The SWOV Institute for Road Safety Research

International experiences in brief, up to 1996

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SWOV Institute for Road Safety Research

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1. The SWOV Institute for Road Safety Research

1.1. Introduction

The SWOV Institute for Road Safety Research, located in Leidschendam, near The Hague, is a private organisation and the centre point for road safety research in The Netherlands. SWOV was founded in 1962 as a result of a joint initiative by the Minister of Transport and private national organisations (insurers, vehicle industry, touring club).
The aim of SWOV, then and now, is to offer a contribution towards improving road safety by means of scientific research and consultancy.
SWOV has a staff of seventy people, among them forty researchers and consultants.
In the 34 years since its foundation, SWOV has conducted or commissioned numerous studies, published over one thousand papers and organised meetings and many conferences.

1.2. Objectives

SWOV's goal is to contribute to road safety by means of scientific research, consultancy and dissemination of knowledge. Its activities cover all aspects and areas of road safety.

SWOV is in command of road safety knowledge for The Netherlands, helps the Ministry of Transport to design research projects, contracts research to other research institutes and carries out scientific research itself. The work applies to the international and national, as well as to the local and regional level.

The tasks of SWOV can be described as follows:
- to initiate and create research policies;
- fundamental theoretical research;
- anticipating research;
- policy evaluation research;
- policy supporting research;
- consultancy;
- research coordination.

Its activities cover all aspects and areas of road safety. To give an idea of in which activities SWOV is involved, we herewith list as an example some of the items:
- accident registration
- behavioural research
- black spots
- costs of road accidents
- crash helmets
- crash simulations
- daytime running lights
- drinking/driving, drugs use in traffic
- driver training and young drivers

- education
- heavy goods vehicles
- injury prevention
- lighting and visibility
- obstacles in verges
- police enforcement
- reconstruction of urban areas
- roundabouts
- seat belts
- speed
- traffic flow models
- tires, road surfaces and accidents involving skidding
- vulnerable road users like children, elderly, pedestrians and cyclists
- weather conditions, such as fog

The results and knowhow are spread among policy making bodies, scientists - in order to exchange research results and methods - and institutions and persons charged with road safety.
Aside from activities in the field of research, SWOV is also commissioned with the transfer and diffusion of knowledge, data and experiences in the field of road safety, both at national and international level.

1.3. Philosophy

SWOV looks at road safety through the functioning of the transport system in its entirety. This means that study into road safety demands an interdisciplinary approach. The solutions to various problems and specific aspects will also be considered in relation to each other, and require an insight into the technical, psychological, sociological and economic aspects of the transport system and the way in which these factors are linked.
Highly advanced analysis techniques are essential to ensure the success of this interdisciplinary approach. The use of the computer as well as the development of mathematical models for traffic and accident processes are considered to be of vital importance.

1.4. Some features of SWOV

1.4.1. *Sustainably safe traffic system*

The SWOV Institute for Road Safety Research has developed in cooperation with a number of Dutch research institutes in the National Road Safety Investigation 1990-2010 a new concept: a sustainably safe road traffic system, because it was expected that intensifying the current policy would be insufficient to realise the road safety target (minus 50% road deaths in 2010 compared with the year 1986).
Such a system has an infrastructure that is adapted to the limitations of human capacity through a conflict minimising design of the network of arterial and rural roads and motorways, vehicles fitted with ways to simplify the tasks of man and constructed to protect the vulnerable human being and a road user who is adequately educated, informed and, where necessary, controlled. This policy has now been adopted by the Dutch government.

Because of the high costs involved, SWOV suggests a gradual implementation over a period of 30 years.

1.4.2. *Computer simulation programme*

In 1970, SWOV began collaborating with Professor V. Giavotto, Professor of Aircraft Design at the University of Milan, on a computer model, the forerunner of VEDYAC. With this model over 1,000 simulations were carried out with the aim of improving the safety barriers. With the experience thus gained a new model was developed, one which has greater flexibility and versatility: VEDYAC. VEDYAC stands for Vehicle Dynamics and Crash Dynamics, a flexible computer model which is able to compute and display movements of bodies in space and what happens when they collide. VEDYAC is able to simulate all sorts of manoeuvres and collisions, not only real-life traffic situations but even situations that exist only on the drawing board, for which full-scale crash tests are not feasible.

1.4.3. *Road Safety Information System RIS*

SWOV maintains the national Road Safety Information System (RIS) for the Dutch government. RIS enables quick understanding of road safety and related developments and supports timely adjustment of policy. It stimulates rational decision making regarding safety measures. The maintenance regards all aspects of RIS: contents (data, explanations and background information); computer application; communication with the users, to support and stimulate the use of the system and to discuss possible improvements.
By now only the Ministry of Transport uses the system, but for coming years other users are foreseen as well.

1.4.4. *Documentation/Library and Public Relations*

One of SWOV's services is an open large road safety library, containing also an extensive collection of 'grey' literature and semi-official published reports and other documentation. SWOV is the co-ordinating centre in The Netherlands of the International Road Research Documentation (IRRD) system, which is organised by the Organisation for Economic Co-operation and Development OECD.
IRRD is a modern, easily accessible, computerised reference system containing abstracts and other bibliographic details on publications as well as current research from around the world of interest to road construction, road transport and road safety research. The aim of IRRD is to collect and disseminate all information of interest to researchers, engineers, managers, policy makers, practitioners, educators and others working in this field.

Since 1979 SWOV publishes a quarterly journal in the Dutch language, called 'SWOVschrift'. This journal has a circulation of 4,000 copies and contains summaries of research carried out by SWOV. Since 1994 each half year the journal 'Research Activities' reports on ongoing research activities in English.

1.4.5. *Congresses/courses*

SWOV workers are frequently visiting and giving presentations on high level scientific congresses, seminars, workshops, etc. Their expertise and experience is recognised throughout the world.

Apart from giving lectures, we also write articles in international scientific journals and many people from abroad come to visit the institute.
A part of the TREND course for traffic engineers from developing countries of the Delft University of Technology is taken care of by SWOV. Exchange of knowledge and information also takes place in various committees of international organisations, like PIARC, ICADTS, PTRC, OECD, ETSC.

1.5. **Clients**

Aside from work commissioned by the Dutch Ministry of Transport, SWOV is increasingly receiving assignments by the European Union as well as by regional and municipal governments, private organisations and industry. Studies are also requested by organisations overseas. Over the years, SWOV has evolved increasingly towards a market-oriented institute, actively acquiring assignments.

2. International experiences

In the almost 35 years of existence, SWOV has worked on a large variety of road safety research projects. Although the contracts from the Dutch Ministry of Transport still form the biggest part of the portfolio, SWOV is more and more active on the international market. Here below we give a brief overview of our recent international experience.

2.1. **European Commission**

SWOV participated in three EC-technology projects in the DRIVE-framework i.e. in DRIVE I: PUSSYCATS and in DRIVE II: HOPES and SAMOVAR, and executed or participated in other international projects on road safety, commissioned or subsidised by DG VII.

2.1.1. *PUSSYCATS*

Two of the DRIVE I projects aimed at pedestrians. PUSSYCATS was about the development of a new kind of pedestrian crossing. In the experiment use was being made of a detection mat and infrared detectors.
In a joint project with French and English participants the behaviour of pedestrians at four locations was investigated. SWOV wrote two reports in English on this subject; one describes the Dutch evaluation research, the other compares the evaluations in the three countries.

2.1.2. *HOPES*

In DRIVE II the evaluation of traffic safety effects of the developed telematics systems was the main concern. The HOPES project was to give support to projects in their evaluations. In 1992, the first year of the project, several guidelines were developed both for human/machine-interaction and safety. These guidelines give an introduction to the concepts and the various methods and techniques to be used and give examples of application of these techniques. SWOV took responsibility for the following deliverables:

- Guidelines for retrospective safety analysis;
- Application of tools for retrospective safety analysis to ATT-systems in DRIVE II.

In 1993 instructions and support were given to the DRIVE II projects as to planning and execution of their evaluation study. Furthermore, the DRIVE relevant safety issues were evaluated on the most.

2.1.3. *SAMOVAR*

Fundamental aim of this research project was to determine whether the automatic registration of a number of data and the knowledge gained by that would increase road safety. The recordings regard vehicle data, such as speed, deceleration and acceleration, driver behaviour and the road circumstances. In 1992 a proposal was made for a study design, with research partners from Great Britain, Germany and Greece.

SWOV interests were in practical possibilities and methods to determine whether recording driver behaviour by in-car telematics systems would have a beneficial effect on driver behaviour, and by that on road safety.

2.1.4. *Utilisation of Security Helmets for Two-wheeled Vehicle Riders*

At the request of the EC in 1990, SWOV made a study with the purpose to give a description of the state of the art in the member states of the EC concerning the legislation and the use of helmets by two-wheeler drivers and passengers in road traffic. Also the requirements to be met by helmets per country were taken into consideration.
Scientific reports (medical and biomechanical) from the member states of the EC and some other countries on injuries due to traffic accidents of drivers and passengers of two-wheelers, divided into users and non-users of helmets, were being studied.

2.1.5. *High Level Expert Group for an European Policy for Road Safety*

In 1990/1991, SWOV took part in a committee of experts whose job was to draw up a report on the state of affairs of road safety throughout the member states of the European Community, and to make proposals with a view to improving the situation.
After reviewing the overall situation in the so called 'Gerondeau-report', the Committee first set about compiling a list of the various (60) measures which attribute to the overall objective. Secondly the Committee determined the ways through which the EC could contribute to the setting up of efficient road safety policies on the totality of the Community territory. This could be done by means of binding directives as well as by advisory activities and the setting up of a specialised permanent Community body with well described tasks to monitor and sustain road safety.

2.1.6. *International Committee for DRL*

In 1990, SWOV was asked to set up an International Committee for Daytime Running Lights, consisting primarily of research experts. The EC provided financial support to install this Committee and also meeting facilities in Brussels. The first task of the Committee was to review and evaluate existing evidence on the effectiveness of DRL and to review and evaluate the design and results of new research on DRL, especially in the Netherlands, Denmark, Canada and Austria.

2.1.7. *Social Attitudes to Road Traffic Risk in Europe (SARTRE-survey)*

In 1991/1992 the SARTRE-Consortium carried out a survey in 15 European countries, on the social attitudes to road traffic risk in Europe, financed by the EC and national funds. SWOV not only covered the national survey and analysis, but also was responsible for parts of the comparative international analysis and the publishing of the report on that matter.

It is the wish of the Directorate General for Transport and the High Level Group on Transport to update the first survey after five years. Therefore the four leading partners in the SARTRE consortium made a proposal for

SARTRE II. A survey on the actual car drivers attitudes and reported behaviour will be established.
Furthermore, the work will allow to identify any changes occurring between 1991 and 1996 in the original countries.
Partner INRETS will continue the role of scientific co-ordinator and SWOV will act as main contractor this time.

2.1.8. *International Research on Safety Effects of Road Design Standards*

In 1993, SWOV was requested as main contractor to draw an inventory of existing knowledge on design of all elements of road infrastructure, to analyse the role road safety played when fixing the existing road design standards and to draw a best practice out of all that information. Sub-contractors of this project were located in Ireland, Great Britain, Denmark and Germany.

2.1.9. *Road Safety Impact Assessment (RIA)*

SWOV was asked to formulate a proposal for an outline of Road Safety Assessment including road safety audits (RIA). It was investigated whether the philosophy and structure of Environmental Impact Assessment reports (EIAs) which are already used and the experience now gained with such reports, can be used for translation into RIAs.
The study collected backgrounds and experiences from different member states and formulated a proposal for possible future harmonisation on RIA and for a procedure which EU can use as an instrument in decision-making processes on infrastructural projects.

2.1.10. *Model for Traffic and Safety Developments and Interactions (COST 329)*

The objectives are the specification of an efficient methodology for the analysis of past and future traffic safety developments. Further the description of safety developments, their causes, and the underlying processes, in order to develop realistic quantitative safety targets and to specify or adapt safety programmes. To reach the objectives, it is necessary to monitor the traffic safety developments, to make prognoses of future safety developments, to make international comparisons of safety developments and to determine expected consequences for safety developments from changes in the most influential accident factors. SWOV is chairing this project; 16 countries are participating.

2.2. 4th R&D Framework Programme of the European Commission, proposals

The following projects will be carried out in the 4th R&D Framework Programme of the European Commission. In these projects SWOV is partner in the project team, in the SAFESTAR project SWOV will have a leading role.

2.2.1. *Safety Standards for Road Design and Redesign (SAFESTAR)*

The aim of the project is to promote the systematic and consistent application of safety principles at road design in the European road network (TERN). In view of this more and improved road design standards should be drawn up. This project will capitalise on the work done in the project

'Safety Effects of Road Design Standards' and will add lacking knowledge in some important areas.
On motorways special attention will be paid to the problems of accidents on emergency lanes and in tunnels and bridges. Furthermore criteria will be developed for safety devices. Express roads urgently need safety standards. Rural roads with single carriageway will get special attention as to cross-section design, design and marking of curves and junction design. The last part of the study concentrates on the development of tools and procedures for a Road Safety Impact Assessment (including road safety audits) to be applied for new road schemes in the EU countries.

2.2.2. *Managing Speeds of Traffic on European Roads (MASTER)*

The aim of the project is to produce information that can be used in the preparations of EU decisions concerning speed management and speed control equipment standards. The project team aims to conclude on acceptable ranges of speed on different kinds of roads, on what are the key factors influencing drivers' choice of speed and on what are the best speed management tools and strategies.

2.2.3. *Analysis and Development of New Insight into Substitution of Short Car Trips by Cycling and Walking (ADONIS)*

Traffic problems in European cities have reached an unacceptable level - both from an environmental and a traffic management point of view.
The project team will develop proposals on how to substitute short urban car trips by cycling and walking. Existing measures to promote cycling and walking will be gathered and analysed. New information will be obtained about citizen's modal choice and about the risk assessment of accident-involved roads users. A comprehensive catalogue will be made of concepts, strategies and concrete measures.

2.2.4. *Developing Urban Management and Safety (DUMAS)*

The objectives of this project are to establish a methodology that can be applied generally to towns with different transport systems in different countries, to produce a framework for the design and assessment of urban safety management schemes based on the methodology and to demonstrate the application of the methodology in a sample of towns. An underlying aim is to demonstrate how safety can be improved as part of a package meeting wider urban objectives.

2.2.5. *Advanced Research on Road Workzone Safety Standards in Europe (ARROWS)*

The main objectives are to inventorise current and innovative road work-zone safety measures, as well as existing related standards and practices.
The extent of the safety problem at road work zones will be assessed, by compiling and analysing information on road user behaviour and on accidents involving road users and workers at road work zones.
Also assessed will be the effectiveness of existing safety measures in terms of achieving the desired driver behaviour and reducing accident frequency and severity. Experimental methods used for the evaluation of road work-

zone safety measures will be reviewed. An 'optimal' range of such methods will be proposed.
Also proposed will be improved sets of safety measures for different types of road workzone. Certain features of these improved sets will be evaluated by means of simulation experiments and field tests.
A framework of European standards for road workzone safety will be recommended, based on the proposed and evaluated improved sets of safety measures. Finally a practical handbook will be produced for improved safety of workers and road users at different types of road workzone.

2.3. **EU-countries**

2.3.1. *Classified study*

By order of a German company, SWOV investigated as from 1990 the effect of a number of road side safety structures by collision with a heavy vehicle with high speed.

2.3.2. *SINA*

In 1986 the Società Iniziative Nazionali Autostradali 'SINA S.p.A.' amongst others in Italy requested SWOV to survey and assess the many types of safety barriers which have been developed for motorways in recent years in various countries. The data on the various types of barriers were taken from the literature. A few of the results with certain types of safety barriers reported on derived from mathematical simulations, by using the VEDYAC (Vehicle Dynamics and Crash Dynamics) computer programme.

2.3.3. *TRL*

By order of the Transport Research Laboratory in Great Britain in 1988, SWOV made a review of the German literature of the subject of Individual Differences and Accident Liability. Part of the project was carried out by two other Dutch research institutes.

2.3.4. *COBA*

In 1989, the Portuguese Ministry of Roads wanted to take safety measures on the most unsafe road in Portugal: the connection between Lisbon and Cascais along the coast. COBA was invited to study the traffic volume, the speed and the accidents on this road. COBA invited SWOV to act as consultant in the accident studies and in the determination of the measures to be taken.

2.3.5. *BASt*

In 1996, SWOV made a consult on the added value of the various forms of provisional drivers' licenses above the present license system in Germany. Reason for this was the unacceptable high level of fatalities and injured persons among young drivers. Evaluation studies of elsewhere were used and judged on their technical value. From the literature the problem areas of young drivers were mapped out. Per license system SWOV looked at the

effectiveness in reducing the number of accidents among young drivers and in combatting the problem areas, with regard to the present license system in Germany. After having looked at the feasibility, an advice was drawn up.

2.4. Central and Eastern Europe

2.4.1. *General*

As from 1992, the SWOV is building up relationships in particularly Russia, Hungary, the Czech Republic, Rumania, Slowakia, Poland.
The organisations involved are sister-institutes, technical universities or ministries of transport. SWOV paid visits to and fro. With some of the institutes or universities SWOV has signed a Memorandum of Understanding in which the interest for mutual cooperation is expressed.

In co-operation with a panel from the CEEC, SWOV designed a framework for a 'Low-cost engineering manual'. The tackling of the so called 'black spots' will be a cost effective approach for these countries to reduce the number of road accidents.
As to knowledge transfer, SWOV is often contributing to road safety conferences in Central and East European countries. To give some examples: the Mobilità 95 conference in Slowakia, the course on a National Traffic Safety Programme in Estonia in June 1995, a training for the traffic police in Warsaw in July 1995. In July 1995 a Slovenian delegation visited SWOV in order be informed about police enforcement.

2.4.2. *Hungary*

The Hungarian Ministry of Transport in 1993 commissioned SWOV with a consult on a point demerit system. The system is intended to serve as a supplement to methods of enforcing the traffic rules. In addition to a fine or other penalty which a road user may receive for a traffic offence, points are also allocated. The road user's licence will be retracted for a period of time, when a maximum number of points is exceeded.
On the basis of the outcome of a workshop held in Budapest, in which also the Dutch Ministry of Transport took part, SWOV formulated recommendations for the implementation of a system which would have the greatest possible contribution to traffic safety in Hungary.

At the request of the same Ministry, SWOV made a consult on the draft National Traffic Safety Programme for Hungary in 1993.

2.4.3. *Training Programme Russian specialists*

In March 1995, SWOV organised in her office a one week training programme for 20 Russian managers and specialists in the field of road safety. The subjects were the main characteristics of road safety in The Netherlands, belonging to the top five of safest countries in the world in this field. The goal was to disseminate knowledge and experiences to the Russian participants about the Dutch road safety system. Technical visits formed also part of the programme.

2.4.4. *Traffic Safety Improvement Program in Poland (GAMBIT)*

Road safety is a quality aspect of road traffic which should represent an equally important consideration in decision making. The fact that the situation in Central Europe has changed, caused a change in the situation in Poland as a transit country between East and West.

Responding to two of the main recommendations of the World Bank Report on road safety in Poland, the Polish Government ordered a comprehensive project on the improvement of traffic safety in Poland, the GAMBIT project. SWOV is involved in the various phases of the project. First it was asked to give a general opinion on the contents of the GAMBIT project and further to express an expectation about the future development of traffic safety in Poland.
Contributions were made to the conferences in this project in Rynia in October 1994 and in Gdansk in March 1996.

In the framework of 'Memorandum of Understanding' for bilateral co-operation in the field of road transport between the Dutch and Polish Ministries of Transport, SWOV contributed to a conference on 'Traffic Calming in Small Towns' in Warsaw in May 1995 and one in Wisla in April 1996. Furthermore a group of Polish experts visited SWOV in October 1995 in order to be informed about the design of built up areas and traffic education.

2.5. **International organisations**

2.5.1. *OECD*

As from the beginning SWOV has on behalf of the Dutch government a representative in the Steering Committee of the Road Transport Research (RTR) programme of the Organisation for Economic Co-operation and Development in Paris.
The programme has two main fields of activities:

- International research and policy assessment of road and road transport issues to provide scientific support for decisions by member governments and international governmental organisations;
- Technology transfer and information exchange through two databases - the International Road Research Documentation (IRRD) scheme and the International Road Traffic and Accident Database (IRTAD).

These activities are conducted by or in the form of scientific expert groups, research workshops, seminars, symposia and conferences as well as joint research projects.
SWOV chairs the management committees for IRRD and for IRTAD. Further SWOV participates in both mentioned databases as well as in numerous scientific expert groups, workshops, joint research programmes, etc. Over the 28 years of the RTR-programme, SWOV has chaired about 20% of the expert groups on road safety.

CEEC-activities of the OECD-RTR
The OECD decided to propose joint initiatives towards Central and East European Countries (CEEC's) and New Independent States from the Soviet Union concerning technology transfer and exchange of scientific and technological information in the field of road and road transport. In this framework a series of 14 workshops was organised.
In 1994, SWOV organised together with the Czech Ministry of Transport a four days workshop in Prague on infrastructure design, delivered a chairman and two contributions.

Apart from this workshop, SWOV also contributed to three other workshops/seminars in the road safety field, i.e. on Accident Data Systems, Education and Training of Drivers and Childrens' Safety and Education as well as to the concluding conference in Ljubljana in October 1995 with a presentation called 'Road infrastructure maintenance and safety strategies in Central and Eastern Europe'.

2.5.2. *PIARC*

During the annual PIARC conference, in 1995 held in Montreal, Canada, SWOV contributed with a presentation *Road accidents: worldwide a problem that can be tackled successfully!*. Every year, worldwide about 500,000 people are killed and 2,500,000 are injured in road accidents. It can reasonably be expected that this number is more likely to increase than to fall, particular in developing countries and probably also in countries in Central and Eastern Europe. But also in highly motorised countries, where a considerable drop was registered in the 1970s, there has been a less significant drop in recent years, and sometimes even a 'rebound' effect.
A further drop in road accident statistics may be achieved through an effective road safety policy. A wide range of examples was given.

2.5.3. *FERSI*

On initiative of a.o. SWOV, a Forum of European Road Safety Research Institutes (FERSI) was inaugurated in March 1991. The mission of FERSI is to provide research-based scientific input to the road safety policies and practices of inter-governmental bodies and central and local governments in Europe, as well as to promote closer collaboration between the European institutes undertaking research into road safety. In the 4th R&D Framework Programme FERSI-members could easily form consortia, also including non-member institutes, in order to submit project proposals. At present SWOV is chairing FERSI.

2.5.4. *European Road Safety Federation (ERSF)*

On behalf of the ERSF the Royal Dutch Touring Club ANWB commissioned SWOV to bundle the information from the member states of the European Union on characteristic young driver accidents.
It was concluded that because of the limited information an analysis on which a European policy can be based cannot be provided. However, there are many comparable characteristics between the countries, which might provide a scope for European policy. It was recommended to stimulate at a national level, the analyses if young driver accidents.

The European Commission asked ERSF to take the lead of Working Party No. 4 'Infrastructure', which should recommend a limited number of road safety measures suitable for application in the short term. The activities should focus on interurban roads because these roads are relatively dangerous. A report on this matter was compiled by SWOV on behalf of the ERSF.

Technical Guide about Road Safety for Interurban Roads (INTERSAFE)
This guide will the first in a series, with SWOV acting as reporting institute. This project is considered the follow-up of the work of Working Party No. 4. National standards for road design and operation are not uniform in the various countries of Europe. The actual layout and the use of the roads differ considerably between the countries and also within the countries. Much can be achieved just by harmonising the practice of road design and operation by just making use of the margins in the existing standards.

Any action towards harmonising the current practice by selecting certain values as the optimal ones, should be inspired by road safety motives only.

Programme for Improved Safety in PHARE-countries, proposals
In close cooperation with the World Bank and with the PHARE Regional Programme for Transport, ERSF prepared a programme for Improved Safety in PHARE-countries. This programme could be considered as a follow-up of the Road Safety Policy Seminar, which was held in Budapest in October 1994. A series of seven projects are proposed, to be executed in 1996/1997.
SWOV will play a leading role in three projects:
- project 1, Road Safety Policy Mission to the Baltic States;
- project 4, Setting up of a regional Monitoring and Evaluation System;
- project 5, Best practices reports, as far as the sub-project Interurban Roads is concerned.

2.5.5. *European Transport Safety Council (ETSC)*

The main aim of this organisation is to impartially identify and promote the access to road safety research findings and influence political policies on a parliamentary level in this respect. SWOV is contributing to two of the set up Working Parties, i.e. chairing the Working Party on Transport Accidents Statistics and participating in the Working Party on Road Infrastructure.

2.6. SWOV worldwide

2.6.1. *Classified studies*

In 1985 an European company asked SWOV to give advice on road safety issues in a desert country. A study was carried out on roll-over accidents. Advice was given in the safety of additional installed fuel tanks, fitting of seat belts in buses for passengers and the effectiveness of existing roll-over protection. Furthermore a review was made on the drivers' skills and driving attitude.

In 1987, SWOV took part on a road safety audit in an African country. The Safety Committee of a European company produced a Guide on Road Safety Management. SWOV was asked to look at the cultural aspects, ways to make the guide better applicable to the local circumstances and to comment on the contents of the guide.

2.6.2. *Cuba*

In 1993 the Cuban Ministry of Interior Affairs asked the Dutch Ministry of Transport for a consult on the bicycle policy. SWOV acted as sub-contractor and gave advice on instruction, education, enforcement and information for cyclists.

2.6.3. *Worldbank*

Aim of a road safety seminar on December 14-15 1992, in Washington, was to develop and disseminate relevant guidelines for implementation of road safety measures in on-going Bank projects.
SWOV contributed with lectures on improving road safety for vulnerable road users and legislation, regulation and enforcement to improve road safety in developing countries.

In connection with the European Union PHARE Program, the World Bank organised a road safety policy seminar for Central and Eastern European Countries. The seminar was held in Budapest from 17-21 October 1994, and SWOV contributed with a presentation on the 'Evolution of road accidents'. Since road safety development is strongly related to traffic growth and to the quality of the road transport system, a policy is required with an integrated traffic and infrastructure policy. It was recommended in general to make use of realistic road targets and targeted road safety programmes.

2.6.4. *United Nations*

At the request of the Working Party on Road Traffic Safety of the Transport Division, SWOV made a proposal for the setting up of an information system on 'Who is who in road safety'.

Together with the Beijing Research Institute of Traffic Engineering, the Department for Development Support and Management Services of the United Nations organised a seminar on bicycle safety, planning and design for Chinese cities in April 1994. SWOV contributed with two lectures on the design and the planning of bicycle facilities.

2.6.5. *World Health Organisation*

The WHO Collaborating Centre for Research and Training in Safety Technology, Centre for Biomedical Engineering, Indian Institute of Technology organised a one-week training course on 'Prevention and control of traffic accidents and injuries' in New Delhi India in December 1994.
The SWOV and the French institute INRETS contributed to this course, in order to transfer their knowledge and expertise to the participants, mostly coming from Asia and Africa.

The India Institute of Technology is interested in a follow-up on the issues traffic calming and safety of vulnerable road users.