reduce human performance (e.g. alcohol, drugs, fatigue). In the figure improvement of road user performance is illustrated by moving the distribution to the right.

By **adapting the traffic conditions to the human characteristics and limitations** we can make it easier to walk, to bicycle, to drive and thereby avoid errors. Good examples of such measures are e.g. daytime running lights (DRL), intelligent speed adaptation (ISA), reflectorised road signs, road lighting, high mounted stop lights. In the figure this is illustrated by moving the cut off to the left.

Figure 2. A schematic illustration of the three possibilities to reduce human errors

1. Selection: Elimination of persons who commit many errors in road traffic
2. Improvement: Improvement of human performance by various means
3. Adapting technology to man: Making it easier to be a road user, causing fewer errors



We have to use all these three principles in the future. However, we should try to focus more on the third approach than we have done in the past. That principle is for many reasons superior. Its effect lasts, everyone benefits, it does not exclude road users from taking part in the transport, the road users welcome it.

6. PREVIOUS ROAD SAFETY WORK WITHIN ECMT

ECMT is a well-established, comparatively old organisation. Next year ECMT will be 50 years old. Like many other international organisations it is weak. It has no legislative power and works primarily through dialogue and exchange of experience and data. Consequently it lacks teeth and muscles. On the other hand it seems that the main advantage of harmonised legislation is with vehicles and authorisation documents (e.g. driver license), which must be able to cross borders. Traffic legislation has to be more national and anchored in history, culture and public opinion. Furthermore there are advantages with progressive countries, which function as a kind of locomotives in the international road safety work. When national differences in safety level become too large, the pressure on countries with considerably lower safety gets very strong. The risk is otherwise that harmonisation is based on the situation in the less progressive countries.

Furthermore the 41 countries belonging within ECMT are very different from a number of general aspects – size, population, geographically, climatically, politically, socio-economically, culturally etc. There are also many differences in road traffic conditions – standard of roads, vehicles, and traffic control, road user knowledge, driver education, traffic rules and legislation, enforcement systems, administration efficiency, treatment of traffic victims.

ECMT has chosen to work primarily by three channels:

- ECMT statistical reports on road accidents.
- ECMT round tables and symposia.
- ECMT resolutions and recommendations.

6.1 ECMT statistical reports on road accidents

The ECMT statistical reports are published biannually. The last report published 2001 covers primarily the years 1997 and 1998. The reports have gradually increased both concerning countries covered and information contained and is presently very good.

The statistical description of the crashes in the ECMT countries and their consequences constitute one of the cornerstones in the road safety work of ECMT. They make possible good overview descriptions of the crash and injury situation among the ECMT countries. However, statistics very seldom give the reasons for a specific situation, they just describe the character and trend, with all the limitations that are associated with all statistics (reliability and validity). Therefore statistics has to be complemented by other types of information and analyses. That is where the Round Tables and Symposia come in.

6.2 ECMT Publications including Round Tables and Symposia

During the last 15 years the following reports of meetings with relevance for road safety have been published:

- **1988 Road safety, first and foremost a matter of responsibility.**

This report divided into two parts: the responsibility of the individual and the responsibility of the society. Two philosophies were confronted. One argued that the human road user is for many reasons inherently unreliable and therefore the society must take large responsibility for the design of roads, vehicles and traffic control. The other one argues that the human operator must take full responsibility and the role of society is to give him that skill and those attitudes. The first view proved somewhat stronger and is even stronger today.

- **1994 Road safety education for young children and teenagers.**

This symposium was divided into two parts: A changing society and which strategies to be adopted. It is a continuation of an earlier ECMT conference in 1980, where the road safety education in schools was discussed. Now resolutions based on this conference were issued. It was among other things recommended to carry out road safety education integrated with other measures, to try to involve parents, media, and other public and private partners in the process. But no single model for this can be recommended. Large consideration must be taken to local conditions.

- **1994 Principle actions of ECMT in the field of road safety.**

This publication came out at the 40th anniversary of ECMT. It summarises the nine resolutions on road safety issued since 1986 (R 48, 50, 54, 55, 56, 91/3, 92/3, 93/4, 93/5). For most of the resolutions (problem areas) the background is explained and for some of the resolutions the situation in the respective countries are described (see resolutions below).

- **1996 Speed Moderation**

This publication is a state-of-the-art report on measures and experiences concerning speed moderation. The content is divided into six sections: present situation, infrastructure, vehicle, driver, speed limits, and enforcement. It concludes with the recommendation adopted by the Council of Ministers 1996.

- **1997 Communication in Road Safety**

Communication can help in road safety work. It consists of the following components: An information source conveying a precise content by means of specific signs and media to a target group with a view to produce a specific effect. Communication should be integrated with other measures and it should not be used when other measures are more efficient. The efficiency should be evaluated.

- **1999 Transport Benchmarking**

This conference had the general purpose of studying how the benchmarking methodology could be used in the transport sector. Road safety was a minor part in this meeting. However, it was concluded that although there are problems, the large road safety differences between countries indicate that benchmarking could be one way of improving road safety.

- **2000 Safety in Road Traffic for Vulnerable Users**

The risk of the unprotected road users in road traffic is considerably higher than for car occupants. This publication is a state-of-the-art report on the best practice and national experiences concerning

safety of vulnerable road users. The report ends with the three recommendations adopted on pedestrians (1998), cyclists (1997), and moped riders/motorcyclists (1999).

- **2000 Economic Evaluation of Road Traffic Safety Measures**

In October 2000, ECMT hold a Round Table on "Economic Evaluation of Road Traffic Safety Measures". In economic appraisals of road safety measures, determining which method to use for valuation is critical. Of the two main methods open to us, one accurately measures a non-relevant concept (the human capital method), while the other measures the correct parameter, but not very accurately (the willingness-to-pay method). The Round Table examined the many complementary aspects of the two and found that what is needed, above all, are practical guides for each method.

The Round Table noted that governments should take charge of safety with the same forcefulness whatever the mode of transport. It also found that spending on road safety was generally adequate, but that the money was often not "wisely" spent. One of the more unconventional proposals put forward by this Round Table was that difficulties in producing major changes in driver behaviour signalled that more attention should be paid to educational measures and infrastructure investment.

- **2002 Quality Assurance**

In 2002 ECMT is planning a seminar to address the specific problem of “Safe and sustainable transport – a matter of quality assurance”. The intention seems to be to treat road safety the same way as other effects of transport, e.g. reliability, travel time, environmental effects. Such an approach could make it possible for users/buyers to require certain safety level of products or actions (quality assurance) by the system owners/sellers. This approach, however, does not take the responsibility away from the users/buyers. They must take full responsibility to use the products/follow the rules agreed upon. It will be a two-sided responsibility but with more responsibility than presently on the system owners/sellers (road and street authorities/producers of transport and traffic products), a partnership for increased road safety.

An analysis of the published reports shows that they all have high quality both from scientific and from practical road safety point of view. The topics are well analysed and the suggestions for actions up to date and realistic. A comparison with other road safety conferences carried out during the same period is flattering for ECMT. Each publication is a good piece of information, which is still many years after publication of considerable interest to people working in the transport and road safety area.

A relevant question is whether the topics chosen by ECMT for studies and conferences are adequate. This seems to be the case, even if the choice could be made more transparent and systematic.

6.3 ECMT resolutions and recommendations

In falling order of frequency resolutions, which have been made available, have been taken on the following topics: Two-wheelers: 5, Speed: 4, Children: 3, Alcohol: 2, Seat belts 2

Other resolutions one each on the following topics: General road safety, Driver training, Pedestrians, Night traffic, Traffic lights, Emergency, Young drivers, Human behaviour, Conflicting advertising, Elderly, Decentralised policies, Lorries, Weather/visibility.

Do the resolutions represent problems, which typically faced the ECMT countries during this period? Yes, they do to a very large extent. Have the resolutions been followed up in some way? No, not really as far as I have been able to find out. Have they had any effects on the road safety actions carried

out by the ECMT countries? Yes undoubtedly, they have created successively increased pressure on policy decisions especially in those countries, which have been lagging behind. But the extent to which this has influenced the process is almost impossible to trace.

What has been good and what has been not so good?

- The reports/meetings published, deal to a large extent with some second order road safety problems (see section 4.3). They are treated in an adequate way. But there does not seem to be any systematic analysis of which topics to deal with. Nor is it known to which extent the reports have been followed up.

- The recommendations adopted have mainly been dealing with the first order road safety problems (see section 4.3). Again they are good and up to date. They have been based on research results and are of clear interest to policy makers in the area of road safety. They have certainly influenced decisions carried out in many ECMT countries. The question is to which extent they have been followed up.

7. WHICH MISTAKES HAVE BEEN MADE IN PREVIOUS ROAD SAFETY WORK?

In order to understand how road safety work should be carried out successfully in the future it is necessary to analyse how it has been carried out in the past and which mistakes that were made and how they could be avoided in the future. The failures presented below are common for most countries and also representative of ECMT failures to stress these topics to the member countries of ECMT.

- Unclear roles of road safety actors.

In too many countries the distribution of tasks and responsibilities between administrations and other organisations active on the road safety scene is unclear. This is a problem, which ECMT could stress more explicitly.

- Activity management.

Present road safety work in most countries is mainly managed by activities. This type of management is weak and inefficient. Commercial companies have to a large extent abandoned this type of management system. They have moved to something which is called result management based on performance indicators. Here ECMT could contribute.

- No exposure control.

As stated above we have to some extent managed to control crash and injury rates. But the public health problem created by injured and killed road crash victims is very large. One of the main reasons for this failure is that traffic exposure is increasing. We will not be able to improve road safety radically until we use exposure control as one of our instruments. This could be a problem for ECMT because reduced exposure is often seen as a threat to mobility. But ECMT should take a position on this problem.

- Too many central decisions.

In most countries decisions influencing road safety work are carried out mainly at the central level. The consequence is that ordinary people do not feel it is any of their business. This is no problem for ECMT but for many national authorities. Road safety decisions should be taken close to the problems.

- Trying to plan future road safety actions

There are two principal ways to make a process work and to reach the goal that has been set up. One way is to plan everything in detail and tell everybody what to do (top down). The other way is to describe the distant future goal in a simple but clear way and to make the goal very visible -- to create a vision. Could ECMT create a vision which could be adopted by its members?

- No quantitative road safety targets

OECD (1994) report ”Targeted Road Safety Programmes shows convincingly how specified quantitative goals lead to more realistic traffic safety programmes, better use of public funds and other

resources, and improved credibility for those involved in the traffic safety work. Targets should also be set in terms of various performance indicators. Targets are crucial in result management. ECMT should argue in favour of national quantitative targets.

- Unclear strategy to reach the targets.

A number of clear road safety targets is not enough. What is also needed is a strategy explaining how the targets are going to be reached. The strategy has to explain which actions that have to be taken along the three axes described above (exposure, risk reduction, injury reduction). Strategies could be fairly common even to countries, which are very different, and this fact could be better used by ECMT.

- Separate budgets for costs and benefits of road safety measures.

One major problem with road safety work is that whatever is suggested to do is perceived as pure costs among those that have to take the decisions. Benefits in terms of reduced number of killed and injured persons and lower administrative and material cost enter into another budget. Consequently there is no economic incentive associated with road safety measures. ECMT should stimulate countries to start experimenting with common budgets.

- Low awareness of the need for increased road safety.

One of the major problems for an efficient road safety work is the fact that the public normally does not realise the size and seriousness of the road safety problem. Therefore we have to raise the general awareness of the seriousness of road accidents and the need for road safety measures among the public and the decision-makers in parallel. Here ECMT has done an excellent job on the international level. What are lacking are national efforts to reach the public, the citizens.

- Low participation of the private sector in the road safety work.

As stated above road safety work is generally considered to be the task of the authorities. However, in order to be effective and successful also the public and the private sector (industry, transport companies, trade) has to be actively involved in road safety work. This is a crucial topic for future road safety work. The planned ECMT seminar on Quality Assurance in the road safety sector (2002) seems to be a promising step in this direction.

- The road safety measures judged necessary must be marketed.

If the public is negative to a chosen road safety measure we have to convince the public. We must market our product using all the knowledge that commercial companies have collected over the years and which we too seldom have made use of. Again ECMT seems to have made a good work on the international level. But the national efforts to market road safety measures to the public are not good enough.

- Too old technology.

A larger and larger part of a modern car consists of electronics and semi-intelligent systems. Also in the infrastructure more and more information technology is used. All this advanced technology could and should be used also for a number of road safety purposes, from driver and company support to surveillance and enforcement. Some applications are market driven but road safety application of ITS must be supported by authorities (ETSC 1999b). Here ECMT could contribute.

- Lack of follow-up and evaluation of road safety measures.

Evaluation, feedback and monitoring of the effects of various road safety measures are very important because without this kind of feedback, learning is more accidental, not systematic. There are two types of evaluations. One is based on crash statistics, the other one on performance indicators. ECMT could stimulate and encourage such evaluations.

8. STEPS AND PRIORITIES FOR A SYSTEMATIC FUTURE ROAD SAFETY WORK

In order not to repeat previous mistakes (see section 7) a number of criteria should be met. There seems to be at least 16 steps in an effective implementation process of a road safety policy as expressed in an effective road safety programme:

1. Treat the road safety problem as a public health problem (WHO 1999).
2. Identify and focus the problem areas by means of crash and health statistics.
3. Create a vision about the future safe transport system that has a common acceptance.
4. Set concrete quantitative goals on the national and regional level.
5. Organise clear institutional and organisational roles and responsibilities.
6. Integrate the different transport policies towards mobility, safety and environment as far as possible.
7. Study and compare countermeasure cost effectiveness.
8. Create a road safety strategy, which the road safety actors agree upon.
9. Formulate a national road safety plan if possible with regional parts.
10. Link budgets for crash costs and safety benefits from countermeasures.
11. Delegate countermeasure responsibility as close to the problems as possible.
12. Analyse possibilities to implement various countermeasures.
13. Educate decision-makers and public on matters of road safety and market countermeasures in such a way that the public requires action, puts pressure on decision makers and authorities.
14. Create effective enforcement systems especially for such countermeasures that do not have public acceptance.
15. Create a road safety result management with specified targets for each problem area and establish process monitoring systems with continuous measurements of safety performance indicators.
16. Create an independent body to follow-up and evaluate the results of the road safety efforts and compare them with the road safety plan.

ECMT can only stimulate its member countries to meet as many of these criteria as possible. As far as I can see ECMT has little possibility on the intergovernmental level to take any decision on these criteria. Many of these steps are presently impossible to reach in many countries. In fact there is probably no country in the world in which all criteria can be met.

The EU has recently published a White Paper on the future transport policy (CEC 2001). The main interests in this document are economy, environment, and congestion. The interest in road safety is comparatively limited. However, a target to reduce the number of fatalities by 50% to 2010 is proposed. But very little is said about the strategy to reach such an ambitious target. This is amazing considering that at the same time an increase of passenger transport of 24% is forecasted until 2010. Most of this increase will take place on the roads. This will increase road traffic exposure and will thereby no doubt increase crashes and fatalities. Suggested measures are transfer to safer modes of transport, harmonising of the TERN roads and penalties, and new technology. That will not be enough to reach the target. However, the 3rd Road Safety Action Programme is not yet published.

9. CONCLUSIONS: THE ROLE OF ECMT IN FUTURE ROAD SAFETY WORK

- The total number of road traffic fatalities in ECMT has during the last ten years decreased from about 130 000 to about 100 000. That is an encouraging improvement but the absolute number is still totally unacceptable. The ECMT countries as a whole have an unacceptably high Traffic Risk in road traffic in comparison with other large comparable areas such as the USA. The Public Risk is comparatively better but not as good as in the best regions of the world. Fatalities in road traffic constitute a public health problem in the ECMT area as well as in the rest of the world (WHO 1999). On the other hand the safety improvement in the ECMT area during the last decade has been impressive also in an international comparison.

- ECMT is a weak intergovernmental organisation without real power to overcome strong national interests (compare EU, USA, where this power exists to a certain extent). It is therefore difficult to take general intergovernmental decisions. For instance to set a common ECMT target for number of killed persons in road traffic. Such a target requires that the one who sets the target has the power to influence plans and actions to reach it and to take responsibility if it is not reached. ECMT does not have such a power and cannot take such a responsibility. (It is questionable if EU can do it.) But ECMT should absolutely stimulate its member countries to establish national road safety plans and to introduce quantitative road safety targets (see below). And on basis of these national targets ECMT could specify an umbrella target. It should be bottom-up and not top-down.

- A problem here is the unbalance between the size of the ECMT secretariat and the size of the road safety problem. In order to be able to diffuse road safety knowledge and experiences among the members and to carry out an effective road safety work, not to mention the follow-up of this work, the ECMT secretariat should be larger and stronger.

- ECMT is facing large national differences in level of safety, trends, and background variables among its members (see Table 3 and compare EU, USA). This complicates the work of ECMT in the respect that only rarely may a road safety action or countermeasure be directly transferable from one country to another. ECMT should probably encourage different strategies in its three different regions. Publication of best practice guidelines is however, probably fruitful for many ECMT-countries. A benchmarking approach could be a possibility in some problem areas or groups of countries, which are fairly homogeneous.

- ECMT should therefore promote common methods, analyses, strategies but not necessarily common or equal actions. In terms of problem order (see section 4.3) ECMT should work more with the second and especially with the third order problems. On the second order problems there are methodological problems such as enforcement methods, teaching methods and licensing methods, which have a large potential on the effectiveness of countermeasures to reduce the first order problems. On the third order problem there are a number of strategic problems such as creating a road safety vision and establishing road safety targets. Both of these could facilitate implementation of a number of road safety countermeasures. Other third order problems are how to increase public awareness of the general road safety problem, the use of result management in road safety work, and the way road safety work and road safety targets are followed up. For all these third order road safety problems the introduction of performance indicators would be helpful.

- ECMT should initiate that data systems are created, which make it possible to compare the risks of various transport modes across the member countries. Presently each mode, and to a large extent, each country, has its own statistical systems.

- The present diagnostic system for road safety is based on police reported crashes and injuries. This system is known to be unreliable and biased in many respects. ECMT should encourage its members also to start using hospital statistics, which could be made more reliable and more valid.

- ECMT should try to create a partnership for road safety, a partnership where ECMT initiates and stimulates the use of certain strategies and methods and the member countries decide which strategies to use and especially which actions to take, which countermeasures to implement.

- The basis for the road safety strategy should be the human characteristics, the human limitations (see section 4.1 and 4.2). The responsibility for road safety between the authorities and the road users should be more equal than is presently the case in most ECMT countries.

- ECMT should encourage its members to try to involve the private sector much more in the road safety work than is presently the case. Here looking at road safety as a quality aspect of transport and focusing on and demanding quality control of the road safety aspects is a fruitful approach in both public and private transport.

- ECMT should encourage its member states to work along all three of the countermeasure axes (see section 5.1.) including reduced exposure, reduced crash risk (prevention), and reduced crash consequence (protection).

- Unprotected road users (pedestrians, cyclists, mopedists, and motorcyclists) constitute almost half of the road fatalities and probably more considering the underreporting. Most of the casualties occur in urban areas. Therefore ECMT should make special efforts to improve urban safety, which is a neglected area in many countries.

- Human errors and mistakes constitute a large part of the road safety problem. In order to reduce these errors ECMT should encourage its member countries to work along all three of the methods described in section 5.2. However among those methods the third one (adapting the situation to human characteristics) is the most appealing and in the long run most effective approach.

- Some examples of methods aiming to improve road safety and which ECMT could promote are road safety audits, the use of performance indicators, independent crash investigations. Most probably these methods have to be tailor made to each country considering the specific conditions prevailing.

- The differences between the ECMT countries are so large that identical organisation and responsibilities can never be the ambition. However, some rules should be valid for all countries. There should be one actor with the main responsibility and responsibility for co-operation between the actors. There should also be one actor responsible for each main part of the road safety work (e.g. statistics, enforcement, education, research etc.). Separation should be made between national, regional and local responsibility.

- One approach, which could be possible, is to pick out a few countries representing the three regions and to make a deeper analysis of the road safety situation in these countries using for instance peer reviews and in-depth discussions. The results from such actions could be of large interest to other countries, which are in corresponding situations.

- ECMT should continue with the statistical reports, but also develop a simple summary measure e.g. a profile, an index (not creating new statistics but using existing road, traffic and other statistics in a more efficient way) to compare road safety level, trends and weaknesses among its member countries (RetsNet 2002). This approach could also be used for diagnostic and benchmarking purposes. Here again the use of performance indicators could improve the quality and usefulness of such a road safety profile.

- The purpose with road safety research has traditionally been to find and explain the road safety problems and identify those countermeasure strategies and countermeasures actions, which in the most effective way reduce the road safety problems identified. Researchers have however normally focused their interest and efforts on the main crash variables and to some extent on countermeasure efficiency. They have not put much of their interest and efforts on the next stage -- how to implement the theoretical and empirical knowledge we have concerning main crash variables and effective countermeasures. This is an overlooked part of road safety research, which ECMT could promote.

- ECMT could also play a larger role in co-ordinating the road safety research going on in most ECMT countries. However, studies of road user behaviour often have to be carried out in each country because of the very different history and conditions, which play an important role in behaviour formation and characteristics.

- Road safety work is fairly conservative. The same methods and the same technologies, which are presently used, do not differ very much from what was used ten years ago. But technology, especially information technology, computers, and telecommunication has changed radically during that time. ECMT should stimulate its member countries to start introducing so called ITS aimed at road safety improvement (ETSC 1999b). Examples of such applications are Intelligent Speed Adaptation (ISA), automated speed enforcement, electronic driving licenses, alcolock systems, belt reminders, Mayday systems, black boxes, and urban traffic control.

- ECMT should promote national co-operation between safety proponents and environmental proponents. There is much to be gained for safety by such an alliance.

- ECMT should study and make use of the EU 3rd Road Safety Action Programme, which will be published later this year.

- ECMT should continue to arrange Symposia and Round Tables on selected topics. However, these arrangements should be more systematic according to a plan and covering a number of second and third road level safety problems.

- ECMT should also continue to adopt resolutions and recommendations. However, also these resolutions/recommendations should be planned more systematically. Resolutions and recommendations should be very clear and short. Therefore they should probably be aimed primarily at the first order road safety problems.

10. REFERENCES

Commission of the European Communities (2001) White Paper – European transport policy for 2010: time to decide, Brussels, Belgium.

ECMT Statistical Reports on Road Accidents from 1990 to 2001, Paris, France.

ECMT Conference Reports relevant to Road Safety from 1988 to 2000, Paris, France.

ECMT documents concerning resolutions and preparation for the 2002 Conference on Safe and Sustainable Transport – A Matter of Quality Assurance, Prague, Czech Republic.

ETSC (1999a) Exposure data for travel risk assessment: Current practice and future needs in the EU. European Transport Safety Council, Brussels, Belgium.

ETSC (1999b) Intelligent transport systems (ITS) and road safety. European Transport Safety Council, Brussels, Belgium.

ETSC (2001) Transport safety performance indicators. European Transport Safety Council, Brussels, Belgium. Road (IRF).

International Road Federation (2000) World Road Statistics from 1990 to 2000, Geneva, Switzerland.

OECD (1994) Targeted road safety programmes. Organisation for Economic Co-operation and Development, Paris, France.

RetsNet (2002) Regional Traffic Safety Network. VTI Development, Linköping, Sweden.

Rumar, K. (1982) The human factor in road safety. Australian Road Research Board conference, Melbourne, Australia.

Rumar, K. (1985) The role of perceptual and cognitive filters in observed behaviour. In Evans, L. and Schwing, R.C. (eds.) Human Behavior and Traffic Safety. Plenum Press, N.Y., USA.

Rumar, K. (1988) Collective risk but individual safety. Ergonomics 31, 4, 507-518.

Rumar, K. (1999) The first European road safety lecture. European Transport Safety Council, Brussels, Belgium.

Swedish National Road Administration (1996) The zero fatality vision. Borlänge, Sweden.

SWOV (1993) Towards a sustainable safe traffic system in the Netherlands. SWOV Institute for Road Safety Research, Leidschendam, the Netherlands.

WHO (1999) Injury – a leading cause of the global burden of disease (ed. Krug, E.) World Health Organisation, Geneva, Switzerland.