

GOVERNMENT STATUS REPORT, SWEDEN

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Swedish Road Administration

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ROAD SAFETY ORGANISATION

The Ministry of Enterprise, Energy and Communications is responsible for the traffic safety in Sweden. The ministry is limited in size and the Swedish Road Administration (SRA) handles most of the practical work. The SRA has been commissioned by the Swedish Government with the overall sectoral responsibility for the road transport system. This involves issues relating to environmental impact, road safety, accessibility, transport quality, regional development and gender equality. Its responsibility also includes intelligent transport systems, public transport, adaptations for disabled persons, commercial traffic, applied research and development and demonstration activities in the road transport system. The main other bodies active in road traffic safety efforts are the police and the local authorities. Other important parties are the National Society for Road Safety (NTF), with its member organisations, and transport industry organisations. The Group for National Road Safety Co-operation (GNS) is a central body that co-ordinates co-operation between the SRA, the local authorities and the police. The NTF is an additional member of this group.

FATALITIES

The Swedish overall long-term safety objective within the road transport system was settled in 1997, when the Swedish parliament voted for the "Vision Zero". This vision states that ultimately no one should be killed or seriously injured by the road transport system. The design and function of the system should be adapted to the conditions required to meet this goal.

Sweden has a long tradition in setting quantitative traffic safety targets. After a period of positive development in the early 1990ies a target was set at 400 fatalities in 1994. This target was confirmed by the parliament in 1997 and a new 10-year target was set at a 50% reduction for 2007. The target to have a maximum of 270 fatalities in 2007 is a major challenge. Sweden as member of the European Union is part of the union's target of a 50% reduction of fatalities between 2001 and 2010. For Sweden that target means maximum 250 fatalities year 2010.

Table 1.
Number of fatalities on Swedish roads

Accident Year	Fatalities
1989	904
1990	772
1991	745
1992	759
1993	632
1994	589
1995	572
1996	537
1997	541
1998	531
1999	580
2000	591
2001	583
2002	532
2003	529
2004	480
2005	440
2006	<440

With around 450 fatalities per year Sweden is still one of the safest countries when it comes to road traffic, with a level of 4,9 fatalities per 100.000 inhabitants. This is around half of the European Union risk average (8,2 fatalities per 100 000inhabitants year 2005, EU15).

RESULTS OF VISION ZERO

In the years since Vision Zero was first introduced in 1995, Sweden has seen major changes both as regards views on road safety as well as in the working approach adopted. An important milestone was the parliamentary resolution adopted in 1997 when Vision Zero became the foundation for road safety operations in Sweden. Another step was the establishment of the Road Traffic Inspectorate in 2003, whose task it is to monitor and analyse safety developments in the road transport system.

One obvious result of Vision Zero is the change in road environments in Sweden. Central median

barriers and roundabouts have become much more common, as have different types of speed calming measures in built-up areas.

Nonetheless, it is still too early to draw any firm conclusions about what Vision Zero has meant as far as reducing the number of people killed or seriously injured in traffic. It takes a long time to implement improvements in roads and vehicles. Changes in the infrastructure occur at a slow pace. What has been seen, however, is a reduction in the number of road deaths in recent years, despite an increase in traffic.

NEW WAYS OF THINKING AND NEW SOLUTIONS

Based on the concept of Vision Zero, the work on road safety has been aimed at preventing serious injuries. Previously this work focused primarily on preventing fatalities and accidents from ever happening. The change in direction also entails changes in our way of thinking and calls for new solutions. One typical example to illustrate the difference can be found in the choice between traffic lights or a roundabout at an intersection.

- If the key objective is to reduce the number of accidents, then traffic lights are the best solution. There will be fewer accidents, but those that do happen often result in serious injury.
- If the key objective is to avoid serious injuries, a roundabout will provide better results. There will probably be more accidents, but the injuries will mostly be minor.

SAFER ROAD ENVIRONMENTS

Everyone who travels by car in Sweden can see how the roads have changed. This primarily involves investments that have been made to reduce the risk of serious human injury. Much of what has been done is due to the fact that the municipal authorities have taken a major responsibility to improve safety from the basis of Vision Zero.

- Roundabouts have become more commonplace at intersections, particularly in populated areas. They are not a new phenomenon, but since the introduction of Vision Zero their key role in road safety has been highlighted. Roundabouts have a traffic calming effect. The consequences of a collision there are less severe than in a normal intersection due to the different angles of impact and lower speeds.
- A new and widely discussed innovation is the 2+1 lane highway with a median barrier, a road type developed in Sweden. The summer of 1998 saw the first such median barriers being installed on a road stretch where there had been many fatal collisions.

Despite much initial scepticism, this trial solution was found to be highly successful in preventing head-on collisions. Since the beginning of 2000 the construction of roads with median barriers has accelerated.

- One of the first effects of Vision Zero was that municipal authorities were able to establish a 30 km/h speed limit in built-up areas. This has been implemented on a relatively large scale, not least of all as a result of the ideas presented in the Swedish Association of Local Authorities publication entitled "Lugna gatan" (Calm Streets), which applies Vision Zero to urban environments. This publication makes it possible to systematically analyse and design a transport system that guarantees good accessibility and a high level of safety for all modes of transport. A speed of 30 km/h in built-up areas is nothing new, but the work on turning Vision Zero into reality has emphasised that this must be the limit if pedestrians and cyclists are to survive a collision.
- Speed limits on parts of the road network have been reviewed in order to ensure that they reflect the safety standard of the road. For example, it is now quite unusual to find a road with a speed of 110 km/h without a median barrier.

SAFER VEHICLES

Private passenger cars have become much safer, which considerably reduces the risk of being killed or seriously injured in new car models. This can in part be attributed to the European New Car Assessment Programme, Euro NCAP, which road safety experts at the Swedish Road Administration (SRA) were instrumental in setting up. As a result, consumers have access to information concerning the safety standard of different cars. There is no doubt that improvements have been implemented at a much faster pace than if legislation had been used for the same purpose. As it takes at least 10 to 15 years to replace an entire vehicle fleet, it will still take some time before the improvements will have full effect. The automotive industry can contribute to positive developments in society through meeting consumer demands concerning their products and behaviour. Particularly important are demands set by governments, municipalities, county councils and private business.

SAFER TRANSPORTS

Since the introduction of Vision Zero, the SRA has been involved in the quality assurance of transports as part of its effort to convince both those who provide and procure transport services to feel a greater sense of responsibility. This is being done by the SRA through its role as the public authority responsible for the road sector. The intention is that all private

companies and organisations that either procure or operate transport services themselves will assume responsibility for the impact this has on the environment and road safety. As a result of these initiatives, many companies and organisations have begun to place stricter requirements on vehicles and how they are used. We are seeing a growing number of those procuring transport services setting greater safety and environmental demands on these services, while more and more transport providers are showing a greater responsibility for how the transports are carried out. Swedish trade unions in cooperation with environmental and road safety organisations have developed a ranking system for heavy transports. This ranking system is called Q3 and is modelled on Euro NCAP. It is based on working environment, environmental and road safety requirements in connection with the procurement of heavy transports. As it is the clients who set the standards for the transports, they are the ones assessed.

IN-DEPTH STUDIES OF FATAL COLLISIONS

Since 1997 the SRA has conducted in-depth studies of all fatal accidents on Swedish roads. The purpose has been to find out how the fatal injuries could happen. These in-depth studies are part of the SRA quality management programme and they also provide a good opportunity to monitor developments. The in-depth studies have shown that shortcomings in the road environment are a common cause of road deaths, in addition to road users exceeding the speed limit, failing to wear a seat belt or driving while under the influence of drugs or alcohol. In order to ensure that the conclusions drawn from an in-depth study are implemented in practice as road safety improvements, "OLA" projects are conducted. The acronym OLA stands for Objective data, List of solutions/actions and Addressed action plans. Subsequent to the study, the relevant system designers assemble to discuss possible solutions to avoid the same thing from happening again. This is followed by the implementation of concrete measures, confirmed in a declaration of intent signed by each player. System designers have been found to be enthusiastic about this way of addressing a problem. OLA projects are also conducted at the national level through what are referred to as "theme studies". Examples of these are Moped-OLA, Bus-OLA and Youth-OLA (targeting young car drivers).

SEAT BELT REMINDERS

Seat belts must be worn in order for the in vehicle safety system to work. Sweden has been actively involved in promoting the development of technical systems to increase the use of seat belts. Representatives from the automotive industry,

research institutes, public authorities and insurance companies have reached a common stand on how to increase the use of seat belts through reminder systems. Cars equipped with modern seat belt reminders are assigned higher ratings by Euro NCAP. Seat belt usage is close to 100 percent in new cars with seat belt reminders.

ALCOHOL IGNITION INTERLOCK

Alcohol related traffic accidents are all too common and often result in death or serious injury. An alcohol ignition interlock in vehicles keeps impaired drivers out of traffic. It is quite common in the USA and elsewhere to use interlocks to prevent any previously convicted drunk drivers from driving while under the influence. In Sweden, alcohol ignition interlocks have been introduced as a means to quality assure transports. Companies who have had interlocks installed in their vehicles can guarantee that their drivers will not be behind the wheel while under the influence of alcohol. A growing number of players within the road transport system are cooperating on developing alcohol ignition interlocks that are inexpensive enough to be installed in all vehicles.

ROAD SAFETY CAMERAS

It is the safety standard of the road that dictates the speed limit. Drivers who exceed this limit put safety in the road transport system at stake. Speed surveillance using road safety cameras has been found to be an effective way to prevent speeding violations and to reduce the number of accidents that result in serious injury. These cameras have therefore become much more common out on Swedish roads. Attitude studies have revealed that most drivers welcome their support in traffic.

CYCLE HELMETS

Vision Zero stresses the fact that the road transport system must be designed on the basis of what the human body can stand. Cyclists are unprotected in traffic and there is a major risk of injury in the event of an accident. Head injuries are the most serious type of injury incurred by cyclists. Wearing a helmet can prevent this. In 2005 it became compulsory by law for all children and adolescents up to the age of 15 to wear a cycle helmet when riding a bicycle. The hope is that wearing a helmet will become a habit past this age.

ROAD SAFETY – A WORKING ENVIRONMENT ISSUE

Many serious road accidents occur in connection with work or when travelling to and from work. The Swedish Work Environment Authority and the SRA have taken the initiative to work in closer cooperation

to reduce the number of work related traffic injuries. The ambition is to show that traffic injuries are also a work environment problem. To include road safety when assessing work environment initiatives systematically undertaken by companies and organisations means placing greater focus on what employers can do to improve road safety.

CLOSER COOPERATION ON ROAD SAFETY

The holistic perspective on safety in the road transport system that characterises Vision Zero has resulted in closer cooperation between system designers and other players. This cooperation is both formal and informal. In August 2002 the Government instituted a national road safety assembly. The aim was better coordination of the initiatives taken by various players for a safe road transport system. The primary focus areas are speed, protection systems, alcohol in traffic as well as children and youth in traffic. Within the framework of the national road safety assembly, several players have pledged their commitment to improve road safety. For example, key road transport carriers have undertaken to work systematically on road safety at top management level. The national road safety assembly has also resulted in regional and local road safety assemblies dedicated to the same purpose. Other examples of closer cooperation are the OLA projects, the quality assurance of transports and the development of such technical systems as seat belt reminders and alcohol ignition interlocks.

QUALITY GOALS FOR THE ROAD TRANSPORT SYSTEM

Goals for the road transport system should be converted into indicators that measure quality and are easy to monitor. Road traffic, for example, could be quality assured with respect to speed, seat belt usage and alcohol/drug-free driving. An example of quality assurance of road environments is the European concept for road tests, Euro RAP (European Road Assessment Programme). Within Euro RAP the safety standard of roads is surveyed and assessed. Road assessment tests were initiated in 2002 in Sweden, England, the Netherlands and Spain. It is still too early to draw any conclusions about the programme, but the intention is to classify road stretches according to their level of safety and then to assign star ratings. Anyone driving in a safe car on a road with the highest safety classification can travel with a sense of security – assuming that they wear their seat belt, they respect the speed limit and that they are sober. Euro RAP is to roads what the Euro NCAP crashworthiness programme is for cars.

ROAD SAFETY STANDARD

Safety and quality norms exist in most fields. The construction industry, for example, has standards for buildings and structures so that they will be able to withstand any critical situation – and not have to be reconstructed in the event of an accident. Such norms or standards are also needed for safety within the road transport system. A reference model based on criteria for a safe road transport system should be developed. This model could, for example, be called "Safe Traffic" and be used as the starting point for all future road safety undertakings. Strategies must be developed and action taken to reduce the gap between the reference model and the current situation. It is the reference model that should be the starting point and not sporadic events in the road transport system. In this way, safety initiatives in the road transport system can approach corresponding efforts in other sectors.

A NEW ENFORCEMENT STRATEGY

To change the police enforcement work from traffic control to safety work the Swedish Police has developed a new enforcement strategy. Through intelligence, uniformity and lower tolerance limits the work will be more efficient and more preventive in accordance with road safety goals. The main targets for the police are surveillance of speeding, non belt-use and drunk driving.

SAFETY IS A PRECONDITION FOR GOOD MOBILITY

Road safety initiatives have often been considered to limit access and mobility in road traffic. An important aspect of the work on Vision Zero is to demonstrate instead that safety is a precondition for good mobility. It is possible to design the road transport system so that it is safe, even at current speed limits. There are major advantages to be gained if automobile manufacturers and road designers were to coordinate their efforts to achieve this. It would seem that cooperation remains a crucial issue for ensuring good mobility. Without coordination and cooperation between road users, the business community and the public sector, the optimum combination of investments required will never be possible.

THE ROAD TRAFFIC SAFETY INSPECTORATE

A committee work on responsibilities of road transport system designers was initiated in 1999 since one of the main ideas in the Vision Zero concept is to add responsibilities to all bodies in society that influence the safety level in the road transport system. The committee proposed the initiation of a new authority, a Road Traffic Inspectorate. The government approved the proposal in 2002. The inspectorate is organised as an independent part of the Swedish Road Administration.

The duties of the Road Traffic Inspectorate are to:

- monitor and analyse conditions that could have a significant impact on safety in the road transport system.
- in discussion form, encourage responsible stakeholders to maintain a systematic approach in their road safety activities.
- co-operate with other players.
- follow and initiate R&D.

The governing principle for the operations is Vision Zero and Parliament's Stage Target of a maximum of 270 killed on the roads in 2007. The attitude of the Road Traffic Inspectorate to road traffic is one system, the road transport system, with the following three components: the road user, the vehicle and the road. Responsible stakeholders shall make sure that together, the components make up a safe single entity. The Road Traffic Inspectorate makes systematic analyses of the road transport system and plans its operations on the basis of identified conditions that must be improved. The Road Traffic Inspectorate's management system for quality is based on ISO 9001:2000. The approach is process-based with production processes that are linked with the Inspectorate's duties. The Analysis process creates and communicates analyses and conclusions regarding the conditions in road traffic. Discussion creates improved conditions in road traffic. Interaction creates the prerequisites for improved conditions and R&D creates and communicates new knowledge on the conditions in road traffic.

THE SWEDISH IVSS RESEARCH INITIATIVE

Intelligent vehicle safety systems (IVSS) is a public – private partnership programme set up to stimulate research and development for the road safety of the future. The end result will probably be new, smart technologies and new IT systems that will help reduce the number of traffic-related fatalities and serious injuries. The IVSS - programme is taking a needs-driven / problem-oriented approach and has identified three **key problem areas** for avoiding major road accidents:

1. **"Impaired drivers"** or drivers with reduced capability as regards the primary driving task
 - Drowsiness
 - Driver distraction
 - Alcohol / drunk drivers
 - Drugs / drugged drivers
2. **"Speed – Sense, alert and respond"** or the driver's ability to adapt to the current or expected traffic situation ("feed-forward capability"). Increase driver / vehicle system ability to respond by
 - Obstacle detection / vision enhancement
 - Traffic & conflict management
 - Performance / Speed adaptation
 - Road condition monitoring
3. **"Just before the unavoidable"** – crashworthiness / mitigation & biomechanics. Further research in the area is needed to improve the ability of these systems to adapt to various accident scenarios with respect to the type of collision and occupants involved, position of the occupants etc.
Another important area concerns inter-vehicle compatibility as well as compatibility between vehicles and vulnerable road users.

To **support** these three problem areas, the IVSS - programme has identified the following three major functions / systems:

1. Sensor-rich embedded systems ranging from external objects detection / vision enhancement to internal vehicle systems / sensor fusion
2. Communication platforms & digital road maps / infrastructure.
3. Dependable, fault-tolerant systems

Each focus area includes basic research, applied research and the use/creation of demonstrators. Development of test and verification methods can be addressed in all focus areas. Further details are available on www.ivss.se

CONCLUSIONS

- The road fatality risk in Sweden is one of the lowest in the world
- The Vision Zero concept is the strategy to achieve safe road traffic in Sweden

- New very demanding targets (50% reduction in ten years) has been decided
- New responsibilities for system designers can improve the safety level
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REFERENCES

More information is available at the Swedish Road Administration home page
<http://www.vv.se>