SWOV
INSTITUTE FOR
ROAD SAFETY RESEARCH

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Contents:

Editorial

This issue of Research Activities contains two articles on research that has been done in the framework of the European IMMORTAL project: the SWOV study into the influence of alcohol and drugs on road safety and the detailed cost-benefit analysis of a number of potential impairment countermeasures. Research Activities opens with an article about the spectacular decrease of the number of road deaths in the Netherlands in 2004.

Spectacular decrease of road deaths in the Netherlands in 2004 cannot be explained

The decrease from 1088 road deaths in 2003 to 881 in 2004 in the Netherlands is unexpectedly large and spectacular. A 19% decrease has never occurred before, despite the continuous efforts to improve road safety in the last decades. SWOV has looked into this development.

Three questions were considered essential for an explanation:'Are the data correct?', ' What part does chance play?' and 'What happened in 2004 that could explain the drop in 2004?'. The first question is easily answered: the data are equally reliable as they were in previous years. No facts were found that indicate that a more inaccurate registration is the cause of the decrease in registered road fatalities in 2004. The second and third question ask for a more elaborate explanation.

The role of chance

Chance may have played an important part in bringing about the difference in the number of road deathts between 2003 and 2004. To understand this, we must look at the time series of traffic fatalities since 1979. (see *Figure 1*). There we see the number of fatalities for each year, compared to the downward trend. The numbers are corrected for underregistration. The trend is

QUOTE

The best car safety device is a rear-view mirror with a cop in it.

Dudley Moore

shown by the middle, with the outer lines indicating confidence intervals (1σ) on either side. The trendline corresponds to a constant yearly decrease in the number of traffic fatalities of 2,87%. This means that the number of fatalities in a certain year is 2,87% lower than that in the year before, apart from fluctuations.

These fluctuations happen to be large, sometimes certainly larger than to be expected from the role of chance. The black dots in *Figure 1* indicate the years where the number of fatalities is significantly different from the trend. *Figure 1* clearly shows that 2004 is one of those outliers, but it is not more exceptional than the other five outliers.

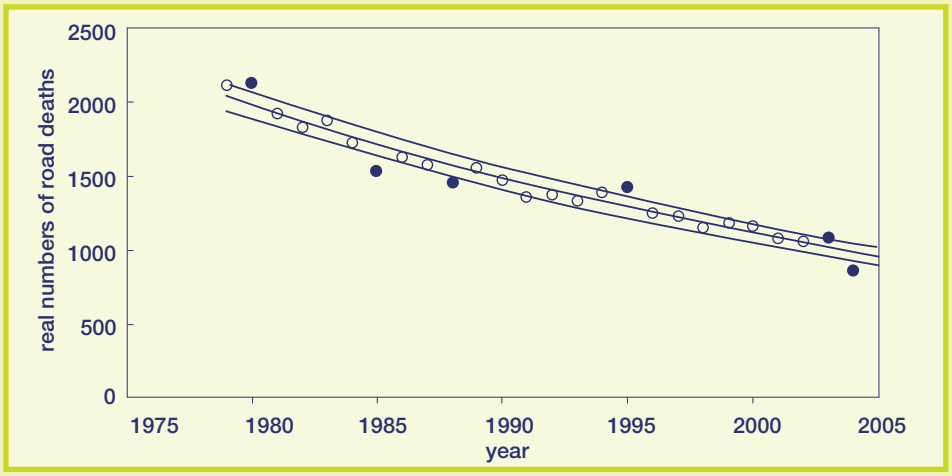

Figure 1 The numbers of road deaths in the Netherlands. The lines show the trend (middle solid line) and 1½σ confidence intervals. The 6 black dots indicate that the number of fatalities in those years differ too much from the trendline to be explained by chance alone.

Explanations?
SWOV attempted to assess the potential influence of all likely factors and developments. However, possible factors were too limited, impossible to investigate, or too speculative. First of all, we still lack reliable data on exposure risk, i.e. data on mobility for 2004. Some confusing and contradictory information on exposure data is still showing up.

We have no indication that one or two effective road safety measures could be responsible for the drop.
At present we can only speculate about the decrease in traffic fatalities, but it is an interesting topic for further SWOV research.

The SWOV analysis of the 2004 figures will be pubished in a SWOV report. This report is forthcoming and will be made available on the SWOV website.

Alcohol and drugs in traffic: a lethal combination

The chance of severe injury in a road crash greatly increases after the combined use of different drugs, but especially after the combined use of alcohol and drugs. Users of multiple drugs have a 25 times greater injury chance than sober drivers. The injury chance is 35 times greater for users of drugs in combination with alcohol than it is for sober drivers.

These are the results of the Dutch part of a larger, EU-wide investigation into the impact of drugs, medications and medical conditions on road safety. This research programme, known as the EU-project IMMORTAL, acronym for **I**mpaired **M**otorists, **M**ethods **o**f **R**oadside **T**esting and **A**ssessment for **L**icensing, investigated the accident and/or injury risk associated with different types of driver impairment and examined the implications for licensing assessment and roadside impairment testing (including drug screening).
The study was carried out between 2000 and 2004 in the Tilburg area, in close cooperation with the Tilburg police and with doctors of the St. Elisabeth Hospital. A total of 3,799 volunteers and 184 severely injured drivers were tested for the use of alcohol, drugs, and medicines.

Roadside survey
Among the general driving population, cannabis, benzodiazepines and alcohol were the prevailing substances. Out of the 3,799 stopped and tested drivers:
- 4.5% were positive for cannabis; 3.9% for cannabis only and 0.6% for cannabis in combination with other drugs and/or alcohol,
- 2.1% were positive for benzodiazepines; 2.0% for benzodiazepines only and 0.1% for benzodiazepines in combination with other drugs and/or alcohol.
- 2.1% were positive for alcohol (BAC ≥ 0.2 g/l); 1.8% for alcohol only and 0.3% for alcohol in combination with other psychoactive substances.

Illegal drugs were mainly found in male drivers aged 18-24; no less than 17.5% were positive for illegal drugs. Psychoactive prescription drugs were strongly concentrated in female drivers aged 50 and older: 11.3% were positive.

Hospital testing
The tests on 184 severely injured drivers in the city of Tilburg and its surroundings showed that about 18% of the drivers had used drugs, often combined with alcohol. Another 17% of the drivers had used alcohol on its own.
Comparison of the road and hospital samples shows that approximately 35% of serious injuries among drivers in the Tilburg police district were associated with self-administered alcohol and/or illegal drugs. Of the 184 severely injured drivers:
- 12.7% were positive for drug-free BAC-levels ≥ 1.3 g/l, compared to 1.8% at the lever of ≥ 0.2 g/l in the roadside survey,
- 8.3% were positive for drug/alcohol combinations at BAC-levels ≥ 0.8 g/l, compared to 0.3% in the roadside survey and
- 7.2% were tested positive with drug/drug combinations, compared to 0.7% in the roadside survey.

In order to be effective, road safety policy should target these three categories with priority because they are so large. Moreover, the number of victims is higher if we consider the fact that in part of the alcohol and/or drug-related serious-injury crashes a sober driver was also seriously injured.

SWOV report R-2005-9 entitled 'The prevalence and relative risk of drink and drug driving in the Netherlands: a case-control study in the Tilburg police district' is written in English and can be downloaded from the SWOV website under Publications.

Cost-Benefit Analyses in IMMORTAL

Preventing drunk driving through random road side tests and installing an alcohol lock are road safety measures with a promising socio-economic effect. Withdrawing the driving licence based on mandatory eyesight tests will result in a negative socio-economic yield. These are some of the conclusions in the European IMMORTAL-project.

The European IMMORTAL-project (**I**mpaired **M**otorists **M**ethods **o**f **R**oadside **T**esting and **A**ssessment for **L**icensing) aims to propose intervention methods for driver impairment. In order to decide on possible policies for impairment countermeasures it is necessary to have an insight in and to provide evidence for the socio-economic effects of policy measures. Cost-Benefit Analyses (CBA) can be used to illustrate these effects.

Relative risk ratio

As a starting point the relative risks of impairments were used. How many times greater is the chance that a driver with a certain impairment will be involved in a serious crash per distance driven than a driver without that impairment? The answer to this question is expressed as the relative risk ratio. The relative risk ratios were obtained from a meta-analysis of relevant epidemiological studies on both chronic and acute impairments. A chronic impairment is cumulative and persistent and is often a disease that is difficult or impossible to cure and that becomes more severe with age. An example is diabetes mellitus. An acute impairment is immediate but transient. For instance, when a driver has consumed alcohol and as long as the alcohol is active in his body, his driving capabilities are significantly impaired. The relative risk ratio of all chronic impairments and most acute impairment ranges between 0.8 and 2.0. This is quite moderate. Only for the acute impairments due to alcohol and the combination of alcohol and certain drugs (both illegal drugs and legal medicines), the relative risk ratio is extremely high. Not only the relative risks of impairments are important but also their prevalence.

Quick scan

When countermeasures are considered, one also must have an indication of their effectiveness. A measure is effective when it leads to a substantial reduction of the relative risk ratio (for instance by effective treatment) or to a substantial reduction of the exposure of impaired driving (the distances driven with a certain impairment). For policy measures it is also important that there is political and/or public support for the measure. The number of countermeasures is almost infinite. Therefore IMMORTAL performed a quick scan which applied the criteria of the relative risk, the prevalence, the effectiveness and the political and or public support. In consultation with the European Commission this has led to the following measures to be included in the CBA:

- Mandatory eyesight testing (three specific types of tests).
- Increasing random road side breath tests (combined with a zero BAC limit for young drivers).
- Installation of alcohol lock for drivers with an alcohol problem.

CBA

Due to budget and time constraints it was not possible to perform the CBA for each counter measure for all 25 EU-member states. CBAs were made for Norway, the Netherlands, the Czech Republic and Spain.
Four impacts of each counter measure were assessed in the cost-benefit analysis of each impairment countermeasure: changes in number of road crashes, changes in amount and type of mobility, changes in environmental effects, and costs of the countermeasure.
All related project costs during the introduction period and operational period are taken into account, regardless of who is paying the costs.

Results

The results of the CBA are presented in *Table 1* and are expressed in million Euros. The socio-economic yield is expressed in terms of the benefit/cost-ratio. If this ratio is larger than 1 it means that the social benefits are larger than the costs. The socio-economic yield of mandatory eyesight testing is in general negative. This is mainly caused by loss of welfare due to the withdrawal of the driving license and the low relative risk ratio for eyesight impairments. The two alcohol measures, however, are very beneficial. Only the introduction of alcohol lock programs in Spain is not beneficial, but this may be caused by the assumptions that had to be made due to lack of input data. Lack of accurate data was a problem of this study. CBA is a rather complex instrument and the results depend heavily on the quality of the input. Some input, especially regarding the different aspects of traffic safety, is missing or is rather speculative. Therefore it was sometimes necessary to make assumptions. However, the assumptions made in the study will probably not change the general conclusion that withdrawing the driving licence (especially at a young age) based on mandatory eyesight testing will push towards a negative socio-economic yield. Preventing drunk driving through random road side tests and installing an alcohol lock both seem promising.

Cost-Benefit Analysis

A Cost-Benefit Analysis (CBA) is meant to answer the integral efficiency question and investigates the social output of a measure or policy. A CBA explores all positive and negative effects of policy measures and expresses them in monetary terms. This also means that a life saved as a result of the measure must be valued in a certain amount of money that is saved (VOSL). The monetized value of all effects is compared to the implementation costs of the measure. If for a certain measure the Benefit/Cost ratio is more than 1, the measure is worthwhile to be taken from a societal point of view.

	Netherlands			Norway			Czech Republic			Spain		
	B	C	B/C	B	C	B/C	B	C	B/C	B	C	B/C
Testing eye sight												
- Visual acuity	-210	-30	**-7**	-10	-5	**-2,0**	4	-1.1	**4,0**	-	-	-
- Standard eye test	-805	-40	**-20**	-29	-6	**-4,8**	n.p.	n.p.	n.p.	-	-	-
- Standard eye test incl. UFOV	-1047	-60	**-17**	-44	-20	**-2,2**	n.p.	n.p.	n.p.	81	-55	**1.5**
Alcohol - breath test												
- Increased breath test	314	-42	**7.5**	35	-17	**2.1**	25	-4	**6.4**	271	-102	**2.7**
- incl. 0 BAC limit young drivers	376	-42	**9.0**	36	-19	**1.9**	-	-	-	280	-116	**2.4**
Alcohol - lock	168	-41	**4.1**	32.5	-7.2	**4.5**	9	-6	**1.6**	69	-99	**0.7**

(-) = not relevant; (n.p.)= not performed due to lack of data.

Table 1 In Spain eyesight testing (excl. UFOV) is already mandatory; In the Czech Republic the alcohol limit is 0 BAC for all drivers.

A multivariate state space model for the analysis of **traffic safety**

One of the tasks of SWOV's Road Safety Planning department is to find quantitative explanations for the observed developments over time of road safety in the Netherlands. Recently two publications were finalized as the result of efforts that have been made to develop proper modelling and analysis techniques.

The data typically consists of repeated measurements over time of one and the same phenomenon, such as, for example, the annual number of road traffic accidents, the annual number of fatalities, the annual number of seriously injured, etc. Such variables are called time series data. An important property of the observations in a time series is that they are usually not independent of one another. This means that standard techniques like classical linear regression are not suited for establishing the relation between two or more time series variables.

Dependencies

Instead, it was decided to use a state-of-the-art family of techniques called 'unobserved components models by state space methods' which are capable of explicitly handling the dependencies between the observations in time series data. A dedicated multivariate state space model was developed, where the development of traffic safety is the product of the development of two latent, unobserved components: exposure and risk. The same model can and will also be used to obtain estimates for future developments in road traffic safety in the Netherlands.

Publications

SWOV has a long tradition in statistical modelling and recently this work has resulted into two publications. The first is a paper published in Accident Analysis and Prevention by Bijleveld (2005), which discusses how to handle the interdependencies between accident related outcomes in a multivariate context by establishing the variance-covariance structure of these outcomes (Figure). The second publication is an introductory book on the state space methodology by Commandeur and Koopman. This book has been accepted for publication by Oxford University Press and is forthcoming.

Bijleveld, F.D. (2005). The covariance between the number of accidents and the number of victims in multivariate analysis of accident related outcomes. Accident Analysis and Prevention, 37, p. 591-600.

Commandeur, J.J.F. and Koopman, S.J. (forthcoming). An introduction to time series analysis by state space methods. Oxford: Oxford University Press.

Annual Report 2004 available on the SWOV website

Every year, SWOV looks back on all its activities in the past year in an Annual Report. Our Annual Report 2004 has just been published. Besides the financial account, this publication presents an overview of SWOV research and other activities.
Annual Report 2004 is electronically available in the English section of the SWOV website www.swov.nl under Publications.

New fact sheets

Since the publication of the previous issue of Research Activities a large number of new fact sheets have been added to the English part of the SWOV website.

The complete list of fact sheets is included under *Publications* on the back page of this magazine. Here we give some more detailed information on three of the fact sheets: *Cost-benefit analysis of road safety measures, Seat belts and child restraint seats,* and finally, *the fact sheet on Road crash costs.*

Cost-benefit analysis of road safety measures

Traffic and transport budgets should be used as optimally possible, at both the national as well as the regional level. That is why it is essential to be able to assess and compare a wide range of measures properly. Cost-benefit analyses make this possible. For example, this method offers support in determining policy plans and budgets, or in prioritizing and phasing investment options. Cost-benefit analyses have already been extensively applied in this country and abroad, but the experiences with applying them to road safety measures are still limited. The SWOV fact sheet *Cost-benefit analysis of road safety measures* offers a practical overview of the various parts of a cost-benefit analysis, and indicates how the method can be applied to road safety measures.

Seat belts and child restraint seats

Seat belts and child restraint seats are the most important traditional restraint devices in cars. They form an indispensable link in what is known as the 'restraint chain': crumple zone-passenger cage-restraint device. Seat belts in cars can not only prevent severe injury, but also fatal injury in an accident in particular. Children are not only smaller and weigh less than adults, they also have a different distribution of body weight among the various parts of the body. This is why that seat belts for adults are generally not suitable for children. The fact sheet *Seat belts and child restraint seats* discusses the use, wearing and effect of seat belts and child restraint seats. It also looks at the number of extra casualties that could be saved. Finally, legislation is also discussed. In addition, the airbag is briefly considered in combination with seat belts and baby seats in the front.

Road crash costs

Road traffic crashes result in all sorts of social costs: medical costs, production loss, material costs, immaterial damage, settlement costs, and traffic jam costs. Insight into these costs is necessary for policy preparation and assessment, and makes it possible to compare road crash costs with those in other areas. These costs are also used for cost-benefit analyses. That is why research into road safety costs and their trends is carried out regularly. The research method of road safety costs has improved greatly over the years, for example by including the costs of immaterial damage. The fact sheet *Road crash costs* gives an outline of the different crash costs and how they are measured in the Netherlands and also takes a look at the situation in other European countries.

The value of a statistical life: € 2.2 million

What price to put on a human life? For road safety policy and policy research SWOV advises a new standard value of a statistical life: € 2.2 million. This amount is the result of an extensive study into the value of immaterial damage of fatal crashes for motorists that SWOV carried out together with the Vrije Universiteit Amsterdam.

Road crashes lead to all sorts of social costs, including immaterial damage. This damage, also known as human losses, refers to loss in the quality of life of casualties and their loved ones. These are costs in the form of pain, sorrow, and loss in the joy of living. It is important for policy and its supporting research to be able to valuate this damage in terms of money, i.e. to monetize it. By doing this, the total road safety costs can be calculated and/or cost-benefit analyses carried out.

A new value for policy

Until recently, there were no well-founded values in the Netherlands. In 2004 however, the Vrije Universiteit Amsterdam (VU), together with SWOV, completed an extensive study of the value of the immaterial damage of fatal crashes for motorists. Based on the results of that study, SWOV has now published a sequential report with recommendations about which values policy makers can best use when expressing the immaterial damage of fatal crashes. The VU's study estimated the so-called Value of a Statistical Life (VOSL). This term has been developed to measure the valuation of safety, including that of immaterial damage. It is also applied frequently in other fields besides road safety. In order to determine the VOSL, the concept 'Willingness to Pay' is used. This is defined as the amount of money that people are prepared to pay for a particular reduction in the chance of a crash. This idea originated in the economic theory of welfare and makes it possible to put a price tag on a risk reduction and its saving of 'statistical' lives.

What is safety worth?

In order to calculate the VOSL for the Netherlands, motorists were asked directly or indirectly, in a questionnaire, what they were prepared to pay for safety facilities. They were asked to make a trade-off between safety, journey time, and money. They first had to make a choice between two toll roads that differed in price (i.e. toll), safety, and journey time. This resulted in a VOSL of € 2.2 million, with a confidence interval of ± € 0.3 million, meaning a range of € 1.9-2.5 million. They were then asked to make a choice between three different types of one and the same car model that only differed in price and safety. They were also asked for the maximum amount they would be prepared to pay for one of the types. This question resulted in a higher VOSL of € 5 million.

€ 2.2 million: the lower standard

The study indicated that, among other matters, the VOSL depends on the road safety measure (e.g. its public or private nature) and its target group (e.g. motorists, cyclists, or pedestrians). However, it is undesirable, but also unfeasible to use a different VOSL in each case.
SWOV recommends using the lower of the two values found, i.e. a VOSL of € 2.2 million with a ± € 0.3 million margin (price level 2001), as a standard in cost-benefit analyses and in research into road safety costs. A different upper and lower margin can sometimes be used for specific applications. The VOSL depends on various factors that can change in the course of time, such as the population's social-economic characteristics and preferences. That is why we recommend determining the value again regularly, for instance every 5 years.

More detailed information about the value of a statistical life can be found in the Fact sheet entitled 'The valuation of immaterial costs of road deaths' and in the SWOV report R-2005-04 entitled 'The valuation of casualties saved' on the SWOV website under Publications. The report is in Dutch, but has an English summary.

Young European researchers in the Netherlands for a training conference

From 11-13th May, the Institute for Coast and Shipping in The Hague was a modern meeting place for a kaleidoscope of cultures. 60 promising young researchers from all over Europe met eachother to practice giving a presentation for an audience of scientists. Their common factor was that they all spoke English, the international language of science.

Steering committee and prizewinners of Young Researchers Seminar 2005

The conference was a combined initiative of three European international traffic and transport research organizations: ECTRI, FERSI, and FEHRL. In the previous issue of Research Activities, no. 28, we presented these organizations. It was the third time that the bienni0 al Young Researchers Seminar was to be held, and this time the Netherlands were asked to organize the conference. SWOV joined hands with the Ministry of Transport's Transport Research Centre and Road and Hydraulic Engineering Institute, and the Netherlands Organization for Applied Scientific Research, TNO, for the organization.

With this congress, the three international organizations want to provide young researchers with the opportunity to improve their writing of a scientific congress paper and their giving a lecture. The training element is the main purpose of this meeting. All participants had to present a research project. Besides reactions to contents, they also were given feedback on their presentation style and suggestions for improving it where possible. This was done before and during the conference by a tutor, a senior researcher, and by colleagues. Besides this training element, the conference offers the participants the unique chance of being informed about new develop-

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The relationship between speed and crash risk

In 2004 SWOV finalized an extensive literature review on the relationship between speed and crash risk. Based on the report *Speed, speed distribution, and the chance of road crashes*, an article was composed that has been accepted for publication by the journal *Accident Analysis and Prevention*.

The relationship between speed and crash risk is an issue that has been studied for over 40 years. The Solomon study in the early sixties as well as the Nilsson study in the early eighties are well known examples. More recently, starting around the beginning of the nineties, a number of additional studies have been performed, mainly in the UK, Australia, the USA and Sweden. All studies, without exception, find a very strong relationship between speed and the risk of a crash. This relationship is beyond discussion. However, a problem arises when individual studies are considered with the aim to quantify the relationship. Direct comparison is virtually impossible because studies differ widely in the research method that was applied, the speed measures that were under consideration, as well as the type of roads and related road characteristics that were included in the study.

Angle

In the article, a distinction is made between studies that looked at the effect of absolute speed and studies that looked into the effect of differences in speed. In both cases the studies are further subdivided into studies that examined the effect of speed at road section level (average speed and standard deviation) and studies that examined speed of individual vehicles on a particular road in comparison to other vehicles on that road. Each of the studies is reviewed and the strong and weak points in the research method are discussed. For each of the distinguished groups of studies, a conclusion about the most likely relationship and the intermediating variables, e.g. those related to road type, is formulated.

Relationship between average speed and crash risk

Most studies looked at the effect of absolute speed. Based on studies that looked at the relationship between average speed on a particular road section and the crash risk, it is concluded that this relationship is best described by a power function. The article concludes that the power function of Nilsson, which was recently validated, best quantifies this relationship between average speed and crash risk. *Table 1* shows the effects of a 1 km/h changes using these power functions.

Relationship between individual vehicle's speed and crash risk

Based on studies that looked at the speed of an individual vehicle in comparison to other vehicles on that same road, it is concluded that this relationship is best described by an exponential function. This is best shown in Australian studies of Kloeden et al. (1997; 2001). These studies also found that the crash rate increases faster with increasing speed on minor roads than on major roads, apparently coinciding with road design and traffic characteristics such as road width, junction density and traffic flow.

Relationship between speed differences and crash risk

Studies that looked at the effect of speed differences found that this is an important factor in determining the crash rate as well. At road level, larger differences in speed between vehicles are related to a higher crash rate. However, at individual vehicle level, the findings are less conclusive: all relevant studies found that a (much) faster moving vehicle had a higher risk to get involved in a crash than a vehicle moving at average speed. However, vehicles moving at a (much) lower speed were not always found to have a higher risk. Especially recent studies (Kloeden et al., 1997; 2001) could not replicate Solomon's U-curve in that respect.

SWOV report R-2004-9, 'Speed, speed distribution, and the chance of road crashes; Literature study and inventory of research methods', can be consulted and downloaded from www.swov.nl. The report is in Dutch but has an English summary. An article about the report was previously published in Research Activities 27 of December 2004.

Reference speed (in km/h)						
Crash severity	**50**	**70**	**80**	**90**	**100**	**120**
Injury crashes	4.0%	2.9%	2.5%	2.2%	2.0%	1,7%
Injury and fatal crashes	6.1%	4.3%	3.8%	3.4%	3.0%	2,5%
Fatal crashes	8.2%	5.9%	5.1%	4.5%	4.1%	3,3%

Table 1. The effect of a change (increase or decrease) in average speed of 1 km/h on the number of crashes (different severities) for different reference speeds (Based on Nilsson, 1982; 2004)

Continued from page 5

ments and research, and of establishing contacts with colleagues from all over Europe. The researchers came all corners of Europe: from Ireland to Romania and from Finland to Portugal.

Themes

In the field of road safety the conference focused on the following themes: the use and the effects of ITS measures such as the alcolock and driver aid systems; studies of road safety policy and its realization; studies of various aspects of the traffic behaviour of different groups of road users, such as the elderly and lorry drivers; and drink driving. Three SWOV researchers participated in this conference.

Winner

At the end of the conference, prizes were awarded for the papers that were best on both contents and presentation. The jury awarded the first prize to the presentation of Nicolas Dapzol of the French research institute INRETS. He has developed an instrument that can be used to analyze and categorize traffic behaviour automatically from in-vehicle and online driver data. In due time, this instrument will be useful for developing driver aid systems that can be better fitted to the assistance 'needs' that drivers have at that moment. Although the winner's contribution was explicitly mentioned, the jury chairman Fred Wegman encouraged everybody once again with the remark: "In a way you are all winners today" in which he praised all participants for their presentation.

All presentations and papers can be found on the special website www.ectri.org under Young Researchers Congress 2005. The next Young Researchers Seminar will be held in 2007.

Factors that promote and hinder decisive road safety policy

Involving many parties in the decision making process and entering into early negotiation with opponents of road safety measures, are appropriate for a decisive policy. These are two of the findings in a SWOV study into the factors that promote or hinder decisive policy.

Delegating the organization of decision making to an external and independent third party and active participation of a platform for road safety interests, also contribute to a decisive road safety policy. Less relevant predictors were whether road safety experts actually draft the policy, or whether sufficient money, personnel and expertise were available in interest groups.

Decisive policy

In this context, a decisive policy was defined as one that is effective, efficient, and ambitious. For road safety this means that the goal will be achieved of reducing the casualties to a lower number than there are now, and that the costs will not be higher than the profits.
Formulating policy is a difficult process that does not just depend on objective information. Especially in decisions about important projects, many parties with different interests are involved, depend on eachother and need to negotiate. The negotiations about these interests often put a stamp on the policy as much as the evidence-based information that is used.

This is also the case for road safety policy where the organization and development of the decision making process are at least as important as the results of sound and well-founded scientific research. An example of large and complicated decision-making processes involving road safety is the realization of the Dutch regional traffic and transport plans.
In the Netherlands road safety is part of the regional traffic and transport plans (RTTPs), which contain the traffic and transport policy for a specific area for a period of four years. Accessibility, environment, public transport, goods transport, bicycle policy, and road safety can be part of the policy in the plans. Road safety has thus to compete with other topics. SWOV used a multiple case study to examine which factors promote or hinder establishing a decisive road safety policy in the RTTPs.

The explorative study investigated three factors which can create a decisive policy: the promotion of road safety interests, the organization of the decision-making process, and the use of information. These three factors were operationalized into a number of measurable items.

Future

The explorative method used in this study appears to be a fruitful one in systematically determining prerequisites that are relevant for the construction of a decisive road safety policy. Athough set in a Dutch context, the method of study as well as the type of results obtained, are useful in building knowledge on decision-making processes. As a follow-up a SWOV study will focus on decision-making processes on the national decision level.

Charlotte Bax's article called 'Cooperation and organisation in decision making: A more decisive road safety policy? Results from a multiple case study in the Netherlands' has been published in the Canadian Journal of Administrative Sciences. The article can be found on the SWOV website under Publications.

Colophon

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Publications

Most SWOV reports are written in Dutch but they all include an English summary. Below is a selection of reports that have recently been published by SWOV. Records of all SWOV reports that were published from 1980 onward can be found on our website (www.swov.nl). Reports that were published in or after the year 2000 can be downloaded free of charge.

The valuation of casualties saved;
Memorandum with the PhD thesis 'The value of a statistical life in road safety'
P. Wesemann (SWOV), dr. A.T. de Blaeij (VU) & prof. dr. P. Rietveld (VU). R-2005-4. 40 + 9 pp. € 11.25 (In Dutch)
Crashes cause all kinds of social costs, among which immaterial damage. Immaterial damage, also called 'human losses', is defined by the loss of quality of life for victims and their next of kin. It is important for policy and research in support of policy to be able to put a monetary value on this kind of damage. In this manner the total cost of road crashes can be determined, and cost-benefit analyses of road safety measures can be made. This report presents the results of the extensive research into the value of immaterial damage of fatal crashes for motorists.

Sustainable Safety in the Netherlands: the vision, the implementation and the safety effects;
Contribution to the 3rd International Symposium on Highway Geometric Design, 26 June - 2 July 2005, Chicago, Illinois
Fred Wegman (SWOV), Atze Dijkstra (SWOV), Govert Schermers (AVV) & Pieter van Vliet (AVV). R-2005-5. 33 pp. € 10.45
Description of the Dutch Sustainable Safety vision which uses functionality, homogeneity and predictability as leading principles in road planning, road design and improvement of existing roads. Attention is paid to the so-called Start-up Programme on Sustainable Safety, and new ideas on road designs are launched to reduce the number of crashes and casualties in the Netherlands.

The Road Safety Explorer used regionally;
The calculation method and its assumptions
S.T.M.C. Janssen. R-2005-6. 44 + 44 pp. € 12.50 (In Dutch)
The nineteen Dutch regions have drawn up their traffic and transport plans, necessary to accomplish their allotted decrease in the number of traffic victims, by using a software instrument that SWOV made available. The so-called Regional Road Safety Explorer is a method to estimate the effects of both national and regional measures. This report describes this method and the way the regions used it between the second half of 2001 and February 2002.

The influence of social and cultural factors on mobility and road safety;
An exploration of external influences
C.C. Schoon. R-2005-7. 79 pp. € 12.50 (In Dutch)
Social and cultural developments and trends have an influence on road traffic. This exploration of external influences describes the influence of factors like individualization, intensification, informalization, computerization and globalization on mobility and on traffic risks. Study is made of how the results can be used in socio-cultural policy and road safety policy.

Young drivers experience: the results of a second phase training on higher order skills;
Evaluation study in the framework of the European project NovEV
Saskia de Craen, Jan Vissers (Traffic Test), Maura Houtenbos & Divera Twisk. R-2005-8. 74 + 20 pp. € 19.- (In English)
To diminish the high accident risk of young drivers, new methods for accident prevention are being investigated. This study in the framework of the European project NovEV evaluates the effects of a post-license training on higher order skills. This second phase driver training consisted of an on-road feedback drive, a training on closed track, a group discussion and a post-test on-road feedback drive. With a before-and-after design, the effects of the training were evaluated using a control group.

Detailed cost-benefit analysis of potential impairment countermeasures;
Willem Vlakveld, Paul Wesemann, Eline Devillers, Rune Elvik & Knut Veisten. R-2005-10. forthcoming
A driver has to perform certain tasks in order to reach his destination safely. Whether he/she is able to meet the task demand depends on his competences and capabilities. These are influenced by respectively chronic and acute impairments. This report gives the results of the cost-benefit analyses of a number of countermeasures to a selection of impairments for four countries on the North, South, East, and West boundaries of Europe (Norway, the Netherlands, Spain and the Czech Republic).

The prevalence and relative risk of drink and drug driving in the Netherlands: a case-control study in the Tilburg police district;
Research in the framework of the European research programme IMMORTAL
René Mathijssen & Sjoerd Houwing. R-2005-9. 36 + 19 pp. € 11.25
Drink and drug driving can have an impact on the driving performance and accident risk. This case-control study examines the accident and injury risk associated with different types of driver impairment and the implications for licensing assessment and roadside impairment testing, including drug screening.

Young Researchers Seminar 2005;
A joint ECTRI-FEHRL-FERSI seminar
SWOV researchers' contributions:
Ch. A. Bax. Cooperation and Organization in Decision Making: a more Decisive Road Safety Policy? Results from a multiple case study in the Netherlands.

M. Houtenbos, M.P. Hagenzieker, P.A.Wieringa, A.R. Hale. The role of expectations in interaction behaviour between car drivers.

W.J.R. Louwerse. ADAS Safety Impacts on Rural and Urban Distributor Roads: An analysis of the potential safety effects of ADAS and a simulation study of the effects of ISA.

Fact sheets:
- Cost-benefit analysis of road safety measures
- Crossing facilities for cyclists and pedestrians
- Daytime running lights (DRL)
- Lorries and vans
- Police surveillance and driving speed
- Road crash costs
- Road works and road safety
- Seat belts and child seats
- The elderly in traffic
- The valuation of immaterial costs of road deaths
- Use of mobile phone while driving

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