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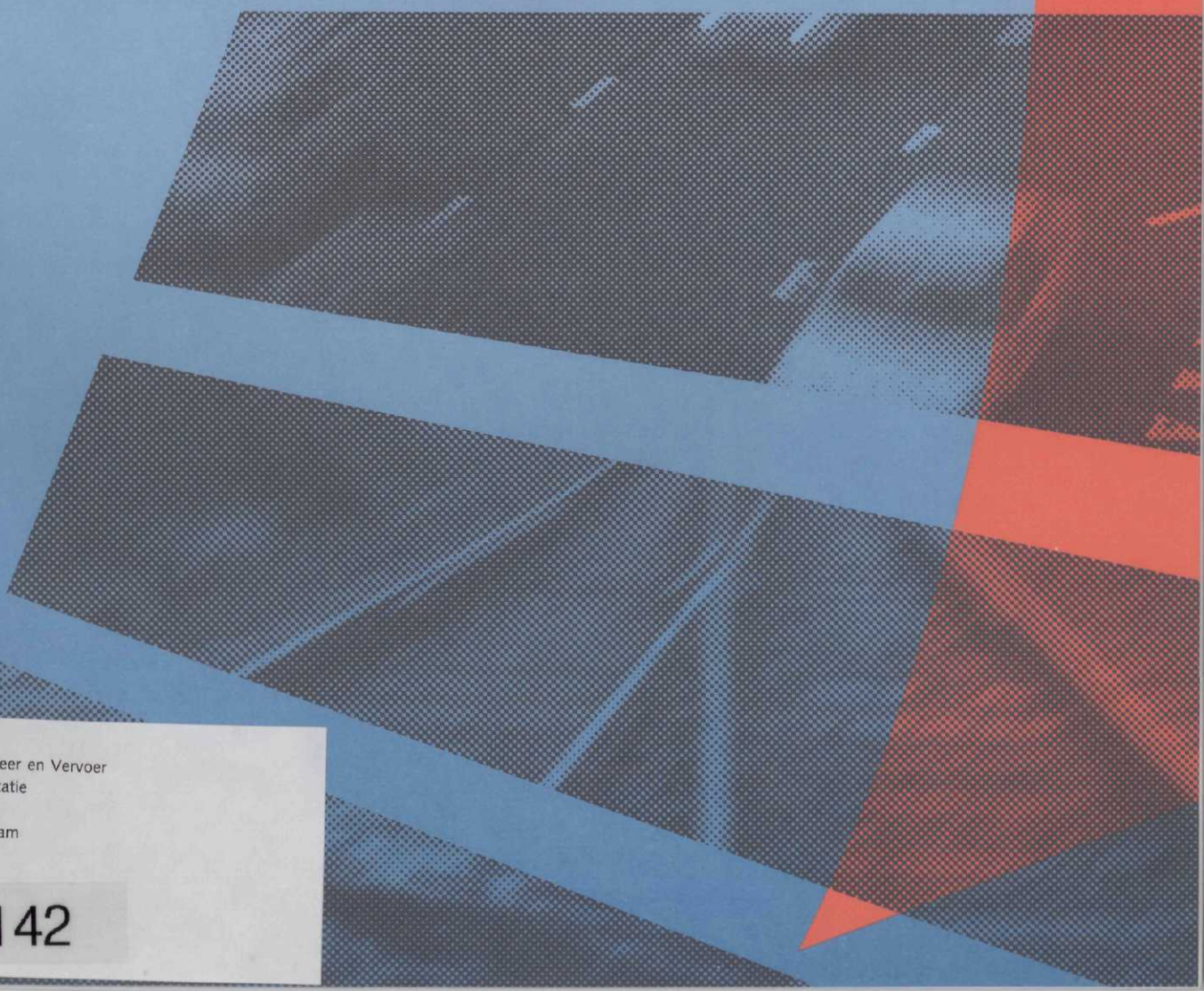
Dutch approaches to a sustainable safe road traffic system

Workshop on traffic safety
South Africa - The Netherlands

Pretoria, 27 September 1999

Joop H. Kraay



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Introduction

To characterice the Dutch road safety policy for the present and for the future, the following approaches can be given:
- quantitative road safety targets for the year 2000 and 2010;
- a spearhead policy: alcohol, safety devices as seat belts and helmets, speeding, hazardous situations, older and younger road users, heavy traffic;
- emphasis on the importance of involving provinces, municipalities and market parties in road safety policies;
- developing and implementing a sustainable safe road traffic system.

The Dutch Government has set the following quantitative targets for road safety: a 25 percent reduction in the number of road deaths and injuries by the year 2000 (compared with 1985 levels) and a further reduction of 50 percent and 40 percent respectively by the year 2010 (compared with 1986 levels).

1 Road traffic accidents

Road safety information, especially about accidents, is vital to both road safety policy and its enforcement. This information is based on accident records received from the police.
Police records have in principle three concerns:
- civil-law consequences;
- criminal-law consequences, and
- road safety policy

Police records do not include what is not reported to them nor what officers do not encounter while on surveillance. From the civil-law point of view, this is not a problem unless the parties concerned request this information. But for investigation and prosecution in the case of serious accidents, accurate records are essential.
As for road safety policy, the failure to keep accurate records can be a problem. Road traffic policy and its implementation need a reliable picture of the total number of accidents.

The general aim of road accident records is to provide the various stages of road safety policy (development, formulation, implementation, evaluation, etc.) at national, regional, and local level with systematic information about road accidents, their location, their consequences, and their causes.

To support road safety policy, records must meet its information needs. These needs include those of research that lies at the heart of policy. This makes the following essential:
- accident information must be available for the research necessary to support policy and signal new directions; this imposes requirements on the quantity and quality of information;
- it must be possible to refine this information in combination with other information;
- their must be enough road accident information available to make it possible to conduct well-researched analyses to support policy processes at national, regional, and local level.

1.1 Problem analyses

As has already been stated, road accidents are recorded on the basis of forms completed by police officers. The following problems can currently be identified with regard to the recording of road accidents by the police.

Level of recording

Police road accidents records are not complete. In principle, lack of completeness is not a problem. Moreover, we must realize that police records can never be complete, if only because the police are not called out to each and every road accident. The lack of completeness has grown over the years. If enough were known about its extent and nature, we would be able to estimate the real scale of danger on the roads. We still do not know enough.

Representativeness

Even if the level of recording is known, it need not be the same for all categories of road accidents. Police records of road accidents are not spread evenly across all types of accidents, and are therefore not representative. It is known that the level of recording falls in proportion to the seriousness of the accident. The level of recording for accidents involving motor vehicles is higher, for example, than that for accidents involving cyclists. There are also local variations with regard to representativeness.

Stability

If the level of recording and representativeness remain the same over a number of years, the information on that period can be analysed. However, neither the extent of incompleteness nor representativeness remain constant across the various categories over a number of years. The extent to which records fluctuate is not known. The real extent and breakdown across the categories cannot therefore be determined by means of the annual multiplication by a fixed factor of the number of recorded accidents in each category. That factor is not known.
In the past few years, police traffic duties have often had lower priority than in the past. The police concentrates nowadays more on the investigation of crimes liable for prosecution.

Vulnerability

The current provision of information is made vulnerable by our dependence on the police as the only recording body.

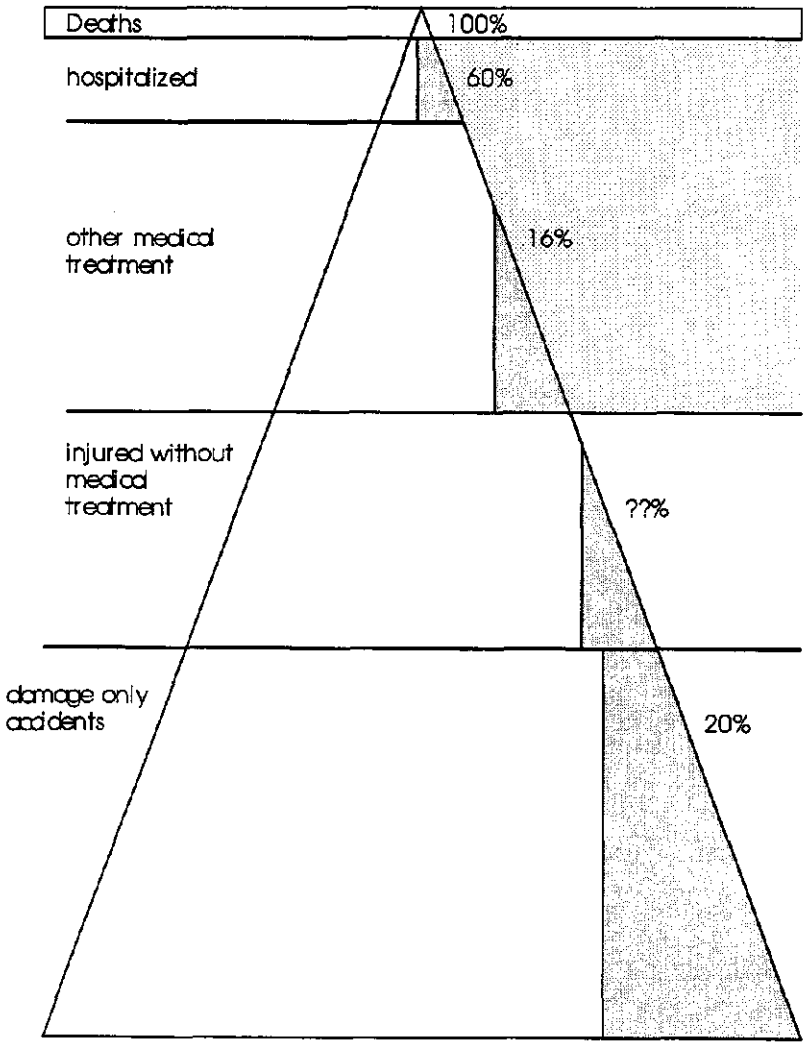
Comparative studies

Various studies have shown that:
- road accident records are not complete, only about 24% of road accidents involving injury are recorded, and the level of recording falls as the accidents become less serious;
- it can be concluded that 48% of accidents involving injury where the police are present are not recorded;
- it can be concluded that 60% of accidents involving admission to hospital are recorded; however, there is an ongoing decline in the proportion of these accidents being recorded;
- only 16% of accidents whose victims are treated in the out-patients department of a hospital (and may be referred to a specialist) are recorded;
- only 11% of accidents whose victims are treated by a family doctor or physiotherapist, etc. are recorded;
- for the largest group of accidents, those with only material damage, the level of recording is estimated at 20%; no study has been conducted into the representativeness of this group.

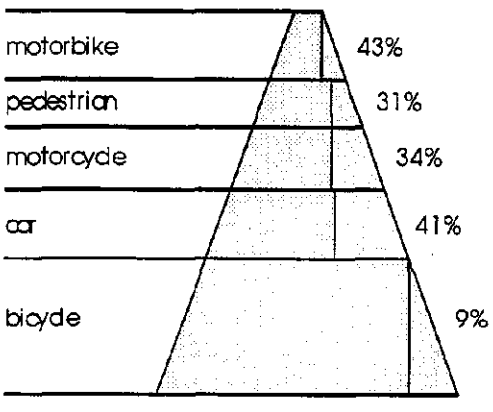
1.2 Concluding remarks on the recording of accidents

Recorded information about road traffic accidents seems to be only the tip of the iceberg. Information about danger on the roads also needs to extend under water.

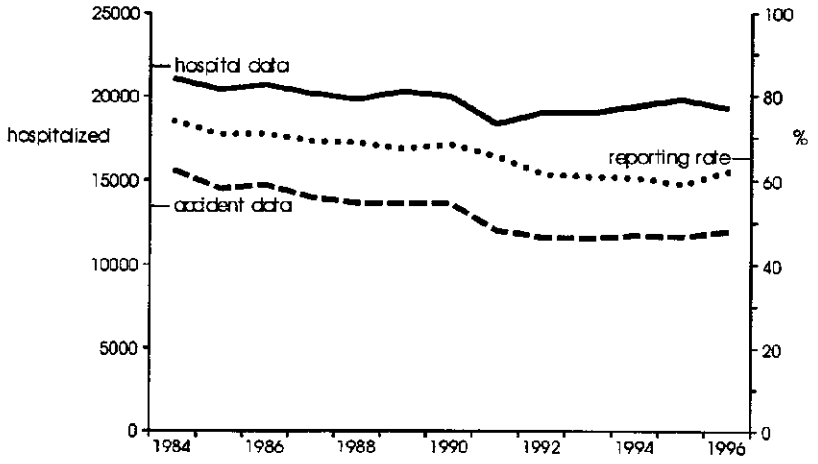
Figuur 1
Completeness



Figuur 2
Representativeness



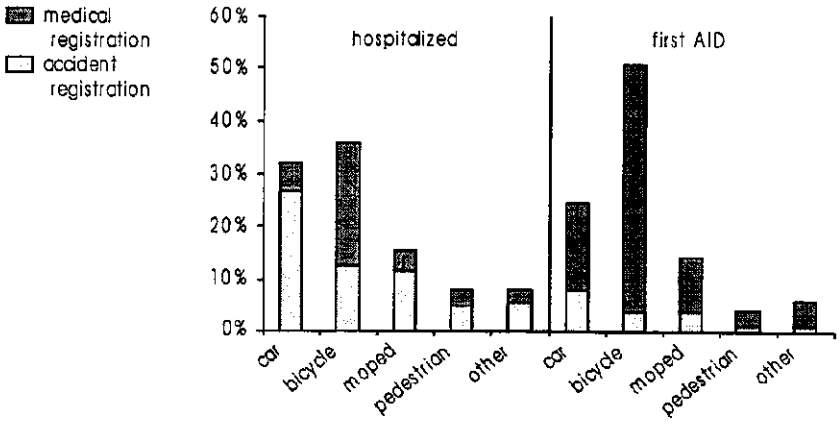
Figuur 3
Varies annually



The need for information about road accidents has changed over the years with regard to both policy and the research that lies at its heart. There is a strong need to research the policy principles and there is a consequent need for information at all policy levels. It is also necessary to indicate the quality standards with which this information must comply.
Not enough is known about the level of incompleteness and representativeness of current information, and they have not been stable over the years. Their real level cannot be determined by means of an annual fixed correction factor.
There needs to be research into the potential of a permanent procedure for monitoring the quality of road accident information.
Road accident information needs to be made available as efficiently and effectively as possible. It should be noted that the current provision of information is made vulnerable by our dependence on the police as the recording body.

We need to avoid a situation where insufficient and inadequate information makes us set wrong priorities and embark on wrong policy directions or prevents us from judging the impact of policy correctly.
To obtain a more total picture, in addition to the information gathered by the police, information is obtained from the medical recording systems of hospitals compiled by the Health Care Association, and the road accidents in the private accident recording system compiled by the Consumer Safety Foundation. National surveys are also conducted with the Dutch population, which help to make the picture more complete.

Figuur 4
Estimation of the total amounts



The spearheads of the national road safety policy focus on the most important factors accounting for risks. The TRC regularly conducts research to chart the developments in the areas of alcohol and trafic, the use of safety devices and driving speeds on roads outside the built-up area.

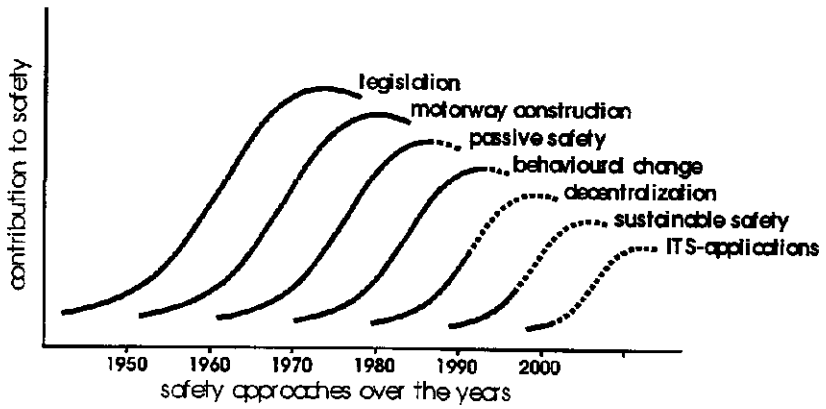
In a new concept of registration, the police makes already use of an electronic tool: the so-called "accident-reporter", in which some data from other databases will be used as input as much as possible. For example, vehicle or infrastructure information will be exchanged automatically with central databases, when the key information such as the number plate or global position is known. In this way the time spent on registration will be reduced substantially. Another feature of an accident-reporter is the internal quality control. Only relevant questions are put to the policeman who registers the accident and only possible answers are accepted.

2 From history

In The Netherlands the death risk per unit of travel fell between 1950 and 1986 by 6 to 7 percent per year, while the percentage of increase in travel were higher in the 1970s, and since that time lower. The number of road deaths increased from about 1,000 in 1950 to over 3,200 in 1972. Since then the annual number of road deaths has fallen to 1,280 in 1991. During the last 5 years the decrease in the death risk has declined to approximately 4 percent per year, while from 1986 to 1991 vehicle use rose by 19 percent.
The number of road deaths in the year 1997 was 1163.

The approach of the road safety policy in the past can roughly be characterized as a succession of five generations of measures (see Figure).

Figuur 5



- The first generation of policy measures introduced after the Second World War concerned legislation: the Road traffic Act of 1951 and the Road Traffic and Traffic Signals Regulations of 1966. This legislation, and the surveillance to ensure that is observed, contributed especially in the 1950s and 1960s to the decrease in road hazards. Partly as a result of the continuous amendment of the legislation, it still has an effect. However, the effect has gradually become constant, and it no longer makes a significant additional contribution to further decreasing the risk.

- The second generation of measures relates to the construction of roads, especially motorways and through roads outside built-up areas. The effect of these measures was mainly to be seen in the decrease of road hazards in the 1960s and 1970s. These measures have allowed the increase in road traffic to develop on safer roads. In the 1980s the contribution of this generation of measures to further decreasing the risk constantly declined, as the rate of expansion of the road and motorway network slowed down.

- The third generation of measures contributed to the decrease in road hazards mainly in the 1970s and 1980s. These are measures to increase "passive safety": compulsory wearing of crash helmets and seat belts and improved constructional safety of cars like flexible steering column,

crushable zones and soft materials. The effects of these measures on the reduction of risk have not yet stabilized. With consistent use and optimization of the possibilities in this area, they may continue to contribute to a further decrease in road risk in the 1990s.

- The fourth generation of measures relates to behavioural change through combinations of legislation, information, education, surveillance and infrastructural changes. These measures were first initiated in the 1970s, but their effect has been most prominent since the early 1980s. Examples include the drink-driving legislation, the introduction of lower speed limits in residential areas in combination with a new layout of those areas, the compulsory road safety education in primary schools and the voluntary teaching packages for secondary education. Especially the innovative police surveillance of the alcohol consumption of drivers, information about alcohol within a broad context, and the production of low-alcohol drinks have effectively contributed since the mid 1980s to a further decrease in risk. This is also true for the still ongoing infrastructural adaptations in residential areas, designed to enforce a maximum speed of 30 km/hr.

- The fifth generation of measures involves mainly organizational and incentive measures. The effects began in the late 1980s, when the government set the objective of 25 percent fewer road casualities in the year 2000 compared with 1985. Incentive measures with the aim of achieving this objective were introduced for the short term. The next step is the decentralization of the task to provinces and municipalities. The effect of these measures still remains to be seen.

- From the second half of the 1990s, new generations of policy measures will have to follow the preceding generations in order to further reduce road hazards in the future. The next generation of measures concerns the "sustainable safe" design of our road network, with the accompanying regulations.

- The future approach and generation of measures will probably relate mainly to the application of telematics and electronics in road traffic.

This method of presentation is naturally schematic and it does not cover all types of policy measures. For instance, the fields of active vehicle safety, trafic technology and medical assistance have not been mentioned, because the effective contribution to the reduction of road hazards has not yet been established. There is uncertainty, for example, about the safety effects of devices for active vehicle safety (such as an anti-blocking system for brakes). Because these devices give more obvious possibilities for risk control, the potential gain in safety could perhaps be negated by riskier behaviour. In the areas of medical assistance and traffic technology, there is no coherent policy which focuses on improving road safety, although risk reduction measures have certainly been introduced sporadically in these two areas.

The succession of different generations of measures has achieved a generally constant decrease in road hazards. When the contribution to risk reduction of one generation of measures begins to decline, the next generation emerges. The quasi-autonomous character of the risk reduction averaging 6 to 7 percent since 1950 should therefore be regarded as the cumulative effect of the successive generations of policy measures.

Looking back at the history of the approach to road accidents in The Netherlands, a few further comments may be added.

- Initially there was a tendency when describing and controlling road accidents to think in terms of incidental problems and solutions. For instance: accidents-prone drivers who had to be detected and dealt with; parts of the road network which were unsafe (black spots) and had to be improved; technical defects of vehicles, for which a periodic vehicle inspection was introduced.
- In a later phase the focus changed to looking for groups of road users and parts of the road traffic system which were associated with relatively high risks.
- Another innovative development was the greater tendency to think in terms of controlling the phenomenon, rather than in terms of the phenomenon itself. It became apparent that more attention was needed for ensuring the implementation of measures in Dutch society, where administration proceeds along complex lines, not least because there are so many parties involved, and the problems cannot be solved only from the ministrial center of The Hague. This resulted in the idea of the Regional Bodies for Road Safety in each province.
- A final development which should be mentioned is the combination of the "control philosophy" and the analysis of the "inherent safety" of the system, which resulted in the creation of the concept of Sustainable Safety.

3 Traffic calming

In newly designed areas the design principles based on the separation of different types of traffic (such as the American Radburn-principle and the Swedish SCAFT-guidelines) were in The Netherlands only used on a rather limited scale.

During the seventies an entirely different principle to that of separation was developed for residential areas in The Netherlands: total integration of the different transport modes. The concept has become known by the Dutch word "woonerf". Motorized traffic (excluding through traffic on the main arterials) is accepted but is subordinate to the other woonerf-users. In a woonerf motorized traffic is permitted to drive at walking pace. In 1976 the woonerf achieved legal status.

The woonerf-concept has greatly influenced thinking on the improvement of road safety and environmental aspects in The Netherlands. The woonerf led indeed to a substantial reduction in the number of injury accidents. In some projects some 70 percent reduction of injury accidents were reported.
However, the application of the woonerf often remained restricted to only a limited amount of and relatively small areas. As reasons for this the following was given: very strict legal design requirements, the high construction costs and the extra physical space needed for realisation.

Since 1983, Dutch road authorities can get a legal limit of 30 km/hr on roads or in zones within built-up areas. To guide Dutch municipalities to design effective speed restricting and through traffic preventing measures, a handbook was developed. Half of all the Dutch municipalities have realized one or more 30 km/h-zones. Recently, the effect on the number of injury accidents was studied and it was determined that the number of serious injury accidents had dropped by more than 30 percent.

From a survey conducted in a number of pilot areas, it showed that the creation of 30 km/h-zones is a very effective way of improving the quality of life in residential areas. The majority of the residents (80 percent) are happy with the creation of a 30 km/h-zone.

4 The concept of sustainable safety

The starting point of the concept of "sustainable safety" is to drastically reduce the probability of accidents in advance, by means of infrastructure design and, where accidents still occur, the process which determines the severity of these accidents should be influenced so that serious injury is virtually excluded.

The reason for this approach is the following formulation from the Dutch Parliament:
"no longer do we accept that we hand over a road traffic system to the next generation in which we tolerate that road transport leads to thousands of fatalities and tens of thousands of injuries".

The concept is based on the principle that man is the reference standard. A sustainable safe traffic system has an infrastructure that is adapted to the limitations of human capacity through proper road design, vehicles fitted with ways to simplify the tasks of man and constructed to protect the vulnerable human being as effectively as possible, and a road user who is adequately educated, informed and, where necessary, controlled.

The key to arrive at a sustainably safe road system lies in the systematic and consistent application of three safety principles:
- functional use of the road network by preventing unintended use of roads;
- homogeneous use by preventing large differences in vehicle speed, mass and direction;
- predictable use, thus preventing uncertainties amongst road users, by enhancing the predictability of the road's course and the behaviour of other road users.

In a sustainably safe road traffic system, the road user represents the central element, the reference. He must be prepared to accept an infrastructure, vehicles, rules of behaviour, information and control systems, that may restrict his individual freedom, in return for a higher level of safety. If this willingness is not present, resistance will result. Perhaps by using "social marketing" the willingness to accept all elements could be achieved. Freedom restrictions without good arguments should not be offered to the road user.

Education could and should play an important role in the transition period from the road traffic system of today to the sustainably safe system. The content of education could concentrate on the whys and wherefores of sustainable safety. Public awareness, public participation and education should create support for implementation and find their place alongside implementation of other key elements of this vision.

With respect to vehicles, the diversity of vehicles should be kept to a minimum. Furthermore, the various types should be clearly distinguished. When used in the same traffic area, vehicles should demonstrate the same behaviour as far as possible, or otherwise be provided with separate facilities.

In the sphere of passive safety, sustainably provisions to be mentioned here are those that work independently of the driver or the passenger: built-in devices like solid passenger compartments of cars combined with crushable zones around and airbags. Improvement of the front-end design of passenger cars to reduce injuries to pedestrians and cyclists are of relevance as well.
In the field of active safety, interesting developments are the so-called Intelligent Speed Adapter in The Netherlands and the intelligent cruise-control.

The three safety principles (functional use, homogeneous use and predictable use) requires the specification of the intended function of each road and street. Roads are built with one major function in mind: to enable people and goods to travel, the so-called traffic function. Three options could be distinguished:
- the flow function: enabling high speeds of long distance traffic and, many times, high volumes;
- the distributor function: serving districts and regions containing scattered destinations;
- the access function: enabling direct access to properties alongside a road or street.

Besides a traffic function, streets and roads in built-up areas should allow people to stay in the vicinity of their house safely and comfortably. We call this function the residential function and this function could well be combined with the access function.

The concept of sustainably safe road transport comes down to the removal of all function combinations by making the road monofunctional, i.e. by creating categories of roads: pure through roads, pure distributor roads and pure access roads. Multy-functionality leads to contradictory design requirements and also to higher risks.

Based on our existing knowledge functional requirements for design criteria have been developed for a sustainably safe traffic system:
- create residential areas as large as possible;
- every trip as long as possible over the safest type of roads;
- make trips as short as possible;
- combine short and safe;
- prevent search behaviour for destinations;
- make road types recognisable;
- reduce and uniform design characteristics;
- prevent conflicts between on-coming traffic;
- prevent conflicts between crossing traffic;
- separate different transport modes;
- reduce speed where conflicts could occur;
- prevent obstacles alongside a road.

Recently, these functional requirements have been made operational in draft guidelines by a Working Committee. The policy on implementation of sustainable safety follows three lines: to develop the concept into more practical terms, to implement a so-called Start-up Programme and to carry out different demonstration projects.

4.1 Demonstration projects

To demonstrate the concept of sustainable safety to a broader public, a start has been made with executions in practice. For that purpose four demonstration projects are selected and are running. The object of using demonstration projects is to show how road traffic accidents can be minimized by an approach focussed on the tools of sustainable safety.

By dissemenation of the knowledge gathered through the experiences with demonstration projects, this process will bring new knowledge to the notice of others. This new knowledge is also important for the realisation of other projects. Knowledge is power and gives knowledge to them who are keypersons in the process of implementation.

The four formal demonstration projects selected are the areas of West Zeeuws-Vlaanderen, Grubbenvorst, Oosterbeek and Kop van Overijssel. At the same time there are also running two other cases in the areas of Westland and West-Friesland.

Besides the mentioned demonstration projects, several experiments with 60 km/h areas outside built-up areas and experiments with sustainably safe lay-outs of 80 km/h roads are in progress and are monitored.

4.2 Start-up Programme 1997-2000

The concept cannot be handed over to just those who are interested in the concept and rely on their individual willingness to come to implementation and leaving those who are not interested aside. The concept requires an active participation of all road authorities in the country and of the whole road safety community as well. The culture in Dutch public administration requires dialoque and consultation to meet this aim.

A special Steering Committee, with representatives from the central, provincial and local government and from the water board, has been set up to guide this proces. After broad consultation this Steering Committee came to the conclusion that the vision of sustainable safety received broad support. However, different opinions were heard about how to implement the concept and how to finance it. The Steering Committee made an inte-grated Start-up Programme, covering the first phase of implementation of sustainable safety.

This Start-up Programme comprises a package of measures which forms essential con-ditions to fulfil firstly, before investments in a sustainably safe road transport system could be made. Secondly, all measures in this start-up programme are relatively cost-effective and could be implemented in a rather short time (three years period) and got support from a wide majority of those who were consulted.

July the first 1997, a letter of intent had been signed by the central government, provincial and local governments, and by the water-board. This letter of intent comprises the real implementation of the Start-up Programme which will be realised in the period between 1998 and 2000. The total costs of implementation will provide half of the financial means required, and the other partners will contribute the other 100 million US dollars.

In the Start-up Programme it was decided to follow a two-phase implementation of sustainable safety.
The first phase spans from 1997 through 2000. This phase involves the implementation of the measures in the Start-up Programme. Within a short amount of time and with a limited budget, they must give a clear impulse and hence contribute to the road safety objectives set for the year 2000.
The second phase, the integral implementation of sustainable safety, runs from the year 2000. The public bodies will make clear agreements no later than 1999 regarding the formulation of the plans for the second phase. These agreements must state how the objectives set for 2010 will be achieved in the first decade of the next century.

The Start-up Programme is a minimum package of measures to create the greatest uniformity and clarity at the national level. Fortunately, many governmental bodies have already moved forward with the sustainable safety design of their road networks. And this is clearly praiseworthy, because the first phase is only the beginning. A genuine sustainable traffic and transport system demands more far-reaching measures.

During the first phase there are five areas involved in the battle against road unsafety:
1 infrastructural measures and new legislation
2 additional enforcement
3 education and information
4 active transfer of knowledge
5 launching plan formation for the second phase.

The following countermeasures are part of this Start-up Programme:
- road classification programme (for the complete Dutch road network of more than 100,000 km road length), which enables the roads to fulfil their functions satisfactorily and forms a basis to solve the problems of contradictory design requirements;
- stimulate a low-cost introduction of 30 km/h-zones inside built-up areas (excluding roads with a flow function and with a distributor function); an extension is agreed upon of the number of 30 km/h-zones from 10 percent of the possible zones (as is the case now) up to 50 percent by the year 2000;
- introducing with simple means a concept of 60 km/h-zones for minor rural roads; some 3,000 km of road length is aimed for to be realized by the year 2000;
- if needed and possible infrastructural measures like cycle facilities, roundabouts, small-scale measures to support 30 km/h-zones and 60 km/hr-zones;
- inside urban areas mopeds on the carriageway instead of on cycle tracks or cycle paths in 1999;
- indication of priority at every junction (outside the 30 km/h-zones); the same priority rules for cyclists and mopeds as for motorised traffic will be introduced;
- public information campaigns to support the introduction of sustainable safety; a better and more intensive police enforcement on dangerous roads and education programmes;
- in order to determine the effects the development and introduction of a road safety audit in 1998.

Based on the implementation of this Start-up Programme further steps will be defined for the implementation of a sustainable safe road network in The Netherlands in the years to come. This Start-up Programme is, after all, only the beginning. Implementation of the Start-up Programme could be considered as a major step to reach the road safety targets set for the year 2000.

4.3 Preparation for the second phase

In 1999 a plan will be drafted for the second phase. The topics are the categorization, road design and new financing possibilities. This forms the basis for the next step: the realization of the tasks set for 2010.

Following the execution of the first phase, there will be an infrastructure in The Netherlands with several basic common characteristics. Then the time will be ripe for the further rearrangement of the road netwerk. There will also be more clarity regarding the possibilities for telematics applications for enhancing the flow and safety of traffic.

Recognizability is vital for a sustainably safe traffic system. This requires a division of the road network into a limited number of clearly distinguishable road categories whereby the same subdivision is employed nationwide. Recently, draft guidelines on this topic have been published.
The public bodies will each categorize their own roads before 1999 using the draft guidelines as the basic premise. The provinces and enabling legislation areas will perform a coordinating function, so that the plans can be harmonized. In the extension of the categorization guidelines, preliminary criteria for the design of the various road types will be developed. A draft of these will be available in the beginning of 1999 and tested with projects in practice.

A commission will be established to develop proposals to come up with new ways of financing road safety measures as a supplement to existing possibilities. This commission will present its proposal in 1999.

4.4 Looking to the future

The Start-up Programme for sustainable safety shows which agreements have been made between representatives of municipalities, water management authorities, provinces and the National Government. The practical and easy measures to be implemented in the first phase are an important preparation for the second phase; the integral and comprehensive implementation of the concept in The Netherlands.

The Netherlands will become a different place if sustainable safety is achieved:
- the road network will be adapted to what people are capable of in traffic;
- the desired road behaviour will be clear from the road network;
- road safety will be considered in town planning;
- traffic participants will be well educated and informed;
- there will be adequate enforcement;
- the construction of vehicles will protect people;
- vehicles devices that make driving easier.

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