

An independent review of road safety in Sweden



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December, 2007

Executive Summary

OVERVIEW

Sweden is a world leader in road safety performance having achieved continuous improvement towards one of the lowest death rates globally. Sweden works to highly ambitious long term and interim road safety goals and has developed innovative strategies and solutions which have inspired and engaged national stakeholders as well as road safety professionals worldwide.

The review acknowledged, at its outset, that Sweden's road safety management system is in a highly advanced phase of development when compared internationally. The higher the level of ambition, however, the more robust the road safety management system is required to be. Sweden has embarked upon a bold path and Vision Zero demands a new level of high performance and responsibility which needs to be shared by both the providers and the users of the system. Based on national and international good practice and information provided by senior management of stakeholders in Sweden, this independent review has identified some scope for future action.

Achievement of the long term goal of death and serious injury elimination influences management functions and interventions in ways that differ profoundly from typical targeted approaches of the past. It requires both a shift to a more protective system (separating dangerous mixed road use as, for example, is being done with median barriers, better speed management, more crash protective roads and vehicles, good recovery and rehabilitation mechanisms) as well as achieving higher levels of user compliance with the design parameters set for the system in terms of speed and use of safety equipment.

Sweden is in the 'establishment' phase of its journey towards Vision Zero. The next challenge, in view of Sweden's highly ambitious goal, is to achieve rapid 'growth' in the delivery of accountable, well-orchestrated, and effective Vision Zero activity. This is expected to include the continuation and deepening of essential long term work either underway or envisaged, as well as sharper multi-sectoral focus on interim goals to prevent death and disability in the short term. Short term gains can be expected from conventional interventions derived from national and international best practice, while improvement of the protective features of the network and the vehicle fleet will bring big benefits in the longer term. The new interim target(s) to 2020, and the related strategy and programme will establish the next phase of 'growth' for Vision Zero.

REVIEW AIMS AND METHODS

As an input to the current national review of its interim targets and, in line with good practice, a peer review of road safety management in Sweden has been carried out by international road safety experts. The independent review was carried out during the second half of 2007, funded by Skyltfonden at the Swedish Road Administration (SRA) with in-kind support from the World Bank.

Safety management capacity in Sweden has been reviewed in a systemic way which takes account of all elements of the safety management system and their interactions. Activity has been reviewed across best practice road safety management dimensions using a systematic checklist used by the World Bank. These dimensions comprise institutional management functions which provide the foundation for multi-sectoral and system-wide interventions in order to achieve results. This approach also distinguishes between the establishment, growth and consolidation phases of a country's long term strategy for road safety.

The purpose has been to provide an expert examination and judgement of how well the road safety management system in Sweden is set to move forward to achieve its ultimate goal. A key objective of the review has been to achieve a high-level consensus of senior management in Sweden on capacity weaknesses and how to overcome them.

HIGH-LEVEL FINDINGS

Institutional management functions

RESULTS FOCUS: The new 'results focus' is clear and unambiguous but its 'ownership' is fragmented and variable. In 1997, the Swedish Parliament mandated the ambitious long term Vision Zero strategy to eliminate death and serious injury in its road traffic system and to adapt the design and performance of the transport system to this goal. Vision Zero was adopted as the basis for future road safety work in the National Transport Policy 1998, but as one of six transport goals. Parliament also set an interim quantitative target to reduce deaths by 50% by the year 2007. As noted by the SRA in its last annual report, the system is far from being designed on the basis of the Vision Zero decision and the rate of fall is too slow, viewed in relation to the interim goal for 2007. With only 70 fewer deaths since 1997, the interim target will not be met.

Recommendations

(1) Strengthen lead agency arrangements: New arrangements for transport organisation in Sweden present an opportunity to review and strengthen appropriate lead agency functions, organisational structures and processes. These should address the effective development and operation of the key institutional management functions (which are also relevant to road safety management outside government) towards the delivery of well-orchestrated and funded multi-sectoral interventions to achieve Sweden's long term goal and interim targets. Specifically these functions include: results focus, coordination, funding, legislation, monitoring and evaluation, promotion and research and development and knowledge transfer. It is recommended that an appropriately resourced road safety strategy unit be established urgently within the lead agency.

(2) Specify multi-sectoral responsibilities and accountabilities across government for Vision Zero: It is recommended that consideration could be given to improving whole governmental accountability for road safety. In particular, the shared responsibility for Vision Zero amongst (1) governmental stakeholders – Enterprise, Health, Justice and Education, their agencies and Municipalities - and (2) system providers – road system, vehicle providers, emergency medical system providers and users - could usefully be set out either in legislation and/or a Memorandum of Understanding or in a road safety strategy policy document. It is further recommended that internal reviews be carried out of Agency/Ministry management capacity to deliver these responsibilities.

(3) Ensure next interim target is challenging but achievable: Informed by the substantial body of good practice interim target-setting experience which exists nationally and internationally (particularly in Australasia) link interim outcome targets, intermediate outcome targets and annual institutional output targets as a framework for the national road safety strategy and plans. Use trend forecasting of exposure and key risk factors and model potential outcomes of specified activity and implementation arrangements to ensure interim targets are challenging but achievable. Document all assumptions and calculations made.

(4) Review multi-sectoral performance regularly: It is recommended that, in addition to annual performance review of outcomes, a comprehensive high-level multi-sectoral review of performance in meeting Vision Zero and interim goals is carried out every three years by Government (in a new high level coordination body - see below) and Parliament. This would review results, interventions and institutional management arrangements as the basis for revised three year action plans. Given the multi-sectoral nature of road safety, Parliament should give consideration to establishing a periodic joint hearing of the Transport, Health, Justice, Education and Employment Committees to review progress.

COORDINATION: There is an impressive array of coordination mechanisms but their objectives lack sharp definition with respect to the new 'results focus'.

Recommendations

(1) Strengthen horizontal inter-governmental engagement at senior level

on results: It is recommended that a multi-sectoral intergovernmental group is set up to engage key ministries in a) agreeing national governmental interim targets, b) the strategy and programme for road safety, and c) any legislative and budgetary implementation of strategy needs and other key management functions. The stakeholders would include: the Ministry of Enterprise Energy and Communications (MoEE&C), Ministry of Justice, Ministry of Health, Office of the Prosecutor General, SRA and the National Police Board at Chief Executive/Secretary level supported by a senior management group comprising the Swedish Roads Administration, the National Police Board, the Work and Environment Authority and the Institute of Public Health (and key stakeholders including Local and County Government, Ministry for Education, the NTF and the National Board for Health and Welfare from time to time as necessary). The management group would, in turn, be supported by technical working groups and stakeholder reference groups. The Road Traffic Inspectorate would also attend the CEOs' meetings and the management group meetings from time to time to discuss specific current issues and to input latest information about their review processes. A dedicated and funded coordination secretariat will be necessary in the lead agency.

(2) Strengthen Parliamentary engagement: It is recommended that Parliament give consideration to establishing regular joint road safety hearings involving the Transport, Health, Justice, Education and Employment Committees.

(3) Strengthen vertical delivery partnerships: It is recommended that coordination arrangements between central, regional and local governmental levels for roads and policing forces, be periodically reviewed and developed further in support of the developing strategy and new targets. Stronger enforcement partnerships for all regions are recommended to improve the deterrent effect of policing.

LEGISLATION: Legislation is mature and comprehensive but it is not well aligned with the new 'results focus'.

Recommendations

(1) Formally specify institutional roles, responsibilities and accountabilities for Vision Zero

(2) Further review road traffic legislation to better align it with road safety goals and interventions needed to realise them. E.g. consideration could be given prohibiting use of mopeds during disqualified car driving; reviewing graduated driver and rider licensing and the age of access (particularly for riders); the use of hand held mobile telephones while driving and mandatory good practice road safety audit.

(3) Enhance the enforcement regime to improve 'general deterrence' effects. E.g. consideration could be given to introducing a usable penalty points system; owner liability for speed camera offences; automatic number plate recognition; addressing any perceived limitations on enforceability by police (including concerns about evidentiary requirements); courts' perception of speed in 'careless driving' offences; mandatory interlocks for alcohol offenders.

FUNDING AND RESOURCE ALLOCATION: Road funding for infrastructure safety measures has been substantially increased but across partnership agencies funding levels are not commensurate with the new 'results focus'.

Recommendations

(1) Make appropriate funding commitments to all partnership agencies:

It is recommended that the key governmental Ministries with road safety responsibilities (Enterprise, Justice, Health, Education, Employment) at central, regional and local levels should make annual provision for road safety expenditure in their budgets. Human and financial resource for traffic policing is a particularly urgent issue. In view of the importance of Sweden's leading edge work-related safety activity for Vision Zero, it is recommended that the human and financial resource directed at work-related road safety is ring-fenced in the work of the Swedish Work Environment Authority.

(2) Use cost benefit analysis to underpin future resource allocation decisions:

In order that road safety can compete with other areas of activity successfully (e.g. in police work), it is recommended that annual estimates are adopted by Government of the value of preventing death and serious injury and the total socio-economic cost of road crashes. It is also recommended that cost-effectiveness and cost-benefit analysis are used as widely as possible in road safety resource allocation at national and local levels. It is recommended that the successful practice of ring-fencing annual funding for road safety engineering and enforcement projects be continued.

(3) Explore further opportunities for insurance industry investment:

Against the background of forthcoming changes in insurance, opportunities for investment for the insurance industry should be jointly explored (some countries require 10% of premiums to be invested in a road safety fund). Commercially attractive road safety investment programmes for insurers, supported and facilitated by government, need to be explored and developed.

PROMOTION: The promotion of the new 'results focus' has been effective, especially at the global level, but central elements of the 'safe system' model are still misunderstood or inadequately defended.

Recommendations

(1) Reposition road user 'compliance' obligations: To address political and societal acceptance of high numbers of deaths and injuries on the road, it is suggested that a multi-sectoral communication strategy should be drawn up to explain limits of current protection in the road system better and promote different interventions - especially speed management. Highlight shared responsibilities. Engage the community in monitoring performance indicators to open up the safety debate.

(2) Broaden advocacy roles: It is recommended that the research sector as well as the Inspectorate, comprise sources of impartial information on road safety and strengthen their advocacy and promotional efforts in support of Vision Zero.

MONITORING AND EVALUATION: Monitoring and evaluation builds on a long tradition of measurement and analysis but it lacks integration and follow-through with respect to the new 'results focus'.

Recommendations

- (1) Separate organisation of regulation and inspection functions** in line with international good practice.
- (2) Establish the Traffic Inspectorate as an independent body** to achieve a higher profile than to date and promote Inspectorate reports amongst policymakers, Parliamentarians, stakeholders and media.
- (3) Improve measurement procedures and their systematic coverage**
E.g. Review trauma registries periodically for better information on road traffic injury outcomes; take high-level action with regional and local governments to engage more hospitals in STRADA; ensure new data collection process provides for representative measurement (nationally, regionally and locally) of average speeds to provide a baseline for speed management and to monitor the effectiveness of outputs; record vehicle make and model in national crash injury database to assist crash research and ratings; and actively apply findings of OLA programme, further develop methodology and publish periodic aggregate analysis of the outcomes.

RESEARCH AND DEVELOPMENT AND KNOWLEDGE TRANSFER: Research and development and knowledge transfer is well supported and remains productive but linkages to the new 'results focus' remain unclear.

Recommendations

- (1) Review the 2001 research reforms for effectiveness** of policy development, coordination and funding for road safety research.
- (2) Prepare multi-disciplinary 'safe system' national R & D strategy** in support of Vision Zero & interim target.
- (3) Establish multi-disciplinary advisory panel** to contribute to annual review of research needs.
- (4) Lead agency and professional organisations** to continue to actively develop tools for knowledge transfer based on good practice covering all safety elements of the road traffic system.
- (5) Establish a small international advisory panel** to ensure regular access to international best practice.

Interventions

Vision Zero requires high levels of safety performance of the road network as well as of the vehicles and people who use it. The review looked at a system-wide range of interventions to achieve results: planning, design and operation of the road environment; conditions of entry and exit of vehicles and road users to the road environment and the recovery and rehabilitation of crash victims in the road environment.

PLANNING, DESIGN AND OPERATION OF THE ROAD

NETWORK: Vision Zero requires that speed is considered a central parameter in the planning, design and operation of the network and the Government has publicly stated “road safety needs to be at core of speed limit setting decisions” (Tylösand, 2007). The new ‘results focus’ is principally directed at system providers but road user compliance with design rules remains a key element of a ‘safe system’.

Recommendations

Standards:

(1) Comprehensively match road and vehicle design standards to safe speed limits: Complete EuroRAP assessment of rural network and review findings regularly for action; take up Inspectorate’s suggestion to adopt new safety standard(s) for roads - better matching road design and layout to appropriate speed limits - to reduce user risk and increase user protection; ‘Standard(s)’ to be consistently/ systematically applied in terms of speed limits for existing roads and new roads; an SRA speed limit advisory group be established; SRA to be responsible for final decisions on speed limits above 50km/h.

(2) Give greater attention to safety needs in project planning: Introduce a 5 stage mandatory road safety audit for all new road projects. Area-wide safety impact assessments of potential safety impact of project on the surrounding area also to be undertaken. All road projects above an agreed value discussed in depth at concept stage by a senior Project Review Committee of SRA directors and the proposing regional or major projects staff. The aim is to resolve safety issues relevant to the 6 transport goals.

(3) Adopt a road safety engineering and police enforcement strategy to address road deaths and serious injuries on urban main roads in the three largest municipalities.

Compliance:

(4) Enhance speed compliance capability: Increase speed camera coverage and processing capacity, including increased covert mobile camera deployment to promote the notion that speeding “anywhere, anytime” will not be permitted; review urgently current courts policy not to accept speed in isolation as a reason for finding of careless driving - under speeds of 190 km/h.

CONDITIONS OF ENTRY/EXIT TO ROAD NETWORK- VEHICLE STANDARDS:

Entry and exit conditions for vehicles reflect good practice but the new 'results focus' requires continuous improvement to be sustained over the longer term.

Recommendations

Standards:

(1) Enhance national advocacy for key vehicle safety improvements at EU level especially legislation on car to car compatibility, an effective Phase 2 for the pedestrian protection standard, frontal underrun protection on HGVs as well as electronic stability control. Encourage EuroNCAP to combine car occupant and pedestrian safety ratings into an additional overall crash protection rating and adopt a whiplash specification.

(2) Expand SRA and partners world-leading efforts in creating national market for vehicle safety equipment through use of consumer information and in-house safety policies: In particular encourage Swedish car industry to fit seat belt reminders in all rear seats; give appropriate priority in public sector transport contracts for heavy vehicles fitted with energy absorbing front underrun protection (available since late 1970s); include speed adaptation systems to assist drivers in keeping to the speed limit as a condition of all public sector transport contracts and ensure fitment of speed adaptation systems to all vehicles registered for use on Sweden's roads is a condition of registration by an agreed date.

(3) Ensure that motor vehicle dealers display car occupant and pedestrian safety EuroNCAP ratings on new vehicles for sale in Sweden.

(4) Ensure that lower top car speeds are permitted for use on Swedish roads and lower limit speedometer displays.

Compliance:

(5) Strengthen key means of systematically monitoring compliance with new and existing standards and new technologies through, continued certification and annual inspection procedures, enhanced EuroNCAP assessment, EU 'adaptation to technical progress' evaluations, in-depth crash injury investigation and study, collection of vehicle make and model in crash statistics and in-vehicle performance monitoring.

CONDITIONS OF ENTRY/EXIT TO ROAD NETWORK- USER STANDARDS:

Entry and exit conditions for road users reflect good practice but the new 'results focus' requires continuous improvement to be sustained over the longer term:

Recommendations

Standards:

(1) Novice drivers and riders: Introduce two stage graduated licensing arrangements for the first 4 years of riding and driving with:

- passenger, mobile phone, and late night use restrictions,
- compulsory alcolocks for return to driving after BAC offence (court supervised),
- lowered annual penalty point limits, and
- speed compliance recorders for offenders (court supervised).

(2) Two-wheeled motor vehicle riders Remove any existing incentives for the use of mopeds compared to car use; increase the age for moped access with no accompanying passengers until a rider is 18 and widely communicate the high risks associated with the use of two-wheeled motor vehicles.

Compliance:

(3) Continue to utilise technology in the network and in vehicles wherever possible to assist user compliance.

(4) Review potential ‘deterrence’ value of future court and fixed penalties for offenders and high visibility police enforcement activity, including use of enforcement tools based on international good practice.

(5) Increase speed camera coverage and processing capacity, including increased covert mobile camera deployment to promote the notion that speeding “anywhere, anytime” will not be permitted.

(6) Review urgently current courts policy not to accept speed in isolation as a reason for careless driving under speeds of 190 km/h.

RECOVERY AND REHABILITATION OF CRASH VICTIMS: The emergency medical services are acknowledged as being integral to the new ‘results focus’ but they are not included as a system provider in day to day strategic management processes:

Recommendations

(1) The Ministry of Health/National Board of Health and Welfare to review a) the potential for increased contribution of emergency medical services, trauma care and long-term disability in Sweden to reducing road deaths and serious injuries and b) ways in which public health could further contribute to Vision Zero activity through road injury prevention activity.

Results

RESULTS: Results achieved are among the best in the world but the 2007 interim targets have not been met.

Recommendations

Social costs:

(1) While Vision Zero is not bound by the traditional model of providing road safety at reasonable cost, decisions are being made in Sweden based on costs which affects road safety, especially in the short term. Government should produce annual estimates of the value of preventing death and serious injury and the total socio-economic cost of road crashes to increase the likelihood that road safety can compete successfully with other areas of activity (e.g. in police work).

Final outcome target: Death and serious injuries:

(2) To address substantial under-reporting in police statistics for serious road traffic injury, there is an urgent need to determine the incidence of long term serious, serious or minor road traffic injury through the health system and to achieve the 100% cooperation of hospitals with the STRADA system.

Intermediate outcome targets:

(3) Set a range of system-wide intermediate outcome targets based on agreed institutional output targets which can contribute to a new headline outcome target to reduce deaths (and eventually severe injuries once a new definition exists).

Institutional output targets:

(4) Establish agreed institutional output targets, led by governmental agencies, which can contribute to intermediate outcome targets - which in turn will contribute to a new headline outcome target.

1. Introduction

In 1997, Sweden embarked upon its highly ambitious long term Vision Zero strategy to eliminate death and serious injury in its road traffic system and to adapt the design and performance of the transport system to this goal. Alongside the Dutch Sustainable Safety strategy, Vision Zero represents the new paradigm for road safety ambition and work worldwide. Vision Zero together with an interim quantitative target to reduce deaths by 50% by the year 2007 was mandated by Parliament in 1997. Vision Zero was adopted as the basis for future road safety work in the National Transport Policy 1998 as one of six transport policy goals towards a socio-economically and efficient long term sustainable traffic system for individuals and the business community throughout the country. The Swedish Road Administration (SRA) is required to propose to Government a new interim quantitative target for the next ten years at the end of 2007.

As an input to this process and in line with good management practice, an independent peer review of road safety management in Sweden has been carried out by international road safety management experts (See Appendix 6). The review was carried out during the second half of 2007, funded by Skyltfonden at the SRA with in-kind support from the World Bank.

The review has drawn from information gathered in August and September from face to face interviews with the key stakeholders (particularly in Government and its agencies) as well as from national and international road safety publications and reviews (See Appendix 4).

Results of this review were presented to key stakeholders at a workshop in Stockholm on 12th December 2007 before the completion of the review's final report. The workshop succeeded in its aim in forging consensus on the key findings.

1.1 REVIEW AIMS

The review aims to provide a qualitative management tool for use in the national discussion of the next steps to Vision Zero as well as to inform the substantial interest which exists internationally in Sweden's approach. Specifically, the aims of this review have been:

- to provide an independent peer review of Sweden's road safety management system across best practice dimensions and to ascertain its capacity to meet its ultimate goal.
- to provide a useful management tool for road safety policymakers and managers in the current national review of road safety performance in Sweden.
- to reflect stakeholder views about current approaches (strengths and weaknesses).
- to express an expert road safety management opinion about the scope for further multi-sectoral action across the management system based on national and international good practice.

1.2 REVIEW BACKGROUND

The road safety management system

Road safety performance is shaped by the quality of the road safety management system. The setting and meeting of ambitious road safety targets requires a clear understanding of all elements of the road safety management system and the linkages between them. The road safety management system has evolved over time and can be characterized as a complex interplay of institutional management functions which determine the road safety results being sought and which produce the interventions to achieve them. This framework for safety management is set out in Figure 1.

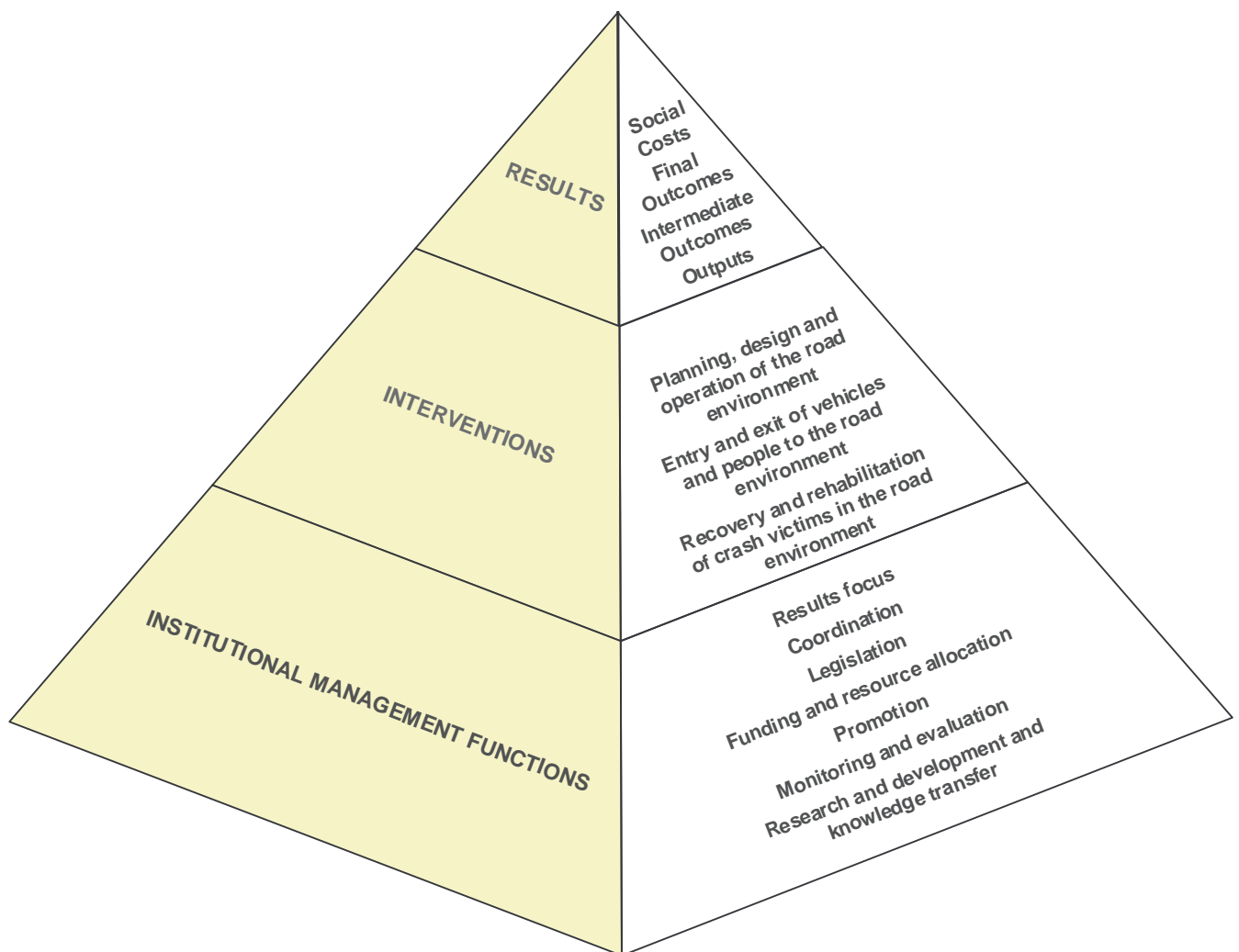


Figure 1: The road safety management system (Bliss and Breen in preparation, 2007)¹

¹ Figure 1 derives from the Land Transport Safety Authority of New Zealand's comprehensive target setting framework which linked desired results with interventions and related institutional implementation arrangements. The New Zealand framework was further refined by the European Transport Safety Council, the Sunflower Project (which defined the institutional implementation arrangements in broader terms as 'structure and culture')⁷ and the World Bank (which expressed 'structure and culture' in terms of seven institutional management functions).

Institutional management functions: The institutional management functions are the foundation on which road safety management systems are built. They are essential for the production of interventions which, in turn, achieve road safety results and for this reason they must receive the highest priority in road safety planning and policy initiatives. The institutional management functions relate to all government, civil society and business entities that produce interventions and ultimately results.

Interventions: Broadly, these comprise system-wide strategies and programmes of interventions to address safety targets. Interventions cover safer transport and land-use planning, safer road design and operation, safer vehicles, safer road use, and post-impact care. They seek to manage exposure to the risk of crashes, prevent crashes, and reduce crash injury severity and the consequences of crash injury. They comprise safety designs, standards, and rules and well as a combination of activity to secure compliance with these.

Results: In good practice management systems road safety results are expressed in the form of long term goals and interim quantitative targets. Targets specify the desired safety performance endorsed by governments at all levels, stakeholders and the community. To be credible, interim targets must be achievable with cost-effective interventions. Targets are usually set in terms of final outcomes. They can also include intermediate outcomes consistent with their achievement, and institutional output measures required to achieve the intermediate results.

A safety management checklist which addresses these dimensions and which has been developed and applied as an assessment tool by the World Bank in its international road safety work has been used (See Appendix 2). The review has also drawn on new work carried out by the World Bank on institutional arrangements for road safety management.

The safety management system as defined has a number of useful characteristics:

- it is neutral to country structures and cultures;
- it accommodates evolutionary development;
- it works within any given land-use/transportation system;
- it places an emphasis on the production of safety; and
- it takes the road network as its frame of reference and targets the deaths and injuries that are avoidable.

A qualitative review has been carried out of existing and planned road safety activity in Sweden across these three best practice road safety management dimensions: institutional management functions, interventions and results.

While much attention has been given to interventions by the road safety community, it is being understood increasingly that their success or otherwise in achieving results is highly dependent upon the quality of a country's institu-

tional arrangements for road safety.^{2,3} The seven institutional management functions, which are relevant to road safety management both inside and outside government, are depicted in Figure 1 and summarized below. These form the foundation on which a road safety management system is built.

Box 1

Overview of institutional management functions²

Results focus concerns a strategic focus that links all actual and potential interventions with results; analyses what results can be achieved over time; and sets out a safety performance framework for the delivery of interventions and their intermediate and final outcomes (i.e. the level of safety which a country wishes to achieve expressed in terms of visions, goals, objectives and related targets).

Coordination concerns the orchestration of the interventions and other related institutional management functions delivered by main government partners and other key community and business partnerships to achieve the desired focus on results (coordination takes on horizontal and vertical dimensions within a country and also addresses specific delivery partnerships and Parliamentary relations).

Legislation concerns the Parliamentary specification of the legitimate bounds of institutions, their interventions and related institutional management functions, where necessary, to govern through appropriate legal instruments the delivery of all measures required to achieve the desired focus on results.

Funding and resource allocation concerns the financing of interventions and related institutional management functions on a sustainable basis using a rational evaluation framework to allocate resources to achieve the desired focus on results.

Promotion concerns the countrywide and sustained communication of road safety as a core business for Government and society with an emphasis on the shared societal responsibility to support the delivery of the interventions required to achieve the desired focus on results.

Monitoring and evaluation concerns the systematic and ongoing measurement of interventions in terms of road safety outputs and outcomes to achieve the desired focus on results.

Research and development and knowledge transfer concerns research on all factors that may influence road safety outputs and outcomes and on the basis of research findings the development of improved institutional management.

² Bliss A and JM Breen (in preparation, 2007) Institutional arrangements for road safety management: A Manual For Decision-Makers And Practitioners, World Bank, Washington

³ OECD (in preparation, 2007), Meeting Ambitious Road Safety Targets, Paris

2. Main findings

The findings presented in this Section represent a systematic examination of how well Sweden's road safety management system is set to move forward to achieve the ultimate goal of Vision Zero. A more detailed road safety management capacity review is presented in Appendix 1.

The focus is, principally, the management of government institutions which make the dominant contribution. Civil society and business entities are addressed, but within the context of government support, influence or involvement in shared activity towards achieving results.

This review acknowledged, at its outset, that Sweden's road safety management system is in a highly advanced phase of development when compared internationally.

2.1 INSTITUTIONAL MANAGEMENT FUNCTIONS

Focus on Vision Zero Results?

A country's results focus can be taken as a pragmatic specification of its degree of 'ambition' to improve road safety and the agreed means to achieve this. In the absence of a clearly specified focus on results all other institutional functions and related interventions can lack cohesion and direction and the efficiency and effectiveness of safety programmes can be undermined.

Good practice results focus is usually addressed across five dimensions: appraising current road safety performance through high-level strategic review; adopting a far-reaching road safety vision or goal for the longer term; analysing what could be achieved in the shorter term based on an in-depth understanding of crash types and a comprehensive focus on the key risk elements and their interaction; setting targets by mutual consent across the road safety partnership and establishing mechanisms to ensure stakeholder accountability for results.

VISION ZERO: Since the 1950s and early 1960s, when rapid motorization began in many OECD countries, the ambition to improve road safety outcomes has grown. As summarized in Box 2, four distinct phases can be identified in the evolution of this degree of ambition or focus on results with Sweden in the fourth and most advanced phase.

With a long tradition in results management, Sweden has been working since 1997 to its highly ambitious long term goal to eliminate death and serious injury in its road traffic system. Vision Zero has been a key driver of innovation and wider implementation of key interventions. The general focus since its introduction has clearly been leading edge work towards sustainable longer term improvements to save lives and prevent serious injuries into the future. The achievements made in the road network, vehicle system and in work-related safety are substantial and are outlined in subsequent sections

of this review. Vision Zero has provided focus for new engagement amongst stakeholders at employer, professional and practitioner levels. However, as noted by SRA 'the system is far from being designed on the basis of the Vision Zero decision'.

Box 2

The evolving focus on results⁴

As outlined in the World Report on Road Traffic Injury Prevention and the follow up World Bank Road Safety Note have been evident. Since the 1950s there have been four significant phases of development which have become progressively Bank Transport Note progressive shifts in road safety management thinking and practices in high-income countries have more ambitious in terms of the results desired.

Phase 1 - Focus on driver interventions: In the 1950s and 60s safety management was generally characterized by dispersed, uncoordinated, and insufficiently resourced institutional units performing isolated single functions. Road safety policies placed considerable emphasis on the driver by establishing legislative rules and penalties and expecting changes in behaviour by means of information and publicity. Such interventions were generally used in isolation as the main plank of road safety policy to try and persuade users to behave safely, but without much success. It was argued that since human error contributed mostly to crash causation it could be most effectively addressed by educating and training the road user to behave better. It was believed that attitudinal change would lead to behavioural change, whereas research continues to show that sole emphasis on education and training is incorrect. Placing the onus of blame on the road traffic victim acted as a major impediment to the appropriate authorities fully embracing their responsibilities for a safer road traffic system.

Phase 2 - Focus on system-wide interventions: In the 1970s and 1980s, these approaches gave way to increasingly successful strategies which recognized the need for a systems approach to intervention. Dr. William Haddon, an American epidemiologist, developed a systematic framework for road safety based on the disease model which encompassed infrastructure, vehicles and users in the pre-crash, in-crash and post crash phases. Central to this framework was the emphasis on effectively managing the exchange of kinetic energy in a crash which leads to injury to ensure that the thresholds of human tolerances to injury were not exceeded. The focus of policy shifted from the emphasis on the driver in the pre-crash phase to include in-crash protection (both for roadsides and vehicles) and post-crash care. This broadened it to a system-wide approach to intervention and the complex interaction of factors which influence injury outcomes. It underpinned a major shift in road safety practice which took several decades to evolve. However, the focus remained at the level of systematic but separate intervention and did not directly address the institutional management functions producing these interventions, the opportunities to analyse interactions between key risk elements (e.g. roads and vehicles) or for linkage between potential intervention activity to improve the overall results that were desired.

Phase 3 - Focus on system-wide interventions, targeted results and institutional leadership: By the early 1990s good practice countries were using

⁴ Bliss A and JM Breen (in preparation, 2007) Institutional arrangements for road safety management: A Manual For Decision-Makers And Practitioners, World Bank, Washington

action-focused plans with numerical outcome targets to be achieved with broad packages of system-wide measures based on monitoring and evaluation and the development and application of knowledge. On-going monitoring established that growing motorization need not inevitably lead to increases in death rates but could be reversed by continuous and planned investment in improving the quality of the traffic system. The United Kingdom, for example, halved its death rate (per 100,000 head of population) between 1972 and 1999 despite a doubling in licensed motorized vehicles. Key institutional management functions were also becoming more effective. Institutional leadership roles were identified; inter-governmental coordination processes were established and funding and resource allocation mechanisms and processes were becoming better aligned with the results required. Developments in Australasian jurisdictions (e.g. Victoria and New Zealand) further enhanced institutional management functions concerning results focus, multi-sectoral coordination, delivery partnerships, and funding mechanisms. Accountability arrangements were enhanced by the use of target hierarchies linking institutional outputs with intermediate and final outcomes to coordinate and integrate multi-sectoral activities. This phase laid the foundation for today's best practice.

Phase 4 - Focus on system-wide interventions, long-term elimination of deaths and serious injuries and shared responsibility: By the late 1990s, two of the best performing countries had determined that in the longer term surpassing the ambitious targets that had already been set would require rethinking of interventions and institutional arrangements. The Dutch Sustainable Safety and Swedish Vision Zero strategies re-defined the level of ambition and set out a goal to make the road system intrinsically safe. The implications of this level of ambition are currently being worked through in the countries concerned and elsewhere. These strategies recognize that speed management is central and have refocused attention on road and vehicle design and related protective features. The 'blame the victim' culture is superseded by 'blaming the traffic system' which throws the spotlight on operator accountability. For example, in Vision Zero the aim is for a model of shared responsibility and accountability for road safety in which vehicle design delivers a protected occupant into a road system where conflict is minimized by design and energy transfer in crashes is controlled as far as possible. In this system, users comply with risk-averse behavioural norms created by legislation, education and enforcement. The emphasis is on road users' right to health in the transport system and to demand safer systems from decision-makers and road and vehicle providers. This Safe System approach has influenced strategies in Norway, Finland, Denmark, Switzerland and Australia.

Today the global view is that road safety is a system-wide and shared multi-sectoral responsibility which is becoming increasingly ambitious in terms of its results focus. Sustaining the level of ambition now evident in high-income countries requires a road safety management system based on effective institutional management functions that can deliver evidence-based interventions to achieve desired results. Achievement of the ultimate goal of eliminating death and serious injury will require continued application of good practice developed in the third phase of targeted programs coupled with innovative solutions which are yet to be determined based on well-established safety principles.

INTERIM TARGETS: The current interim quantitative target is to reduce deaths by 50% by the year 2007 (compared with 1996 levels). It was mandated by Parliament in 1997 together with Vision Zero. In its last Annual report, the SRA noted 'the rate of fall is too slow, viewed in relation to the interim goal for 2007'. *

While there have been 70 fewer deaths annually since 1997, the interim target will not be met. The national interim targets are disaggregated regionally with each region required to reduce deaths by the same proportion as the national target. Municipal targets have been set in several cities and municipalities including Stockholm and Göteborg.

In 1999, an 11 point plan was presented by the Swedish Ministry of Industry setting out measures to address the interim target. The effects of these measures were assessed by the SRA in 1999 who concluded that the 11 point programme would not be sufficient to realise the target set for 270 fatalities in 2007. Since 2000, there has been very significant road safety activity but no subsequent published plan of specific and agreed multi-sectoral casualty reduction measures has been implemented to address the 2007 target.

In the last three years, progress to achieve the interim target has fallen short. Following continuous monitoring and evaluations by SRA and a critical evaluation of the 1999 11 point plan in 2004 by the Traffic Inspectorate, collective awareness of the need to obtain adequate levels of government involvement and commitment to focus on short term improvements (especially improved road user compliance with key safety rules) has developed.

Short term gains can be expected from conventional interventions derived from national and international best practice, while improvement of the protective features of the network and the vehicle fleet will bring big benefits in the longer term. In this respect, saving life in the shorter as well as the longer term can be considered an issue of equity.

LEAD AGENCY ORGANISATION: The Swedish Roads Administration has been the lead agency for road safety since 1993 and has established an international reputation over the years for enlightened road safety leadership. Road safety is one of six SRA road transport policy goals and is integrated into a long term sustainable transport policy. A Director of Safety forms part of the Director-General's senior management team. Before 2002, a single organisational unit existed for road safety. Since then road safety functions have been distributed amongst a number of sections within the Society and Traffic Department e.g. in the road user section which comprises around twenty people. Stakeholders both within and external to the SRA have identified benefits of change (e.g. the successful representation of road safety interests at a high level in the organisation). However, they mainly report disbenefits with this recent arrangement (e.g. road safety functions being distributed amongst different sections in SRA leading to reports of reduced internal cohesion, coordination, focus and activity on road safety in Sweden compared with previous years). Some consider that the benefits of integra-

* SRA Annual Report 2006, Borlänge

tion, justify this expressed difficulty.

The current discussion of the organisation of transport in Sweden presents an opportunity to strengthen lead agency functions, structures and processes for road safety to achieve Sweden's long term goal and interim targets.

MULTI-SECTORAL ACCOUNTABILITY: There is wide acknowledgement of the need for shared responsibility and multi-sectoral delivery across the transport system to realise the highly ambitious national goal of Vision Zero. However, while occupational legislation underpins the responsibilities of employers, the shared multi-sectoral road safety responsibilities of different governmental stakeholders for Vision Zero are not formally defined either in legislation, annual instructions and performance agreements or in any road safety strategy, although a formulation was proposed by the SRA in 2003. While the Ministry of Enterprise, Energy and Communications is responsible to government for road safety, the sectoral lead agency responsibility lies with the SRA, which is the only governmental organisation which takes on formal accountability for quantitative road safety targets. While the health sector has most to gain from the achievement of Vision Zero, the Ministry of Health is notable by its lack of engagement in the road safety effort. While the National Police Board has recently implemented a national police traffic safety strategy (April 2006), their annual instruction from the Ministry of Justice makes no reference to road safety or traffic policing and there is a serious lack of central traffic policing capacity and enforcement partnerships are in their infancy.

It is likely that the lack of agreed and clearly specified responsibilities for actions necessary to achieve the 2007 target across agencies is one outcome of the absence of senior level government road safety management arrangements and shared responsibilities throughout the sector across the agencies.

TARGET-SETTING: The Government has asked the SRA to propose a new interim quantitative target by the end of the year (2007) and work is currently in progress towards this end. The exact methodology of the new target-setting has not yet been defined but it is understood that stakeholder Declarations of Intent may be used to determine the path to agreed intermediate outcome targets on an annual basis. The path envisaged for maximising contributions from the non governmental and business stakeholders is supported and SRA's efforts to date with these sectors have been world-leading. However, for contributions for the governmental agencies, an agreed rolling annual action plan by a new high-level inter-departmental coordinating body would help to direct effort towards meeting any agreed intermediate outcome targets, based on available research and evaluations, knowledge and judgement.

Most stakeholders believe that the new interim target should be challenging but demonstrably achievable. The sum of good practice suggests that this should involve a target-setting process which took due account of problem analysis, future long-term casualty, traffic and demographic trends, scenario planning, computer modelling, analysis of cost-effectiveness and

public acceptability of system-wide measures as well as other institutional management considerations such as the availability of resource. Typically, working papers analysing the effects of a range of countermeasures are developed and published to inform target-setting and strategy development. Headline targets would be backed up by intermediate outcome targets and a published multi-sectoral strategy and plan of agreed targeted outputs which address the highest risks in the system to save lives and prevent disability in the short term, as well as continuing to enact longer term solutions.

HIGH-LEVEL PERFORMANCE REVIEW: There does not appear to be regular high level performance review by the Government or Parliament of multi-sectoral progress with Vision Zero or targets. However, final and intermediate outcomes are monitored against targets and reported on an annual basis by the SRA, the Swedish Institute for Transport and Communications Analysis (SIKA) and the Road Traffic Inspectorate, who also report on suggested improvements on the basis of specific studies and investigations. The research sector in Sweden and abroad (e.g. VTI and TOI) is also engaged in aspects of current performance review. The current independent peer review of road safety management capacity in Sweden was commissioned by the SRA in 2007. At local level a special road safety audit for the road safety plans of municipalities was introduced in 2006 by the Swedish Association of Local Authorities and Regions. To date, around 30-35 municipalities have been assessed using this methodology.

Conclusions on findings on Vision Zero Results Focus:

The new 'results focus' is clear and unambiguous but its 'ownership' is fragmented and variable.

Recommendations

(1) Strengthen lead agency arrangements: New arrangements for transport organisation in Sweden present an opportunity to review and strengthen appropriate lead agency functions, organisational structures and processes. These should address the effective development and operation of the key institutional management functions (which are also relevant to road safety management outside government) towards the delivery of well-orchestrated and funded multi-sectoral intervention to achieve Sweden's long term goal and interim targets. Specifically these functions include: results focus, safety coordination, safety funding, safety legislation, safety monitoring and evaluation, safety promotion and safety research and development and knowledge transfer. It is recommended that an appropriately resourced road safety strategy unit be established urgently within the lead agency.

(2) Specify multi-sectoral responsibilities and accountabilities across government for Vision Zero: It is recommended that consideration could be given to improving whole governmental accountability for road safety. In particular, the shared responsibility for Vision Zero amongst (1) governmental

stakeholders – Enterprise, Health, Justice, Education, Municipalities and their agencies- and (2) system providers – road system, vehicle providers, emergency medical system providers and users - could usefully be set out either in legislation and/or a Memorandum of Understanding or in a road safety strategy policy document. It is further recommended that internal reviews be carried out of Agency/ Ministry management capacity to deliver these responsibilities.

(3) Ensure next interim target is challenging but achievable: Informed by the substantial body of good practice interim target-setting experience which exists nationally and internationally (particularly in Australasia) link interim outcome targets, intermediate outcome targets and annual institutional output targets as a framework for the national road safety strategy and plans. Use trend forecasting of exposure and key risk factors and model potential outcomes of specified activity and implementation arrangements to ensure interim targets are challenging but achievable. Document all assumptions and calculations made.

(4) Review multi-sectoral performance regularly: It is recommended that, in addition to annual performance review of outcomes, a comprehensive high-level multi-sectoral review of performance in meeting Vision Zero and interim goals is carried out every three years by Government (in a new high level coordination body - see below) and Parliament. This would review results, interventions and institutional management arrangements as the basis for revised three year action plans. Given the multi-sectoral nature of road safety, Parliament should give consideration to establishing a periodic joint hearing of the Transport, Health, Justice, Education and Employment Committees to review progress.

Coordinating Vision Zero?

HORIZONTAL COORDINATION: Within SRA, three organisational entities deal with the coordination of interventions, each having its own small secretariat situated within the SRA. These comprise:

- the SRA's Director General's Advisory Council on Road Safety which is a high level group of 7 governmental and non governmental stakeholders and which meets twice a year. It was set up as a personal advisory group to the Director-General with members invited on an individual basis rather than representing organisations;
- the National Coordination Assembly (NCA) has 8 members (Ministry of Enterprise, Energy and Communications, Swedish Association of Local Authorities and Regions, National Society for Road Safety, National Police Board, Swedish Work Environment Authority, Folksam, Toyota Sweden AB, Swedish Road Administration), brings together 15-20 people and meets 6 times a year. The aim is "to share knowledge and coordinate the activities of key players with the intention of making Vision Zero a reality". A NCA steering group acts as a reference group for proposals for the new interim target;
- the National Road Safety Assembly (started in 2002 at the instruction of the Swedish Government) brings together a very broad group of stakeholders (about 40 – road user and transport industry stakeholders are pro-

minent) at national (3 meetings a year) and regional levels. The Assembly works in specific areas: speed, drinking and driving, seat belt use, children and young people in traffic and two wheeled motor vehicle crashes and reports over 3000 individual activities.

These coordination bodies are perceived as useful platforms for sharing knowledge, discussing countermeasures and stimulating stakeholder contributions rather than decision-making or results-led bodies. They do not involve those who take final decisions on budgets across all the responsible governmental sectors, policies or legislative developments. Notwithstanding the Swedish tradition to date of small Ministries, there is an absence of inter-Ministerial governmental engagement and coordination at national levels to achieve Vision Zero goals and targets. Those who take final decisions on budgets, policies and legislative developments across all the responsible governmental sectors do not seem to be communicating with each other in a systematic way as in other areas of public policy in Sweden. Many key stakeholders view this as a serious weakness in current arrangements inhibiting policy development and budgets for both the road safety strategy as a whole as well as for individual measures.

VERTICAL COORDINATION: The seven regional SRA offices are expected to prepare long term strategies in support of targets with reference to long term SRA strategic guidelines and annual 'instructions'. The main road safety engineering programmes for state roads are defined at national level. In 2007, the National Police Board started to coordinate the national road safety policing strategy with the 21 autonomous county police authorities. There is variability in the regional and local response to national issues. The SRA at national level has developed a strong working partnership with the Swedish Association of Local Authorities and Regions and the National Police Board. Efforts are being made to improve coordination and encourage activity.

GOVERNMENTAL DELIVERY PARTNERSHIPS: SRA has established strong bilateral partnerships with governmental agencies, safety, user organisations and the business sector at regional and national levels, most of who are engaged in the coordination bodies. These include partnerships to pursue specific interventions with the Swedish Work Environment Authority aimed at safer work-related travel including the development and adoption of in-house safer travel policies; more recently between SRA and the police at national level, in particular, involving formal contractual agreements and booster funding for enhanced enforcement activity on drinking and driving and speed camera deployment; and the road safety research sector.

ENGAGING ELECTED REPRESENTATIVES: Parliament and its Committee on Transport played a key role in the adoption of Vision Zero nationally and the establishment of the 1997-2007 interim targets. While there have been hearings on road safety in which organisations such as the National Road Safety Assembly have participated, there does not appear to have been regular and formal Parliamentary engagement on road safety outside

legislative discussions. The Swedish Association of Local Authorities and Regions has distributed a specially produced guide *One Moment*, funded by the SRA, to increase awareness of the key road safety issues and principles involved in Vision Zero amongst locally elected representatives.

ENGAGING NON GOVERNMENTAL AND BUSINESS SECTORS:

This sector is very actively engaged in Sweden and well-supported by SRA - the assiduous National Society for Road Safety is a case in point. The SRA has also established important working relationships with the Swedish Association of Abstaining Motorists to promote countermeasures aimed at reducing drinking and driving and the Swedish Automobile Association to establish and promote EuroRAP. SRA has also actively and successfully engaged with the business sector. Together with the Swedish Work Environment Authority and other stakeholders it has worked with transport industry groups towards specific outcomes. SRA has also worked successfully with national car and truck and insurance industries to fast-track the fitment nationally of key technologies e.g. seat belt reminders, alcohol interlocks and electronic stability control.

The international coordination and cooperation activities of the SRA and Ministry of Enterprise Energy and Communications (MoEE&C) are world-leading. At European level, the MoEE&C is represented on the European Commission's High level Group for Road Safety. The SRA represents Sweden in the negotiations on vehicle standards. The SRA was a founding member of EuroNCAP which is currently chaired by the SRA Director of Safety. It has also been active in providing key technical effort for EuroRAP. SRA also supports specific activities of the Brussels-based European Transport Safety Council.

Conclusions

There is an impressive array of coordination mechanisms but their objectives lack sharp definition with respect to the new 'results focus'.

Recommendations

(1) Strengthen horizontal inter-governmental engagement at senior level

on results: It is recommended that a multi-sectoral intergovernmental group is set up to engage key ministries in a) agreeing national governmental interim targets, b) the strategy and programme for road safety, and c) any legislative and budgetary implementation of strategy needs and other key management functions (See Appendix 3). The stakeholders would include: the Ministry of Enterprise Energy and Communications (MoEE&C), Ministry of Justice, Ministry of Health, Office of the Prosecutor General, SRA and the National Police Board at Chief Executive/Secretary level supported by a senior management group comprising the Swedish Roads Administration, the National Police Board, the Work and Environment Authority and the Institute of Public Health (and key stakeholders including Local and County Government, Ministry for Education, the NTF and the National Board for Health and Welfare from time to time as neces-

sary). The management group would in turn be supported by technical working groups and stakeholder reference groups. A dedicated and funded coordination secretariat will be necessary in the lead agency. The Road Traffic Inspectorate would also attend the CEOs' meetings and the management group meetings from time to time to discuss specific current issues and to input latest information about their review processes.

(2) Strengthen Parliamentary engagement: It is recommended that Parliament give consideration to establishing regular joint road safety hearings involving the Transport, Health, Justice, Education and Employment Committees.

(3) Strengthen vertical delivery partnerships: It is recommended that coordination arrangements between central, regional and local governmental levels for roads and policing forces, be periodically reviewed and developed further in support of the developing strategy and new targets. Stronger enforcement partnerships for all regions are recommended to improve the deterrent effect of policing.

Legislating for Vision Zero?

A comprehensive legislative framework for road safety has developed over the last 50 years. Of particular note is that Sweden has mandated its ambition for road safety in legislation and has the combination of the lowest blood alcohol limits and rural speed limits in Europe (with recent legislative approval for an updated classification). In 2005, the compulsory use of bicycle helmets for children under 15 was introduced and there has been recent attention to upgrading penalties for key offences (2006). A new long term strategy for the implementation of alcolocks has recently been published (2007). Existing but under-used legislation is currently being studied in support of road safety implementation e.g. occupational health and safety legislation.

Notwithstanding these very positive developments, government processes for regular review, adjustment and development of supportive multi-sectoral legislative initiatives for road safety do not appear to be sufficiently well-aligned with the needs of the short term targets and the longer term goal. There remains considerable scope for better alignment of legislation with Vision Zero and interim target needs in several important areas. These include definitions of shared institutional responsibility for Vision Zero and an increase in the age of access to moped use which have been proposed by the SRA but not yet taken up. There is an opportunity, in particular, for provision of a more supportive legislative framework for deterrent policing to aid compliance with safety rules.

Conclusions

Legislation is mature and comprehensive but it is not well aligned with the new 'results focus'.

Recommendations

(1) Formally specify institutional roles, responsibilities and accountabilities for Vision Zero.

(2) Further review road traffic legislation to better align it with road safety goals and interventions needed to realise them. E.g. consideration could be given prohibiting use of mopeds during disqualified car driving; reviewing graduated driver and rider licensing and the age of access (particularly for riders); the use of hand held mobile telephones while driving and mandatory good practice road safety audit.

(3) Enhance the enforcement to improve 'general deterrence' effects. E.g. consideration could be given to introducing a usable penalty points system; owner liability for speed camera offences; automatic number plate recognition; addressing any perceived limitations on enforceability by police (including concerns about evidentiary requirements); courts' perception of speed in 'careless driving' offences; mandatory interlocks for alcohol offenders.

Funding Vision Zero?

As in most other European countries, road safety in Sweden has to compete with other areas of expenditure and levels. Funding to SRA for road safety engineering activity has increased substantially since the introduction of Vision Zero, especially in recent years.

As in many other European countries, financial resource for road safety comes largely from general national and local tax revenues. In 1999, funding to the SRA was doubled with a total of SEK 8.5 billion to be made available for road safety over 10 years. An increased and earmarked allocation was made to allow resource for physical road safety measures such as roads with median cable barriers, safer intersections and road shoulders. The most recent annual expenditures by SRA on road safety include: approximately SEK 1.8 billion spent on infrastructure safety projects (2+1 treatments), with approximately SEK 80 million provided to police for operation of the speed camera programme, approximately SEK 200 million spent on other road safety programmes and some SEK 150 million spent on road safety research. SRA has directly funded a range of activity which is key to national goals such as police enforcement and used ring-fenced funding to encourage specific road safety activities. Ring-fencing has also been used locally. For example, in Göteborg, the Traffic and Public Transport Committee has ring-fenced annual road safety funding. In the Göteborg agreement national funds were specifically allocated for road safety improvements.

The Swedish Work and Environment Authority report a 30% reduction in overall budget which may reduce its ability to contribute to work-related road safety. This is a significant concern, given their effectiveness in achieving major work related road safety improvements. Human and financial resource for traffic policing is an urgent issue for the National Police Board and the Ministry of Justice.

The forthcoming changes in the road injury insurance provisions (transfer of lost income and rehabilitation transfer from social security system to insurance) open up new opportunity for further investment which is transparent and potentially commercially attractive. Stakeholders believe that this is likely to lead to greater premium differentiation according to individual road risk (vehicle type, driver age, offence history, crash history) in future due to the enlarged scope of the schemes. The increasing injury problem associated with two wheeled motor vehicles is particularly pressing. The Swedish Insurance industry is involved in several key areas of road safety activity and is notable for its concern that evidenced-based approaches are supported.

While Vision Zero is not bound by the traditional model of providing road safety at reasonable cost, decisions are being made in Sweden based on cost which affect road safety, especially in short term work. However, estimates of the value of preventing death and serious injury are not made annually, nor are cost-benefit analysis or cost-effectiveness analysis used widely in resource allocation for road safety work in the public sector.

Conclusions

Road funding for infrastructure safety measures has been substantially increased but across partnership agencies funding levels are not commensurate with the new 'results focus'.

Recommendations

(1) Make appropriate funding commitments to all partnership agencies:

It is recommended that the key governmental Ministries with road safety responsibilities (Enterprise, Justice, Health, Education, Employment) at central, regional and local levels should make annual provision for road safety expenditure in their budgets. Human and financial resource for traffic policing is a particularly urgent issue. In view of the importance of Sweden's leading edge work-related safety activity for Vision Zero, it is recommended that the human and financial resource directed at work-related road safety is ring-fenced in the work of the Swedish Work Environment Authority.

(2) Use cost benefit analysis to underpin future resource allocation

decisions: In order that road safety can compete with other areas of activity successfully (e.g. in police work), it is recommended that annual estimates are adopted by the Government of the value of preventing death and serious injury and the total socio-economic cost of road crashes. It is also recommended that cost-effectiveness and cost-benefit analysis is used as widely as possible in road safety resource allocation at national and local levels. It is recommended that the successful practice of ring-fencing annual funding for road safety engineering and enforcement projects be continued.

(3) Explore further opportunities for insurance industry investment:

Against the background of forthcoming changes in insurance, opportunities for investment for the insurance industry should be jointly explored (some countries require 10% of premiums to be invested in a road safety fund). Commercially attractive road safety investment programmes for insurers, supported and facilitated by the Government, need to be explored and developed.

Promoting Vision Zero?

The promotion of road safety and the shared responsibilities of the road administration, police, regional and local government, employers, and business through Vision Zero and work-related road safety strategies is world-leading and has been particularly effective at global level. The promotion to the road-using public of their shared responsibilities in complying with system standards and rules has been less successful.

Led by SRA, the use of in-house safety policies by key governmental and non-governmental stakeholders has provided leadership by example in work-related safety. A range of stakeholders are actively engaged in the promotion of Vision Zero to responsible organisations through the National Assembly and other bodies. The safety rating of safety products and services is used as a key mechanism for communicating information to professionals and motorists by their representative organisations. Insurance industry development and promotion of safety rating activity is world-leading.

While annual public opinion tracking indicates continuing support for a range of interventions, there is a lack of regular public advocacy on road safety. In the absence of open and ongoing public policy debate, there can still be political and societal acceptance, in practice, of high numbers of deaths and injuries on the road network irrespective of the mandated Vision Zero. A number of stakeholders believe there is a lack of public awareness/discussion about road safety issues in the community and believe more could be done to respond to unhelpful media. This is especially apparent in relation to speed management, a core issue for Vision Zero, where efforts to combat uninformed or hostile media journalism on a continuous basis are needed. A stated strategy of the Traffic Inspectorate has been to maintain a relatively low profile in the media in which it has been successful. With one or two exceptions, the research sector does not appear to be as active as in other countries in promoting research-based problems and solutions in the media. Vision Zero is a global ground-breaking success story which needs to be fed back to the nation. The essence of promotion should continue to address the ethical issue, which provides appropriate context for promoting the shared responsibility of users and, in particular, the crucial issue of speed management.

Conclusions

The promotion of the new 'results focus' has been effective, especially at the global level, but central elements of the 'safe system' model are still misunderstood or inadequately defended.

Recommendations

(1) Reposition road user 'compliance' obligations: To address political and societal acceptance of high numbers of deaths and injuries on the road, it is

suggested that a multi-sectoral communication strategy should be drawn up to explain limits of current protection in the road system better and promote different interventions - especially speed management. Highlight shared responsibilities. Engage the community in monitoring performance indicators to open up the safety debate.

(2) Broaden advocacy roles: It is recommended that the research sector as well as the Inspectorate, re-inforce their roles as sources of impartial information on road safety and strengthen their advocacy and promotional efforts in support of Vision Zero.

Monitoring and evaluating Vision Zero?

Sweden has a long tradition in monitoring and evaluation of road safety. This, in general, is carried out comprehensively by the lead agency (at national and regional level), the Swedish Institute for Transport and Communications Analysis (SIKA), the Road Traffic Inspectorate (since 2003), research organisations, the municipalities and independent experts from home and abroad (See Box 3).

A wide range of performance indicators are used to measure safety outcomes. The SRA is currently working on further parameters for measuring future Vision Zero performance. SRA is making good use of EuroNCAP and EuroRAP rating systems in assessing network and vehicle safety performance. Representative speed monitoring across the network in recent years is notable for its limited presence, given the central importance of speed and its management in Vision Zero.

At local level, a special road safety audit for the road safety plans of municipalities was introduced in 2006 by the Swedish Association of Local Authorities and Regions and around 30-35 municipalities have been assessed. The development and use of safety performance indicators in Sweden is world-leading. SRA is currently working on further parameters.

The establishment of the Road Traffic Inspectorate in 2003 is a world-leading initiative. Its tasks include the monitoring and analysis of conditions that could substantially affect the design and functioning of the road transport system through taking a holistic view of the road safety goals adopted by public authorities, municipalities and others. The Inspectorate has engaged fully with the governmental stakeholders who are involved in the day to day management of road safety, particularly against the background of shared responsibilities being ill-defined. As noted by the Road Traffic Inspectorate itself, while the Inspectorate enjoys a large degree of independence, the entirely independent position that was initially intended has not been created. The positions adopted by the Inspectorate confirm the organisation's independence (although it is part of SRA and reports to its Board) resulting in a healthy tension between the Inspectorate and key stakeholders. However, the Inspectorate's communication strategy and wider advocacy seems to have been consciously limited.

The Road Traffic Inspectorate noted in 2007, that clear follow-up of traffic safety work in some areas is largely absent at present to the extent required. The absence of fully representative data since 2004 either nationally or locally on average speed is one example. In some areas systems are being under-utilized in this respect in e.g. availability of data in hospital trauma registries, STRADA, data from rear seat belt monitoring, and institutional performance (e.g. Declarations of Intent).

Box 3

Summary of monitoring and evaluation systems in Sweden

Vehicle and driver registries: The Traffic Registry and the Driving Standards Division of the SRA are profit centres that work within the framework of law and regulations. The units are responsible for the road traffic registry, driving licence system, and driver testing and supervision of examiners.

Final outcome data systems: The lead agency conducts extensive final outcome monitoring at national and regional levels which are analysed and published annually in a comprehensive SRA annual report and by the Swedish Institute for Transport and Communications Analysis (SIKA) which is also involved in policy monitoring.

Serious injury is currently being re-classified to better align with the measurement needs associated with reduction of serious public health loss as set out in Vision Zero.

The recently established Swedish Traffic Data Acquisition (STRADA) system aims to link medical and police data on serious and fatal crashes to identify levels of under-reporting. From January 2003, all police register crash reports in STRADA but only around 60% of hospitals currently do so.

Trauma registries exist in Swedish medical establishments, but it is understood that data is not necessarily analysed.

Intermediate outcome data systems: An extensive system of performance indicators is used by the SRA against which annual progress is monitored and communicated in annual reporting. The SRA states that parameters for a safe system have not yet been fully developed.

Since 2004 the detailed measurement of average speeds which are nationally, locally or regionally representative has been discontinued and replaced with use of data from the fixed camera sites and 80 other fixed locations not at the camera sites. SRA is of the view that the further rollout of cameras will provide the necessary information.

Sweden has an excellent monitoring system for fleet safety standards by using predictive car safety ratings (Euro NCAP) and retrospective ratings (Folksam Car Safety Rating). Folksam publishes safety ratings of used car crash performance every two years.

The quality of the Swedish rural road network is being assessed according to

EuroRAP and reported by SRA and the Swedish Motoring Association (Motormännens Riksförbund). In February 2004, Sweden was the first country in Europe to begin the classification of roads according to the EuroRAP rating score.

OLA system: SRA has been conducting in-depth investigation into all fatal crashes since 1997. In 2003, SRA was given the responsibility of carrying out in-depth studies of all road traffic crashes. The OLA method was introduced into road safety work at national and regional levels within SRA in 2001. This is a working approach where system designers work together to try to provide solutions to common problems – objective/solutions/action.

A University of Lund study for the Road Traffic Inspectorate in 2005 carried out a review of the SRA's in-depth studies of all fatal crashes and its work in respect of OLA. The Inspectorate concluded in 2006 that the National Assembly project, now renamed Joint Campaign for Road Safety Year 2007, has been given well-defined goals and a clear organisation by SRA. However, there is no evaluation or analysis, as yet, of the extent to which these areas contribute to the road-safety goal. It is recognised that the declarations of interest by stakeholders do require active monitoring. SRA is moving to provide an increased focus on measurement of levels of achievement.

There have been concerns expressed about whether the outcomes of OLA in terms of crash causation and risk are being applied to designing the overall system in a different (safer) way. While every fatal crash is now investigated in-depth, the quality of the investigation is reported to be variable there is, as yet, no national standard methodology in use nor much aggregate analysis of the annual fatal crash sample.

Public opinion tracking is carried out annually by the SRA.

Institutional outputs: There is little or no monitoring or evaluation of declarations of interest by stakeholders. At local level, the Swedish Association of Local Authorities has identified and promoted a methodology for the evaluation and star rating of local road safety plans. These are carried out increasingly (some 30-35 municipalities have been rated) in some cases with partial subsidy by the SRA regional offices.

Road haulage industry: Swedish trade unions in cooperation with environmental and road safety organisations have developed a ranking system for heavy goods transport. This ranking system is called Q3 and is modelled on Euro NCAP. It is based on working environment, environmental and road safety requirements (<http://www.q3.se/>). While the system has limited coverage to date, it is becoming well accepted and is considered a worthwhile initiative.

Road safety inspection: The National Road Traffic Inspectorate was established in 2003. The Managing Director of the Road Traffic Inspectorate reports directly to the Board of the SRA, and otherwise has a separate annual budget, programme and decision-making hierarchy. It has sixteen staff members and an annual budget of around 20,000,000 SEK (\$US 2.6 million). The tasks of the Inspectorate are as follows:

- To monitor and analyse conditions that could substantially affect the design and functioning of the road transport system through taking a holistic view of the road safety goals adopted by public authorities, municipalities and others.

- In dialogue with the stakeholders referred to above, work to ensure that they apply a systematic procedure to prevent road accidents that result in death or serious injury.
- To cooperate with other stakeholders to improve traffic safety on roads.
- To initiate research and development within the road safety sector and monitor research of importance to the operations at the Inspectorate.

Conclusions

Monitoring and evaluation builds on a long tradition of measurement and analysis but it lacks integration and follow through with respect to the new 'results focus'.

Recommendations

(1) Separate organisation of regulation and inspection functions in line with international good practice.

(2) Establish the Road Traffic Inspectorate as an independent body to achieve a higher profile than to date and promote Inspectorate reports amongst policymakers, Parliamentarians, stakeholders and media.

(3) Improve measurement procedures and their systematic coverage E.g. Review trauma registries periodically for better information on road traffic injury outcomes; take high-level action with regional and local governments to engage more hospitals in STRADA; ensure new data collection process provides for representative measurement (nationally, regionally and locally) of average speeds to provide a baseline for speed management and to monitor the effectiveness of outputs; record vehicle maker and model in national crash injury database to assist crash research and ratings; and actively apply findings of OLA programme, further develop methodology and publish periodic aggregate analysis of the outcomes.

Research, Development and Knowledge Transfer of Vision Zero?

Sweden has a long and internationally recognised tradition in road safety research. A recent VINNOVA report carried out by the Institute for Transport Economics in Oslo (TOI) has confirmed that research has had a major impact on Swedish road safety policy development and road safety results. Achieving Vision Zero will require innovative measures which are not yet determined based on well established safety principles.

VINNOVA and the SRA are the two national governmental agencies which provide government funding for road safety research. A number of research funding organisations were amalgamated in 2001. There is a large budget for road safety research. A large variety of organisations – both from Sweden and abroad (e.g. TOI and Monash) - engage in national as well as EU-funded

research. These include the Swedish National Road Research Institute (VTI), Folksam Research, Chalmers University of Technology, and the Universities of Lund and Uppsala.

At the same time, there is no published road safety research and development programme and little evidence of regular coordination both for short term and long term research needs for Vision Zero. Major resource is going into vehicle technology and industry-led programmes. It is not clear, however, to what extent the programmes under development address known problems and can contribute significantly to Vision Zero. A joint SRA/industry working group has been established to examine the potential benefits of new technologies under development.

The SRA maintains a 'total effect' catalogue (last updated in 2000 and currently being further updated) which outlines the effectiveness of different road safety measures. The Swedish Association of Local Authorities and Regions has been successful in communicating a wide range of good practice to practitioners in the municipalities for the implementation of Vision Zero strategies e.g. Calm Streets (1998), and to elected representatives e.g. One Moment. It is currently producing a catalogue of proven cost-effective local measures. The SRA has also funded demonstration projects such as En Route to Vision Zero at Trollhättan to illustrate how Vision Zero can work in practice.

Conclusions

Research and development and knowledge transfer is well supported and remains productive but linkages to the new 'results focus' remain unclear.

Recommendations

- (1) Review the 2001 research reforms for effectiveness** of policy development, coordination and funding for road safety research.
- (2) Prepare multi-disciplinary 'safe system' national R & D strategy** in support of Vision Zero and interim target.
- (3) Establish multi-disciplinary advisory** panel to contribute to annual review of research needs.
- (4) Lead agency and professional organisations** continue to actively develop tools for knowledge transfer based on good practice covering all safety elements of the road traffic system.
- (5) Establish a small international advisory** panel to ensure regular access to international best practice.

2.2 INTERVENTIONS

Vision Zero requires high levels of safety performance of the road network as well as the enhanced safety performance of the vehicles and people who access the network. Speed, the management of kinetic energy and the separation of users above injury thresholds are major system design parameters. While the Vision Zero strategy is principally directed at system providers, ensuring safe user compliance with system rules by a variety of means is seen, increasingly, as a key element of the strategy. Achieving the goal of eliminating death and serious injury will require continued and wider application of national and international good practice in intervention, together with further innovative solutions which may need to be determined.

The review looked at the system-wide range of strategies - crash prevention, crash protection, and post crash care - and interventions to achieve results: planning, design and operation of the road environment; conditions of entry and exit of vehicles and road users to the road environment and the recovery and rehabilitation of crash victims in the road environment.

Vision Zero design and operation of road network and compliance?

Since the introduction of Vision Zero, a significant amount of innovative safety engineering work has taken place introducing barriers on sections of rural roads, replacing signalised junctions with roundabouts and implementing 30km/h urban speed zones (particularly in residential areas). For example, traffic calming in Göteborg has resulted in a large reduction in the numbers of deaths and serious injuries and a socio-economic benefit of more than 47 times the direct costs*.

In Vision Zero, speed management is central and speed limits need to be set in accordance with human tolerance thresholds: 30 km/h combined with physical measures on residential roads where vehicles and vulnerable road users freely mix and 50 km/h combined with the use of roundabouts on roads with intersections which allow possible side impacts between vehicles. On roads of 70 km/h and above which allow possible frontal impact between vehicles, median barriers are provided.

In approving SRA's recommendations in 2007 for a new speed limit classification (limits in 10 incremental bands in the range of 30km/h – 120km/h), the Government has stated recently that road safety needs to be at the core of decisions on the setting of speed limits. SRA is developing a system where network speed limits will be based on EuroRAP road protection scores. The Inspectorate has recommended a new safety standard for roads based on the EuroRAP classification. Since the late 1990s over two thirds of municipalities have implemented 30km/h speed zones mainly in residential areas. The Road Traffic Inspectorate (Annual Report 2006), however, points to "a clear conflict of interest between a safe traffic environment and public demands for accessibility in the three largest municipalities" on the main road networks where 30% of deaths in municipalities occur.

* Traffic safety development in Göteborg, VTI, 503-2004

Speeding remains a socially acceptable behaviour in Sweden. More than half of all traffic exceeds the speed limit on state roads and the risk of being caught for speeding is small. More than two thirds of drivers speed on 50 km/h state roads. Heavy goods vehicle drivers exceed the speed limit for about three-quarters of their work-time. There is a widespread belief amongst stakeholders that there is an inadequate police presence for speed detection and that a broad communications, police enforcement and technology strategy is needed to reach out to the Swedish public. It is understood that an announcement was made to the media by the police in 2007, that speed checks would only be conducted by use of automatic speed camera equipment.

April 2006, the threshold for reporting speeding in speed checks was revised to 6 km/h above the limit in line with the new police strategy. Road safety cameras started operation in 1999 and are managed in a joint venture between the SRA and the Police. By the end of 2006, more than 700 cameras have been implemented covering 1900 kilometres of the road network resulting in 16 fewer deaths annually. Monitoring has shown that average speed has dropped by 8% on roads equipped with cameras and that the camera system has been positively received by the general public. Together with other parties, the SRA is studying appropriate conditions for the installation of road safety cameras on local authority roads. The need for monitoring representative free speeds on the network (not just at speed camera sites) has been mentioned previously.

The Vision Zero strategy also requires facilities to separate users at speeds which are above injury thresholds and protective roadsides to reduce the consequences of car crashes from the road network. Since 1998, there has been a large programme of installation of median cable barriers, creating separated traffic on wide roads with 2+1 lanes to address the problem of head on collisions. However, these only comprise high volume roads. Some 38% of traffic flow on rural roads with a speed limit of 70km/h or greater is now divided (median barrier separated). By the end of 2006, more than 3500 kilometres of roads have separated traffic flows and 1500 kilometres of these have 2+1 barriers. Around 25% of the state network is designed to prevent head on collisions. The SRA strategic plan for 2008-2017 indicates that this work is set to continue. Over two thirds of municipalities have embarked upon separated vulnerable road-users from motor vehicle traffic by more bicycle lanes and pedestrian crossings utilising the Calm Streets guidelines.

Currently, road network standards are set out in a national design manual which is reported to be continuously updated. Road safety engineering guidelines are developed and disseminated by the SRA and Swedish Association of Local Authorities. At present, road safety engineering investment on national roads is directed at high volume roads.

Safety audit is not mandatory, though it is in general practice, but not conducted independently of the design group. The Road Traffic Inspectorate periodically review aspects of road safety engineering. According to the Road

Traffic Inspectorate, insufficient attention is being given to safety at the planning stage of projects.

EuroRAP assessments are being carried out on the road network. The rural road network is currently being assessed in accordance with EuroRAP safety ratings (in which SRA has been fully involved at technical level since its inception in 2001). To date, 10,000 kilometres of the existing rural road network has been assessed by EuroRAP, generally for the higher traffic volume routes. Of the assessed roads, 31% meets the four-star rating which correspond to a safe road. Updating and monitoring of the status of the evaluated roads is now underway. Updating and monitoring of the status of the evaluated roads is now underway.

Conclusions

Vision Zero requires that speed is a central parameter in the planning, design and operation of the network and the Government has publicly stated “road safety needs to be at core of speed limit setting decisions” (Tylosand, 2007). The new ‘results focus’ is principally directed at system providers but road user compliance with design rules remains a key element of a ‘safe system’:

Recommendations

Standards:

(1) Comprehensively match road and vehicle design standards to safe speed limits: Complete EuroRAP assessment of rural network and review findings regularly for action; take up Inspectorate’s suggestion to adopt new safety standard(s) for roads - better matching road design and layout to appropriate speed limits - to reduce user risk and increase user protection; ‘Standard(s)’ to be consistently/ systematically applied in terms of speed limits for existing roads and new roads; an SRA speed limit advisory group be established; SRA to be responsible for final decisions on speed limits above 50km/h.

(2) Give greater attention to safety needs in project planning: Introduce a 5 stage mandatory road safety audit for all new road projects. Area-wide safety impact assessments of potential safety impact of project on the surrounding area also to be undertaken. All road projects above an agreed value to be discussed in depth at concept stage by a senior Project Review Committee of SRA directors and the proposing regional or major projects staff. The aim is to resolve safety issues relevant to the 6 transport goals.

(3) Adopt a road safety engineering and police enforcement strategy to address road deaths and serious injuries on urban main roads in the three largest municipalities.

Compliance:

(4) Enhance speed compliance capability: Increase speed camera coverage and processing capacity, including increased covert mobile camera deployment to promote the notion that speeding “anywhere, anytime” will not be permitted; review urgently current courts policy not to accept speed in isolation as a reason for careless driving under speeds of 190 km/h.

Vision Zero conditions of entry and exit to the road network for vehicles and compliance?

Much has been achieved in car occupant safety in Europe in the last decade and further substantial gains can be made both in crash protection and crash avoidance using existing and new technology through legislation, consumer information, product liability and motor vehicle industry initiatives.

In common with other EU countries, Sweden is a signatory to various EU and UNECE type approval agreements for vehicles which limits its ability to regulate for safety on a national basis. There remain several important crash protection standards (the need for which has been long identified by research) which still need to be developed or agreed in EU legislation e.g. car to car compatibility, an undiluted Phase 2 for pedestrian protection, and energy absorbing frontal underrun protection on heavy goods vehicles which was first available as long ago as the late 1970s. Sweden has been a leading advocate for past improvements in vehicle safety and new rules in these areas are essential for Vision Zero.

The main strategy nationally has been to create a market for vehicle safety equipment in Sweden and the safety quality of the current vehicle fleet in Sweden is amongst and possibly the best in the world. Public authorities have been encouraged by SRA and partners to create such a market by quality assurance of transport and by consumer information. The SRA has played a leading role in developing, supporting and chairing EuroNCAP, developing and promoting in-house vehicle safety policies and encouraging domestic producers to install new technologies at the earliest opportunity. In 2006, just over 50% of new cars sold in Sweden were 5* (car occupant rating). Swedish car and truck manufacturers aim to be the leading manufacturers of automotive products in the safety area. The fitment of seat belt reminders in new cars sold in Sweden has increased from 0% to 80% in just over 3 years. Sweden has led research internationally on whiplash injury (notably from the Swedish insurance sector) and has made a substantial technical contribution to the work of EuroNCAP in this area.

Active safety also holds future promise. Speed is a central design parameter for a Vision Zero traffic system. However, new cars sold in Sweden can reach speeds of over twice the maximum road speed limit. In total almost 1,000 ISA systems have been installed, of which about one third are in SRA vehicles. The availability of electronic stability control in new cars in Sweden has increased from 15% to 91% in further than 3 years. A new government strategy for the fitment of alcolocks has recently been announced. The potential contribution of other new technology to short term targets and longer term goals is largely unknown. A working group comprising the SRA, researchers and car industry has been set up to properly assess the potential contribution of active vehicle safety technology which is currently under development.

Swedish research is working towards the provision of integrated safety systems which are active and passive safety measures aimed at crash avoidance, crash protection and injury severity mitigation by using sensing information

in real-time about the vehicle and vehicle surroundings including other vehicles movements.

Sweden is a signatory to EU and international agreements for type approval. Vehicle certification and testing is carried out by the Swedish Motor Vehicle Inspection company.

Conclusions

Entry and exit conditions for road users reflect good practice but the new 'results focus' requires continuous improvement to be sustained over the longer term.

Recommendations

Standards:

(1) Enhance national advocacy for key vehicle safety improvements at EU level especially legislation on car to car compatibility, an effective Phase 2 for the pedestrian protection, frontal underrun protection on HGVs as well as electronic stability control. Encourage EuroNCAP to combine car occupant and pedestrian safety ratings into an additional overall crash protection rating and adopt a whiplash specification.

(2) Expand SRA and partners world-leading efforts in creating national market for vehicle safety equipment through use of consumer information, in-house safety policies and quality assurance for transport services: In particular encourage Swedish car industry to fit seat belt reminders in all rear seats; give appropriate priority in public sector transport contracts for heavy vehicles fitted with energy absorbing front underrun protection (available since late 1970s); include speed adaptation systems to assist drivers in keeping to the speed limit as a condition of all public sector transport contracts and ensure fitment of speed adaptation systems to all vehicles registered for use on Sweden's roads is a condition of registration by an agreed date.

(3) Ensure that motor vehicle dealers display car occupant and pedestrian safety EuroNCAP ratings on new vehicles for sale in Sweden.

(4) Ensure that lower top car speeds and lower limit speedometer displays are required for vehicles to be permitted to be registered for use on Sweden's roads.

Compliance:

(5) Strengthen key means of systematically monitoring industry compliance with new and existing standards and new technologies through; continued certification and annual inspection procedures, enhanced EuroNCAP assessment, EU adaptation to technical progress evaluations, in-depth crash injury investigation and study, collection of vehicle make and model in crash statistics and in-vehicle performance monitoring.

Vision Zero Conditions of entry and exit to the road network for users and their compliance?

While low licensing rates for 18 to 22 year olds have lessened impacts of inexperience and risk taking, there is still substantial over-representation in casualty crashes by this age group.

Levels of crash involvement by 15 year old moped riders are high. SRA proposed legislation on increasing age of access to mopeds which was not accepted. The high risks of deaths and serious injury associated with motorized two wheeler use (which is gaining in popularity) are not easily reduced by alternative measures which present an urgent problem for Vision Zero.

Until recently, the strategy for securing increased user compliance with key safety rules within Vision Zero has focused on the encouragement and introduction of new vehicle technologies, such as alcohol interlock devices and seat belt reminders in commercial vehicles and private cars. The rate of introduction of such technologies is impressive, as are the results achieved to date.

Annual tracking surveys confirm, however, that there is currently a low perception of risk of being detected committing a traffic offence amongst the public. Behavioural surveys confirm that road users are not sufficiently deterred from offending by the combination of current enforcement activity by the courts and the police and publicity supporting enforcement by government.

Penalty and courts systems and legislative settings

The penalty system is gradually being strengthened e.g. recent penalty point increases. However, stakeholders indicated that there was a need for:

- a more useable penalty points system that would be more readily understood by the public
- a review of court practice for high level speeding
- the permitted use of mopeds during disqualified car driving
- the current limited capacity for processing fixed penalties.

Police enforcement activity and tools

The National Police Board sets the strategic direction for police work and coordinates and monitors activity and the 21 autonomous police authorities integrate national strategy into local plans and operations. While Sweden has a long tradition in police enforcement for road safety, road safety policing has only recently started to get back on track after a significant reduction in activity. Between 1997 and 2002, police resources were cut by 16%. In their Annual Report for 2004, the Road Traffic Inspectorate was highly critical of police enforcement in support of Vision Zero in the areas of speeding, drinking and driving and seat belt use. A new Swedish police road safety strategy came into force in April 2006 in support of Vision Zero and the interim target. It sets out overarching objectives for five years to 2012 to:

- Increase traffic supervision and crash prevention measures.
- Ensure that the level of ambition and activity in police road safety work is uniform throughout the country – stakeholders highlighted that there had been a lack of consistency or enforcement in efforts across Sweden.

-
- Ensure that road safety effort is an integral part of other tasks such as combating crime.

The four priority areas for police crash prevention work are: speed (discussed in previous section), drinking and driving, restraint and helmet use and aggressive driving e.g. headways that are too short, red light running and illegal street racing.

DRINKING AND DRIVING: The SRA estimates that 14,000 trips are made by car each day under the influence of alcohol. Since 1997, the percentage of drivers killed while under the influence has almost doubled and in 2005 (most recent available data) was 34%. The SRA concludes that the increase in the percentage of drink drivers among road deaths in recent years is in part a result of a reduction in the number of drivers killed on the roads while the number of drink drivers has remained largely constant during the 2000s. Around 25% of all road deaths involve excess alcohol or drugs.

The police strategy states that the aim is to carry out 2 million breath tests annually. Since 2001, breath tests have been carried out every time a driver is stopped by a police officer. In 2006, 2.2 million tests were carried out which equates to around 1 in 2.6 licensed motor vehicles drivers and a 25% increase compared to activity in 2005. The increased number of tests performed is estimated using the current assessment model to have led to 15-20 fewer fatalities and 150-200 fewer seriously injured persons per year. The number of tests, the regional allocation and the targeted breath testing times are currently under review.

SRA currently provides supplementary funding for these police outputs. Funding for breathalysers has come from the personalized number plate fund which is administered by the SRA. The SRA runs a Don't Drink & Drive project, which is a nationwide joint project to encourage young people to stay away from alcohol in traffic.

SEAT BELT USE: Front seat belt use is high and is being addressed by the combination of police enforcement activity, information and seat belt reminders (which were installed in 80% of new cars - for drivers - in 2006). Rear seat belt use is not yet high (74%) compared to European best practice and has been declining. The police report less activity on seat belt enforcement in the last couple of years.

Other issues highlighted during stakeholder meetings include:

- The need for automatic number plate recognition which has proved successful elsewhere.
- The need for regular TV deterrence advertising by the police, SRA and other partners.
- The need for red light cameras, mobile camera and hand held speed detection devices for use by police.
- The need for public information on fatigue.
- The opportunities for insurance premiums to include consideration of compliance records.

Recommendations

Standards:

(1) Novice drivers and riders: Introduce two stage graduated licensing arrangements for the first 4 years of riding and driving with:

- passenger, mobile phone, and late night use restrictions,
- compulsory alcolocks for return to driving after BAC offence (court supervised),
- lowered annual penalty point limits, and
- speed compliance recorders for offenders (court supervised).

(2) Moped- och motorcykelförare: Ta bort eventuella fördelar förknippade med att använda moped istället för bil; öka åldern för mopedkörning och tillåt inte körning med passagerare förrän föraren fyllt 18 år; betona ordentligt de stora riskerna i samband med motorcykel- och mopedkörning.

Compliance:

(3) Continue to utilise technology in the network and in vehicles wherever possible to assist user compliance.

(4) Review potential 'deterrence' value of future court and fixed penalties for offenders and high visibility police enforcement activity, including use of enforcement tools based on international good practice.

(5) Increase speed camera coverage and processing capacity, including increased covert mobile camera deployment to promote the notion that speeding "anywhere, anytime" will not be permitted.

(6) (As recommended in earlier recommendations on legislation), Review urgently current courts policy not to accept speed in isolation as a reason for careless driving under speeds of 190 km/h.

(7) Increase current levels of rear seat belt use in the short term through combined police enforcement and publicity.

Vision Zero recovery and rehabilitation of crash victims?

The quality of the emergency medical system and the treatment and rehabilitation of the road user has a direct bearing on achieving road safety results. One study in Umea has estimated that further improvements could contribute to a 7% reduction in deaths.

While the emergency medical system is acknowledged as being an integral part of traffic system safety and one of the keys to achieving Vision Zero, it is mentioned occasionally in policy documents but does not seem to be included as a system provider in day to day road safety activity in Sweden. Several stakeholders believe that post-crash care is a road safety issue which deserves more attention.

Emergency services are a local or regional responsibility. Regional councils

are responsible for ambulance transport. Many of the services are contracted out to private enterprises and in contracts there are often stipulations about response times (the setting and compliance of emergency medical response times is conducted locally). The general standard of emergency response and trauma care is understood to be good. State of the art courses for trauma care developed in the US were introduced in the mid-1990s.

The National Board of Health and Welfare is the national expert and supervisory authority for activities including public health and medical care. Its mission, as formulated by the Government, is to deal with issues concerning health and medical care from a holistic perspective. The responsibility for road safety in Sweden, however, falls outside the domain of the health sector.

The World Health Organisation noted that while the health sector is only one of many bodies involved in road safety – and usually not even the leading one – it nonetheless has important roles to play in public health in addition to its post impact care and rehabilitation responsibilities in:

- **Surveillance:** discovering, through injury surveillance and surveys, as much as possible about all aspects of road crash injury – by systematically collecting data on the magnitude, scope, characteristics and consequences of road traffic crashes.
- **Research:** researching the causes of traffic crashes and injuries, and in doing so trying to determine the causes and correlates of road crash injury, factors that increase or decrease risk, factors that might be modifiable through interventions.
- **Prevention and Control:** exploring ways to prevent and reduce the severity of injuries in road crashes by designing and helping to implement, across a range of settings, interventions that appear promising, especially in the area of human behaviour, disseminating information on the outcomes.
- **Evaluation:** monitoring and evaluating appropriate intervention and evaluating the cost-effectiveness of these programmes.
- **Advocacy:** working to persuade policy-makers and decision-makers of the necessity to address injuries in general as a major issue, and of the importance of adopting improved approaches to road traffic safety.
- **Policy:** translating effective science-based information into policies and practices that protect pedestrians, cyclists and the occupants of vehicles.
- **Services:** promoting capacity building in all these areas, particularly in the gathering of information and in research.

Conclusions

The emergency medical services are acknowledged as being integral to the new 'results focus' but they are not included as a system provider in day to day strategic management processes.

Recommendations

(1) The Ministry of Health/National Board of Health and Welfare to review a) the potential for increased contribution of emergency medical services, trauma care and long-term disability in Sweden to reducing road deaths and serious injuries and b) ways in which public health could further contribute to Vision Zero activity through road injury prevention activity.

2.3 RESULTS

Social costs

Estimates of socio-economic costs are not established annually. VINNOVA noted in 2007 that, on the basis of a research study, the direct costs for killed and injured road users in 2005 in Sweden are estimated to exceed 29 billion SEK.

Recommendation

While Vision Zero is not bound by the traditional model of providing road safety at reasonable cost, decisions are clearly being made in Sweden based on cost which affect road safety, especially in short term road safety work. In order that road safety can compete with other areas of activity successfully (e.g. in police work), it is recommended that annual estimates are adopted by Government of the value of preventing death and serious injury and the total socio-economic cost of road crashes.

Final safety outcomes – deaths and serious injuries

Notwithstanding Sweden's level of ambition for road safety and the fact that the interim final target has not been met, Sweden has one of the lowest death rates in the world.

In 2006, there were 445 deaths in Sweden, slightly up on the previous year (440) and 70 fewer than in 1997, 3959 police-reported serious injuries (up 1% compared with 2005) and 22,677 slight injuries. The National Board of Health and Welfare reports that there are around 13,000 admissions to hospital following road crashes.

The death rate per 100,000 population was 4.9. The number of cars increased by 1.5% and the number of motorcycles by 11% though there was no change in traffic volume. There were 5.8 million licensed drivers in 2006.

While the police report around 4000 serious injuries annually, the National Board of Health and Welfare reports that around 13,000 people are injured annually with injuries which are sufficiently serious to require admission to hospital following a road crash. This represents a serious discrepancy. It is understood that many of these are likely to be minor injuries and that different hospitals have different systems for registration of crashes. Studies

indicate that the police report 60% of serious injury and that there are problems in classifying injury severity. Work is underway on a new definition of serious injury and several stakeholders pointed to the urgent need to determine the incidence of long term serious, serious or minor road traffic injury in the system.

A hospital study conducted in Umea indicates that 6% of all road users attending hospital as out patients or in-patients following a crash resulted in disability. The Inspectorate reports that only a proportion of work-related crashes are reported to the Swedish Work and Environment Authority system.

Recommendation

Sweden has a substantial under-reporting problem in police statistics for serious road traffic injury. There is an urgent need to determine the incidence of long term serious, serious or minor road traffic injury in the health system and to achieve the 100% cooperation of hospitals with the STRADA system.

Intermediate safety outcomes

Sweden has been at the forefront internationally in the development and use of safety performance indicators to inform the development and monitoring of its road safety goals, targets and programmes. With the notable exception of a limited sampling of average speeds, data is available to identify a range of outcomes:

(1) NETWORK VEHICLE SPEEDS: Limited representative data of average speeds in the urban and rural network currently exists. Quite detailed speed observations were carried out in the rural network until 2004. Monitoring to 2004 indicated that mean speeds increased on State roads from 53% (1997) to 57% (2004). Data, though not nationally representative of average speeds is available for analysis at fixed speed camera sites and at 80 other sites across the network. One or two SRA stakeholders noted evidence of speeds going up in their region. In 2006 in Stockholm speeds were measured following the introduction of congestion charging and were lower than comparable stretches of 50 kilometres of road measured in 2005. In Göteborg, the average speed was comparable with sections of commuter road measured in 2005 and the speed increased in two sections and decreased in three sections;

(2) SEAT BELT WEARING RATES: The front seat belt wearing rate (2006) is 94% which has been increasing over recent years. The level is 97% in Göteborg. The national rear seat belt wearing rate is 74% (2006) which has decreased from 80% (2004). In 2006 seat belt use among taxi drivers rose significantly to 90% from 83%. Estimated seat belt use of heavy goods vehicle driver use is 40%;

(3) MOTORCYCLE AND MOPED HELMET WEARING RATES: No recent surveys have been carried out, though experts believe rates for motorcycles exceed 90% but are less for moped use;

(4) CYCLE HELMET WEARING RATES: In 2006, 25% of cyclists wore cycle helmets. Helmet use among younger school children (aged 6-12) was 61%, compared with 74% in 2005, although higher than in 2004 when legislation was introduced. Adult use of helmets on public cycle lanes and paths has risen by almost 5% since 2005;

(5) ALCOHOL USE IN TRAFFIC AND INVOLVEMENT IN CRASHES: The SRA estimates that alcohol is involved in around 20% of fatal crashes. Since 1997, the percentage of drivers killed while under the influence has almost doubled and in 2005 (most recent available data) was 34%.

The number of reported offences involving impairment by alcohol or drugs in 2006 amounted to 27,308. Of these, 9 931 involved drugs compared with 18,975 alcohol or drugs offences in 2002 of which 4,616 involved drugs.

(6) FLEET SAFETY STANDARDS: In 2006, just over 50% of new cars sold in Sweden were 5 star (EuroNCAP car occupant rating).

(7) SAFETY RATING OF ROAD INFRASTRUCTURE: EuroRAP protocols for rural roads have been used to assess the safety quality of the road infrastructure. Of the assessed rural roads, 31% meet the four-star rating which corresponds to a safe road.

(8) RECOVERY OF ROAD CRASH VICTIMS: Emergency response times are sometimes included in contracts, but no central monitoring appears to be carried out.

(9) NETWORK VOLUMES: These are reported annually by SRA and SIKA. Estimates for traffic mileage in 2006 was 75625 billion kilometres:

Passenger cars	62 979
Light trucks	6 403
Heavy trucks	4 337
Buses	872
Motorcycles	755
Mopeds	279

Recommendation

It is recommended that national intermediate outcome targets are set based on agreed institutional output targets which can contribute to a new headline outcome target to reduce deaths (and eventually severe injuries once a new definition exists).

Institutional outputs

A range of institutional outputs are reported annually by the SRA: Further outputs are under consideration.

Box 4

Reported institutional outputs: 2006 include:

Breath testing

In 2006, 2.2 million tests were carried out which equates to around 1 in 2.6 licensed motor vehicles drivers. Time of day and locations for testing is under review.

Seat belt checks

During 2006 the police reported 50,294 drivers and passengers in passenger cars for not wearing seat belts, which is 6% fewer than 2005.

Speed checks

In 2006, 700 speed cameras were operational on the rural road network. It was announced to the media in 2007, that speed checks would only be conducted by use of automatic speed camera equipment.

Median barriers

In 2006, 3500 kms of road have separated traffic flow, 1500 of which are on 2+1 roads.

Electronic stability control

In 2006, 91% of new cars sold were fitted with electronic stability control.

Seat belt reminders

In 2006, 80% of new cars sold in Sweden were fitted with front seat belt reminders.

Recommendation

It is recommended that agreed institutional output targets are established, led by governmental agencies, which can contribute to intermediate outcome targets which in turn will contribute to a new headline outcome target to reduce deaths (and eventually severe injuries once a new definition exists).

3. Road safety management capacity review conclusion

Sweden is a world leader in road safety performance having achieved continuous improvement towards one of the lowest death rates globally. Sweden works to highly ambitious long term and interim road safety goals and has developed innovative strategies and solutions which have inspired and engaged national stakeholders as well as road safety professionals worldwide.

The review acknowledged, at its outset, that Sweden's road safety management system is in a highly advanced phase of development when compared internationally. The higher the level of ambition, however, the more robust the road safety management system is required to be. Sweden has embarked upon a bold path and Vision Zero demands a new level of high performance and responsibility which needs to be shared by both the providers and the users of the system. Based on national and international good practice and information provided by senior management of stakeholders in Sweden, this independent review has identified some scope for future action.

Achievement of the long term goal of death and serious injury elimination influences management functions and interventions in ways that differ profoundly from typical targeted approaches of the past. It requires both a shift to a more protective system (separating dangerous mixed road use as, for example, is being done with median barriers, better speed management, more crash protective roads and vehicles, good recovery and rehabilitation mechanisms) as well as achieving higher levels of user compliance with the design parameters set for the system in terms of speed and use of safety equipment.

Sweden is in the 'establishment' phase of its journey towards Vision Zero. The next challenge, in view of Sweden's highly ambitious goal, is to achieve rapid 'growth' in the delivery of accountable, well-orchestrated, and effective Vision Zero activity. This is expected to include the continuation and deepening of essential long term work either underway or envisaged, as well as sharper multi-sectoral focus on interim goals to prevent death and disability in the short term. Short term gains can be expected from conventional interventions derived from national and international best practice, while improvement of the protective features of the network and the vehicle fleet will bring big benefits in the longer term. The new interim target(s) to 2020, and the related strategy and programme will establish the next phase of 'growth' for Vision Zero.

Appendix 1

APPENDIX 1: DETAILED CAPACITY REVIEW FINDINGS		
ROAD SAFETY MANAGEMENT FUNCTION	STRATEGIC REVIEW OF ROAD SAFETY MANAGEMENT CAPACITY IN SWEDEN	CONCLUSIONS AND RECOMMENDATIONS FOR FUTURE ACTION (based on national and international good practice)
INSTITUTIONAL MANAGEMENT FUNCTIONS		

Results focus

Existence of an official position on acceptable levels of safety in Sweden?

Long term level of safety The long term goal adopted by the Swedish Parliament (Road Safety Bill 1997) and the Swedish Government transport policy (1998) is that no one should be killed or suffer serious health loss in a road traffic crash. Furthermore, the transport system's design and performance should be adapted to the requirements for meeting the goal. This is one of six transport policy goals towards "a socio-economically and efficient long term sustainable traffic system for individuals and the business community throughout the country".

Vision Zero is the well established long term goal for road safety in Sweden to guide future safety work. Vision Zero to date has been an inspiration for road safety work internationally. In Vision Zero, safety is a prerequisite of good mobility and currently has 5 dimensions:

1. a vision for many stakeholders
2. an ethical platform – no deaths
3. shared responsibility of system providers and road users
4. a safety philosophy of managing kinetic energy
5. and driving forces for change by creating a market for safety

The SRA believes that it is possible to design a safe road transport system, without impacting in the long term on mobility and major advantages could be achieved through coordination between motor vehicle manufacturers and road designers.

There is considerable national support for Vision Zero amongst key stakeholders and professionals and the further roll out of the long term strategy as well, in general, for the actions taken to date. However, a widely held view amongst stakeholders is that Vision Zero needs to be 'more than a dream' and should comprise self-explanatory steps if its credibility is to be maintained. The SRA states in its 2006 Annual Report that 'the system is far from being designed on the basis of the 'Vision Zero decision' and the 'rate of fall is too slow, viewed in relation to the interim goal for 2007'

Interim levels of safety The Government set an interim target for the year 2000 of no more than 400 deaths and 3,700 serious casualties. A further 'top-down' target set by Parliament in 1997 to reduce deaths by 50% by 2007 (compared with the 1996 level) has not been achieved.

A new interim target is to be determined shortly.

Since 1997, Vision Zero has been a key driver of innovation and wider implementation of key interventions - efforts to date in re-engineering the road network for greater safety are particularly notable - as well as providing the focus for new engagement amongst stakeholders at employer, professional and practitioner levels.

The general focus has clearly been on leading edge work towards sustainable longer term improvements to save lives and prevent serious injuries long into the future. The challenge for Sweden, in view of its highly ambitious goals, is how to continue and develop further this essential work to upgrade the road traffic system, while also giving a sharper and multi-sectoral focus to shorter term goals using priority measures which will give fast and guaranteed returns on investment and activity.

Definition of responsibilities?

The shared responsibility of the various system providers for road safety envisaged in Vision Zero is not established in legislation, although a formulation was proposed by the Swedish Road Administration to this effect in 2003.

Governmental responsibilities While the lead Governmental Ministry (on behalf of government), is the Ministry of Enterprise, Energy and Communications, the sectoral road safety responsibility lies with the Swedish Roads Administration (SRA). In general, the different road safety responsibilities of different governmental stakeholders are not formally defined either in legislation, annual instructions (apart from the SRA), or in any road safety strategy, although the SRA role and responsibilities for road safety are clearly set out in a 1998 policy statement on the SRA website

Notwithstanding its role as lead agency for road safety, the SRA is thus the only central governmental organisation which takes on a major formal accountability for road safety in Sweden. This is despite the wide acknowledgement of the need for shared responsibility and the need for delivery across the transport system to realise the highly ambitious national goal of Vision Zero. While SRA is accountable to the Ministry of Enterprise, Energy and Communications and has annual performance agreements to reduce deaths and serious injuries, no governmental department or agency is accountable for delivery either of Vision Zero or the interim target. While government and Parliament approved Vision Zero, it was noted that Vision Zero does not appear to be, in practice, a vision for all of government. Stakeholders commented that “No one has real responsibility” and “There is a lack of multi-departmental decision making and commitment”.

While the National Police Board has very recently devised a national police traffic safety strategy (February 2007), their annual instruction from the Ministry of Justice makes no reference to road safety or traffic policing. There is a serious lack of traffic policing capacity at central level with only four police staff working on traffic policing matters.

While Vision Zero is essentially a public health vision and while the health sector has most to gain from its achievement, the Ministry of Health is particularly notable by its lack of engagement in the road safety effort. Injury prevention related to traffic safety is a secondary priority for involvement by the public health sector. There is fragmented responsibility for health provision between the central government and regional and local governments.

It is recommended that consideration could be given to improving whole governmental accountability for road safety. In particular, the shared responsibility for Vision Zero amongst (1) governmental stakeholders – Enterprise, Health, Justice, Education, Municipalities and their agencies- and (2) system providers – including road system, vehicle, road transport and workplace related road travel providers, emergency medical system providers and users - could usefully be set out formally whether in legislation, a Memorandum of Understanding or in a road safety strategy policy document.

It is recommended that internal reviews be carried out of Agency/ Ministry management capacity to deliver these responsibilities.

Rather oddly, the health sector's emergency medical system is not widely perceived to be a 'system provider' within current Vision Zero activity although local government has a legislative responsibility as part of its public health responsibilities to prepare a plan for injury and accident prevention. Current reorganisation proposals for government health authorities are likely to affect responsibilities in the injury prevention sector

There does not appear to be any active or agreed specific contribution to Vision Zero goals and targets by the Ministry of Education outside the general governmental accountability.

At the same time, a key driver of Vision Zero and the shared responsibility for the prevention of death and serious road injury to date is occupational legislation. This requires all employers to ensure the health and safety of their employees whilst at work. These shared legislative responsibilities have been followed up assiduously by the SRA in conjunction with the Swedish Work Environment Authority with many stakeholders. For example, the Swedish Motor Vehicle Inspection Company's safe travel policy requires alcohol locks to be fitted in all company cars and prohibits travel by motorcycle in the carrying out of work duties.

In practice the Ministry of Enterprise, Energy and Communications, the Swedish Road Administration, the National Police Board, the Swedish Work Environment Authority, the Road Traffic Inspectorate (part of SRA), Office of the Prosecutor General, and local municipalities are the governmental organisations which most actively engage in road safety. (The National Society for Road Safety (NTF) is a key player but draws its membership from beyond government)

SRA is currently reviewing available but unused legislative opportunities which could be beneficial for road safety outcomes and for deepening shared responsibility if they were to be actively applied. Three examples are the greater use of occupational health and safety legislation, the use of product liability and achieving compliance by all in the supply chain with permit conditions for transport of goods. It is also anticipated that SRA's role as a provider of safer roads (with definition of what is meant by a safer road together with the development of a management process for continuous improvement) will be set out in new legislation.

Private and non governmental sector There are of course, a number of non government partners who also play a significant role as is outlined below. Employers in the private as in the governmental sector have a responsibility set out in law for ensuring that their employees travel and purchase of transport services are implemented in a safe way. The efforts of the motor vehicle manufacturing industry are also of key importance to Vision Zero.

Lead agency form?

Since 1993, the lead agency for road safety has been the roads authority for national roads - the Swedish Roads Administration - which has established an international reputation over the years for enlightened road safety leadership. Road safety is one of six SRA road transport policy goals and is integrated into a long term sustainable transport policy. A Director of Safety forms part of the Director-General's senior management team. Before 2002, a single organisational unit existed for road safety. Since then, road safety functions have been distributed amongst a number of sections within the Society and Traffic Department e.g. in the road user section which comprises around twenty people. Stakeholders both within and external to the SRA have identified benefits e.g. the successful representation of road safety interests at a high level in the organisation, but mainly disbenefits with this recent arrangement e.g. loss of focus on interim targets brought about by expertise which is too scattered in the organisation to achieve meaningful internal and external (to SRA) policy change.

The organisation of governmental responsibilities for transport (including road safety responsibilities) are currently under discussion in Sweden. New arrangements are expected to be in place by 1st January 2009

Based on international good practice, the World Bank has summarised key lead agency management functions: results focus, coordination, legislation, funding and resource allocation, promotion, monitoring and evaluation and research and development and knowledge transfer (See Annex 3). The pivotal institutional management function is results focus which concerns a pragmatic specification of the country's degree of 'ambition' to improve road safety which takes into account the agreed means to achieve this. All the other functions are subordinate to the focus of results and concern their delivery.

The development of new arrangements for transport in Sweden presents a good opportunity to review appropriate organisational structures and processes for the effective development and operation of these key functions (which are also relevant to management outside government) towards the delivery of well-orchestrated and funded multi-sectoral interventions to achieve Sweden's long term goal and interim targets.

It is recommended that the lead agency provide 'first amongst equals' leadership of Vision Zero, the new interim target and strategies (including indicators of performance) which are agreed and monitored by a new high-level inter-governmental coordination body. This body will need to ensure that the actions necessary to give effect to agreed strategy do occur, e.g., the development and introduction of specific legislation, the availability of resource, and regular review.

In the interim, and in view of the importance of the SRA's national road safety responsibilities, the ambition of Sweden's long term road safety challenge and the need to develop, launch, coordinate and monitor new interim targets and plans, it is recommended that a separate road safety strategy unit be established within the SRA .

Targets and target setting?

National targets Sweden has a long tradition in results management. In addition to the long term goal for zero deaths and serious injuries, an interim target was established in 1997 to reduce deaths by 50%. In addition, transport policy in Sweden has set targets for more efficient transport, a better environment, a more accessible transport system, and regional development. In 1999, an 11 point plan was presented by the Swedish Ministry of Industry (Näringsdepartementet) setting out key strategies to address the interim target. The 11 points proposed in the plan included:

1. Identifying and treating the most hazardous road sections
2. Making traffic safer in towns, by reconstructing streets according to the design principles of Vision Zero
3. A stronger emphasis on the responsibility of road users
4. Safer cycling, especially by means of promoting helmet wearing
5. Safety audit of transport services purchased by the public sector
6. A law requiring the use of winter tyres on slippery roads in winter
7. Exploiting Swedish technology to make motor vehicles safer
8. Codifying the responsibility for safety of those who design the road transport system
9. Reassessing penalties for traffic law violations
10. Clarifying the role of voluntary associations and organisations working for road safety
11. Experimenting with new systems for financing new roads.

The effects of these measures were assessed by the SRA in 1999 who concluded that the 11 point programme would not be sufficient to realise the target set for 270 fatalities in 2007 (SRA, 1999). The main criticism by national stakeholders was under-ambitious delivery of the interim target by government as a whole and lost opportunities for activity by key stakeholders in the earlier years of the target period.

Since 2000, there has been very significant road safety activity but no subsequent published plan of specific multi-sectoral casualty reduction measures which would be implemented to address the 2007 target.

In 2000 a report by the Institute for Transport Economics, Oslo for the SRA concluded that in principle, the target set for 2007 could be realised if measures that are effective in the short term – in particular a very substantial increase in police enforcement – were to be introduced before that year. Furthermore, the study concluded that according to the cost-benefit analyses conducted, it was possible to develop a road safety strategy that would reduce the number of fatalities by nearly 300 per year, without any adverse net effect on other policy objectives and without requiring any increase in public expenditure. In the first evaluation of the 1999 eleven point road safety plan carried out by the Traffic Inspectorate in late 2003, it was concluded that the SRA had not set the priorities needed in order for the 1997-2007 goal to be met and had proposed a plan that would not lead to goal achievement. The Inspectorate proposed that SRA should instead present an alternative plan making clear which measures were needed in order to meet the interim target. It is understood that the matters identified by the Inspectorate were not taken up directly with government at the time.

Subsequent strategies were put to government by SRA recommending a range of initiatives. SRA provided an outline strategy to government in 2004 for the sector, with an emphasis on getting stakeholders to accept responsibility for taking various actions to improve outcomes. It is understood that government did not respond to the strategy in a manner which would have resulted in multi-sectoral programmes and actions necessary to give effect to the strategy by a range of agencies in order to seek to meet the 2007 target. SRA also set out the actions it was taking and proposing to take, within its areas of responsibility to improve road safety performance in accordance with that strategy. While these were not approved in the form of a detailed action plan or programme to be implemented by police, SRA and other government stakeholders, there were a number of substantial initiatives commenced or approved including the speed limit setting arrangements, installation of fixed speed cameras and increased drink driving enforcement by police.

It is likely that the lack of agreed and clearly specified responsibilities for actions necessary to achieve the 2007 target across agencies is one outcome of the absence of senior level government road safety management arrangements and shared responsibilities throughout the sector across the agencies. Various stakeholders highlighted the need for a multi-sectoral programme and a route map of agreed measures which would deliver interim targets.

A new interim goal to 2017 is to be proposed by the SRA to the Ministry of Enterprise, Energy and Communications in December 2007. A common observation of stakeholders was the need to connect interim goals and targets and their delivery more meaningfully than before. Many stakeholders believe that the new national interim target should be challenging but demonstrably achievable.

- The SRA strategic plan for 2008-2017 includes several key SRA road safety objectives:
- The long term goal is that no-one should be killed or seriously injured in traffic. The intermediate goal to 2007 is no more than 270 deaths. A new interim goal is being formulated.
- On parts of the network with speed limits of 90 or 110 km/h and more than 3500 vehicles a day, 90% of traffic shall be separated by 2015 and 70% of traffic shall be separated on larger state roads irrespective of traffic volume.
- The number of children in urban and rural areas who can travel safely to school shall increase every year to 2017.
- By 2010, 50% of all new cars used by companies in Sweden shall have alcolocks
- The use of cycle helmets shall be increased by 2017
- Traffic on roads with automatic speed cameras should be doubled by 2010 compared with 2006
- By 2010, all new cars sold in Sweden should have seat belt reminders
- Citizen's knowledge about the basis for safe and sustainable use of the system should increase
- Every year should see improvements in vehicle technology. Between 2008-17, these should result in at least 10 fewer deaths than the previous year.

Regional targets The national interim targets are disaggregated regionally with each region required to reduce deaths by the same proportion as the national target.

While the exact methodology of the new target-setting has not yet been defined it is understood that intermediate outcome measures will be used to assess achievement. Further, it is understood that stakeholder declarations may be used to determine the path to agreed targets on an annual basis.

The path envisaged for maximising contributions from the non governmental and business stakeholders is supported. However, for contributions for the governmental agencies an agreed rolling annual action plan by a new high-level inter-departmental coordinating body could help to direct effort towards meeting specific progress towards any agreed intermediate outcome targets, based on available research and evaluations, knowledge and judgement.

A substantial body of good practice target-setting experience exists nationally and internationally (particularly in Australasia) where interim outcome targets, intermediate outcome targets and annual institutional output targets have been closely interlinked in road safety plans. To inform this activity, interim target-setting is based on the forecasting of trends, detailed modelling of potential outcomes of agreed specified activity and implementation arrangements to ensure interim targets are challenging but achievable.

Local and city targets Municipal targets have been set in several cities and municipalities including Stockholm and Göteborg. For example, Göteborg has been setting targets since 1991. It set an ambitious target in 1997 to reduce deaths and serious injuries by 60% by 2005 compared with the baseline 1985-89 which was reached for pedestrians and cyclists but not for all road users. During this period a large amount of traffic calming, speed management and provision of separated facilities for cyclists and pedestrians took place. The current target is to reduce deaths and serious injuries by 50% by 2010 (compared with 2004).

Intermediate outcome targets. There is a tradition in SRA for setting internal intermediate outcome targets in critical areas for road safety in Sweden annually, but it appears such targets have not ever been formally adopted by government for the sector. It is understood that a range of intermediate targets are under consideration alongside an outcome target for reducing deaths.

Output targets The police have set their own annual output targets to reduce drinking and driving. The SRA's goals for 2006 were to implement cost-effective road safety measures on the state road network so that the number of deaths in traffic accidents is reduced in 2006 by at least 20 persons compared with 2005 which it reports as being achieved. A second goal was to prioritise measures that aim to improve traffic safety for children which it reports as being partially achieved.

Regular performance reviews?

There do not appear to be regular performance reviews by the Government or Parliament of multi-sectoral progress with Vision Zero or targets.

Key final outcomes are monitored against targets and reported on an annual basis by the SRA, the Swedish Institute for Transport and Communications Analysis (SIKA) and the Road Traffic Inspectorate. Intermediate outcomes are also monitored. The Road Traffic Inspectorate also reports annually on suggested improvements on the basis of specific studies and investigations. Road Traffic Inspectorate evaluations have noted shortcomings in the Swedish Road Administration's processes for control and systematic methodology in the implementation of traffic safety improvement measures aimed at reaching the 2007 stage goal. The research sector in Sweden and abroad (e.g. VTI and TOI) is also engaged in aspects of current performance review. The current independent peer review of road safety management capacity in Sweden was commissioned by the SRA in 2007.

In general, since 1997, the focus has been on activity in the road network and vehicle system and the achievements made in these areas are substantial with considerable returns forecast for future years. In the last three years, as progress to achieve the interim target has fallen short and following continuous monitoring and evaluations by SRA and a critical evaluation of the 1999 11 point plan in 2004 by the Road Traffic Inspectorate covering a range of governmental stakeholder activity, collective awareness of the need to obtain adequate levels of government involvement and commitment to focus on short term improvements, especially improved road user compliance with key safety rules, has developed .

The absence of a senior multi-sectoral government group to focus on the road safety concerns identified in these evaluations has proven to be a major impediment to government decision making to adopt a specific plan of action across all agencies.

In addition to annual monitoring of outcomes, it is recommended that new arrangements are put in place to facilitate a full multi-sectoral performance review to be carried out (internally and externally) every three years reviewing results, interventions and institutional management arrangements as the basis for revised three year action plans.

Coordination

Horizontal coordination?

Within SRA, three organisational entities deal with the coordination of interventions, each having their own small secretariat situated within the SRA. These are:

- the SRA's Director General's Advisory Council on Road Safety which is a high level group of 7 governmental and non governmental stakeholders which meets twice a year. It was set up as a personal advisory group to the Director-General with members invited on an individual basis rather than representing organisations;
- the National Coordination Assembly (NCA) has 8 members (Ministry of Enterprise, Energy and Communications, Swedish Association of Local Authorities and Regions, National Society for Road Safety, National Police Board, Swedish Work Environment Authority, Folksam, Toyota Sweden AB, Swedish Road Administration), brings together 15-20 people and meets 6 times a year. The aim is "to share knowledge and coordinate the activities of key players with the intention of making Vision Zero a reality". A NCA steering group acts as a reference group for proposals for the new interim target;
- the National Road Safety Assembly (started in 2002 at the instruction of the Swedish Government) brings together a very broad group of stakeholders (about 40 – road user and transport industry stakeholders are prominent) at national (3 meetings a year) and regional levels. The Assembly works in specific areas: speed, drinking and driving, seat belt use, children and young people in traffic and two wheeled motor vehicle crashes and reports over 3000 individual activities.

SRA has been active in creating several useful platforms for sharing knowledge, discussing countermeasures and stimulating stakeholder contributions. These, however, are neither decision-making nor results-led bodies. They do not involve those who take final decisions on budgets across all the responsible governmental sectors, policies or legislative developments. There is an absence of inter-Ministerial governmental engagement and coordination at national levels to achieve Vision Zero goals and targets. Many key stakeholders view this as a serious weakness in current arrangements inhibiting policy development and budgets for both the road safety strategy as a whole and individual measures. E.g. coordination of efforts to address drink driving requires government stakeholders associated with: legislative development, penalties review, enforcement, interlock development and application, rehabilitation, courts and the prosecutor general (among others) to work together as necessary to improve settings and outcomes. This is a substantial coordination challenge and opportunity.

Road safety is a multi-sectoral and shared responsibility. It is recommended that a multi-sectoral inter-governmental and decision-making group is set up to engage the key ministries with responsibilities impinging on road safety, to agree the national governmental interim targets and strategy for road safety and to ensure follow-through of strategy implementation.

The key players at executive level currently would appear to be the Ministry of Enterprise Energy and Communications (MoEE&C), Ministry of Justice, Ministry of Health, Office of the Prosecutor General, SRA and Police supported by a management group comprising the Swedish Roads Administration, the National Police Board, the Institute for Public Health and the Work and Environment Authority (and Local and County Government and Councils, Ministry for Education, the NTF and the National Board for Health and Welfare from time to time as necessary).

The county councils have a crucial role to play in road investment decisions and speed limit setting decisions and the county governments have a key role in health provision.)

A dedicated and funded secretariat will be necessary

In good practice countries, technical working groups and reference groups are established lower down the coordination hierarchy. The management group would in turn be supported by technical working groups and stakeholder reference groups.

Vertical coordination?

There are seven regional SRA offices which are expected to prepare long term strategies in support of targets with reference to long term SRA strategic guidelines and annual 'instructions'. The main road safety engineering programmes for state roads are defined at national level. The offices implement key recommendations provided by the national SRA in their annual transport policies and programmes. The Inspectorate reported in 2007 that the regions are showing 'clear signs of frustration over their inability to get in touch with the right people in Borlänge when they have a road safety-related question'. There is considerable flexibility in the regional response to both national issues and local issues.

Specific allocations of funding for speed cameras have been used to good effect to encourage roll out at regional level. The regional office plays a key liaison role with local governments through key meetings and pump-priming of local initiatives. Agreements between the municipalities and the regional offices for specific actions are common. Each regional office expects to meet with its largest towns about 2-3 times a year.

The National Police Board has started (2007) to coordinate the national road safety policing strategy with the 21 autonomous county police authorities. .

Robust delivery partnerships?

A strong partnership exists between the SRA and the Swedish Work Environment Authority in pursuit of safer work-related travel and the shared responsibility of employers for road safety.

Recently, a strong partnership between SRA and the police at regional and national levels has been developed. Formal contractual agreements have resulted in enhanced and data-led enforcement activity which continues to develop. SRA funding has boosted police activity on enforcing excess alcohol legislation.

The SRA has a strong working partnership with the Swedish Association of Local Authorities and Regions and the Association is actively engaged in the National Coalition of Road Safety.

The SRA has developed strong working partnerships with the road safety research sector nationally and abroad.

Efforts are being made to coordinate and encourage a range of activity in several regions.

It is recommended that coordination arrangements between central, regional and local governmental levels for roads and policing forces, be periodically reviewed and developed further in support of the developing strategy and new targets.

SRA has been assiduous in establishing strong partnerships with other governmental agencies and other key stakeholders. The long term and interim levels of ambition for road safety in Sweden suggests that these should be kept under regular review and enhanced through the use of contractual agreements and specific funding mechanisms and allocations wherever possible to meet the new national performance targets. Stronger enforcement partnerships, in particular, for all regions are recommended to improve the deterrent effect of policing. There could be merit in establishing a specific group to focus on heavy vehicle related safety. Membership could include SRA, County Councils, Police, Work Environment Authority, NTF, the Road Haulage Association and the Transport Union.

EU and international coordination?

At European level, the MoEE&C is represented on the European Commission's High Level Group for Road Safety. The SRA represents Sweden in the negotiations on vehicle standards. The SRA was a founding member of EuroNCAP which is currently chaired by the SRA Director of Safety. It has also been active in providing key technical effort for EuroRAP.

NGO engagement?

The non governmental sector is active in Sweden and well-supported by SRA. For example, the SRA has actively and over a long period of time engaged and provided financial support for the main umbrella organization – the National Society for Road Safety (SRA currently contributes 60% of NTF's funding although this has decreased over the years). The SRA has also established important working relationships with the Swedish Association of Abstaining Motorists, to promote countermeasures aimed at reducing drinking and driving and the Swedish Automobile Association to establish and promote Euro RAP. SRA has also actively supported specific activities of the Brussels-based European Transport Safety Council.

Business engagement?

SRA has actively and successfully engaged with the business sector. Together with the Swedish Work Environment Authority and other stakeholders it has worked with transport industry groups towards specific outcomes. SRA has also worked successfully with the car and truck and insurance industries to advance the fitment nationally of key technologies e.g. seat belt reminders, alcohol interlocks and electronic stability control.

Parliamentary engagement?

Parliament and its Committee on Transport played a key role in the adoption of Vision Zero nationally and the establishment of the 1997-2007 interim targets. In 2004, the Committee organized a first European meeting of Parliamentary Select Committees on Transport to discuss priority actions for the EU road safety policy.

The international coordination and cooperation activities of the SRA and MoEE&C are world-leading. Vehicle safety standards and improvements are important for Vision Zero. Leadership and encouragement in improving safety quality is needed in the European regulatory standard setting committees as well as in EuroNCAP.

The capacity and engagement of the non governmental sector in Sweden is world-leading. New and further commitments will be needed to deliver improvements in safety performance.

The capacity and engagement of the business sector in road safety in Sweden is world-leading. New and further commitments will be needed to deliver improvements in safety performance.

The results of annual monitoring and evaluation of final and intermediate outcomes are available annually. It is recommended that an annual summary of these results is prepared for Parliamentarians and other elected representatives.

While there have been hearings on road safety in which organisations such as the National Road Safety Assembly have participated, there does not appear to have been regular and formal Parliamentary engagement on road safety which has had much effect on multi-sectoral policy development. Several stakeholders believe that more could be done to achieve political ownership of road safety by both Government and Parliament.

At regional level elected representatives have taken part in regional meetings and have presented at hearings. The Swedish Association of Local Authorities and Regions has distributed a specially produced guide One Moment, funded by the SRA, to increase awareness of the key road safety issues and principles involved in Vision Zero to elected representatives.

Given the multi-sectoral nature of road safety, it is recommended that Parliament give consideration to establishing a joint hearing of the Transport, Health, Justice, Education and Employment Committees every 3 years.

Legislation

Adequacy of current legislative settings?

A comprehensive legislative framework for road safety has developed over the last 50 years. Of particular note is that Sweden has a combination of the lowest blood alcohol limits and speed limits in Europe.

Legislation was approved in 2007 to amend the Swedish classification of speed limits (See section below). A new strategy for the implementation of alcolocks has recently been published (2007). It provides for the introduction of alcolocks for all convicted drinking and driving offenders (one third are recidivists); a change in EU rules to introduce alcolocks or other techniques that prevent impaired driving in all new commercial buses and lorries (drinking and driving is as common here as in other driving); companies to be encouraged to fit alcolocks to company cars; alcolocks in all public transport and enabling legislation to be introduced. In 2005, the compulsory use of bicycle helmets for children under 15 was introduced. In several instances, however, the SRA has proposed important amendments to legislation which have not been taken up e.g. age of access to moped use and definitions of shared institutional responsibility for Vision Zero.

While there has been recent attention to upgrading penalties for key offences (October, 2006) there remains considerable scope for better alignment of legislation with Vision Zero and the interim target needs in key areas.

Regular review and adjustment of legislative procedures and instruments?

The government processes for regular review, adjustment and development of supportive multi-sectoral legislative initiatives for road safety do not appear to be sufficiently well-aligned with the needs of both the short term targets and the longer term goal.

It is recommended that further review of road traffic legislation is undertaken at the earliest opportunity to assess the needs of the ongoing road safety goals, targets and the interventions required to realise them. A priority item for review is the setting out of the shared responsibilities, for Government as a minimum, for realising Vision Zero.

In line with good international practice, consideration should be given to: the introduction of a usable and more readily understood penalty points system which will help to deter offending (as introduced successfully in Denmark); owner liability for speed camera offences and automatic number plate recognition (e.g. as used successfully in the UK); addressing any perceived limitations on enforceability by police (including concerns about evidentiary requirements) in order to extend road rules; the courts' perception of the role of speed in 'careless driving' offences; mandatory requirements for interlocks for alcohol offenders (legislation has been foreshadowed); prohibiting use of mopeds during disqualification from car driving; a review of graduated driver licensing and the age of access to riding and driving; the use of hand held mobile telephones while driving and mandatory good practice road safety audit.

Funding and resource allocation

Funding levels and mechanisms?

As in many other European countries, financial resource for road safety comes largely from national and local tax revenues. It is not easy to assess total current road safety funding levels. In 1999, funding to the SRA was doubled with a total of SEK 8.5 billion to be made available for road safety over 10 years. An increased and earmarked allocation was made to allow resource for physical road safety measures such as roads with median cable barriers, safer intersections and road shoulders. The most recent annual expenditures by SRA on road safety include: approximately SEK 1.8 billion spent on infrastructure safety projects (2+1 treatments), with approximately SEK 80 million provided to police for operation of the speed camera programme, approximately SEK 200 million spent on other road safety programmes and some SEK 150 million spent on road safety research.

The Swedish Work and Environment Authority report a 30% reduction in overall budget which may reduce its ability to contribute to work-related road safety. This is a significant concern, given their effectiveness in achieving major work-related road safety improvements.

SRA has directly funded a range of activity which is key to national goals such as police enforcement and used ring-fenced funding to encourage specific road safety activities. Ring-fencing has also been used locally. For example, in Göteborg, the Traffic and Public Transport Committee has ring-fenced annual road safety funding. In the Göteborg agreement national funds were specifically allocated for road safety improvements.

In addition, around 75% of the sale proceeds from personalized licence plates is allocated primarily to road safety research.

The forthcoming changes in the road injury insurance provisions (transfer of lost income and rehabilitation transfer from social security system to insurance) open up new opportunity for further investment by the industry which is transparent and potentially commercially attractive. Stakeholders believe that this is likely to lead to greater premium differentiation according to individual road risk (vehicle type, driver age, offence history, crash history) in future due to the enlarged scope of the schemes. The increasing injury problem associated with two wheeled motor vehicles is particularly pressing. The Swedish Insurance industry is involved in several key areas of road safety activity and is notable for its concern with evidenced-based approaches rather than general promotional activity e.g. seat belt reminders, safety ratings and whiplash prevention research and advocacy.

It is recommended that the key governmental Ministries with road safety responsibilities (Enterprise, Justice, Health, Education, Employment) at national and local levels make annual provision for expenditure on road safety in their budgets. Human and financial resource for traffic policing is an urgent issue.

In view of the importance of Sweden's leading edge work-related safety activity for Vision Zero, it is recommended that the human and financial resource directed at work-related road safety is ring-fenced in the work of the Swedish Work Environment Authority.

Opportunities for investment for the insurance industry could be jointly explored (some countries requires 10% of premiums to be invested in a road safety fund). Commercially attractive road safety investment programmes for insurers, supported and facilitated by government as necessary need to be explored and developed

Resource allocation procedures?

Benefit to cost analysis is used to identify priorities for infrastructure spending on road safety.

It is recommended that cost-benefit analysis is used as widely as possible in road safety work at national and local levels.

Promotion

Promotion of government, community and business responsibilities?

There is very active promotion by the lead agency of the Vision Zero strategy and the shared responsibilities of road administration, police, regional and local government, employers, and business. A wide range of stakeholder organisations is involved in promoting the Vision Zero strategy and key interventions to responsible organisations which come together in bodies such as the National Coalition of Road Safety. Led by SRA, the use of in-house safety policies by key stakeholders has provided leadership by example in work-related safety.

The SRA, the National Society for Road Safety, the Swedish Road Haulage Association and the Swedish Association of Local Authorities and Regions are active in promoting road safety to professional and industrial stakeholders. Most road safety stakeholders have safe travel policies.

While annual public opinion tracking indicates continuing support for a range of interventions, there seems to be a need for increased regular public advocacy on road safety. A number of stakeholders believe there is a lack of public awareness/ discussion about road safety issues in the community and believe more could be done to respond to unhelpful media. This is especially apparent in relation to speed management, a core issue for Vision Zero, where efforts to combat uninformed or hostile media journalism are needed. No code of practice to restrain advertising on vehicle speed and performance exists for the motor vehicle industry.

The Road Traffic Inspectorate do not seem to actively communicate with the media and public. Indeed, it is stated in the Inspectorate's annual report for 2005 that the conscious strategy has been to maintain a relatively low profile in the media!

Folksam Research plays a major role in devising and promoting safety ratings for used car crash performance. Otherwise, the research sector does not appear to be active in promoting research-based problems and solutions in the media.

The Swedish lead agency approach to promoting road safety through Vision Zero and work-related road safety strategies is world-leading.

A voluntary industry Code of Practice on vehicle advertising and road safety represents international good practice and is recommended for development by the industry and SRA

To ensure public support for key Vision Zero strategies, it is suggested that a multi-sectoral communication strategy should be drawn up to explain better to the public the limits of current protection in the system, to promote different interventions and the need for adequate funding provided over time.

Insurance industry development and promotion of safety rating activity is world-leading.

It is recommended that the Road Traffic Inspectorate develops a broad communication strategy to promote more widely the conclusions of studies.

Monitoring and evaluation

Sweden has a long tradition in monitoring and evaluation of road safety. This, in general, is carried out comprehensively by the lead agency (at national and regional level) the Road Traffic Inspectorate (since 2003), research organisations, the municipalities and independent experts from home and abroad. There is excellent national capacity – both in terms of systems and human resource - for safety performance monitoring and evaluation. However, the Inspectorate was of the opinion in 2007 that there is insufficient clear follow-up of traffic-safety work.

In some areas systems are being underutilized e.g. trauma registries, STRADA, rear seat belt monitoring, institutional performance (e.g. Declarations of Intent). At local level a special road safety audit for the road safety plans of municipalities was introduced in 2006 by the Swedish Association of Local Authorities and Regions. To date, around 30-35 municipalities have been assessed using this methodology.

Vehicle and driver registries: The Traffic Registry and the Driving Standards Division of the SRA are profit centres that work within the framework of law and regulations. The units are responsible for the road traffic registry, driving licence system, and driver testing and supervision of examiners.

Final outcome data systems: The lead agency conducts extensive final outcome monitoring at national and regional levels which are analysed and published annually in a comprehensive SRA annual report and by the Swedish Institute for Transport and Communications Analysis (SIKA) which is also involved in policy monitoring.

Serious injury is currently being reclassified to align better with the measurement needs associated with reduction of serious public health loss as set out in Vision Zero.

The recently established Swedish Traffic Data Acquisition (STRADA) system aims to link medical and police data on serious and fatal crashes to identify levels of under-reporting. From January 2003, all police register crash reports in STRADA but only around 60% of hospitals currently do so.

Trauma registries exist in Swedish medical establishments, but it is understood that data is not necessarily analysed.

See also section in results focus on performance review.

It is suggested that annual reports of road safety outcomes are presented to Parliament.

Declarations of intent prepared as a commitment by stakeholders need independent monitoring.

Self-financing driver and vehicle registries provide essential exposure data necessary to establish the road crash injury risks and rates in the system as well as providing essential police enforcement data and support. It is recommended that systems are reviewed periodically, to ensure maximum efficiency in support of the latter function.

It is recommended that high-level governmental action is taken with the regional and local governments to encourage more hospitals to engage in the STRADA system.

It is recommended that trauma registries are reviewed and analysed periodically to provide better information on road traffic injury outcomes, the incidence of long term disability and trauma care performance.

It is further recommended that vehicle make and model is recorded in the national crash injury database to help assess fleet quality based on retrospective safety ratings and for crash research

Intermediate outcome data systems: An extensive system of performance indicators is used by the SRA against which annual progress is monitored and communicated in annual reporting. The SRA state that parameters for a safe system have not yet been fully developed.

Since 2004 the detailed measurement of average speeds which are nationally, locally or regionally representative has been discontinued and replaced with use of data from the fixed camera sites and 80 other fixed locations not at the camera sites. SRA is of the view that the further rollout of cameras will provide the necessary coverage of the network. Sweden has an excellent monitoring system for fleet safety standards by using predictive car safety ratings (Euro NCAP) and retrospective ratings (Folksam Car Safety Rating). Folksam publishes safety ratings of used car crash performance every two years.

The quality of the Swedish rural road network is being assessed according to EuroRAP and reported by SRA and the Swedish Motoring Association (Motormännens Riksförbund). In February 2004, Sweden was the first country in Europe to begin the classification of roads according to the EuroRAP rating score.

OLA system: SRA has been conducting in-depth investigation into all fatal crashes since 1997. In 2003, SRA was given the responsibility of carrying out in-depth studies of all road traffic crashes. The OLA method was introduced into road safety work at national and regional levels within SRA in 2001. This is a working approach where system designers work together to try to provide solutions to common problems – objective/solutions/action.

A University of Lund study for the Road Traffic Inspectorate in 2005 carried out a review of the SRA's in-depth studies of all fatal crashes and its work in respect of OLA. The Inspectorate concluded in 2006 that the National Assembly project, now renamed Joint Campaign for Road Safety Year 2007, has been given well-defined goals and a clear organisation by SRA. However, there still is no evaluation or analysis of the extent to which these areas contribute to the road-safety goal.

There have been concerns expressed about whether the outcomes of OLA in terms of crash causation and risk are being applied to designing the overall system in a different (safer) way. While every fatal crash is now investigated in-depth, the quality of the investigation is reported to be variable, there is no national standard methodology in use, and there is little aggregate analysis of the annual fatal crash sample.

Public opinion tracking is carried out annually by the SRA.

The development and use of safety performance indicators in Sweden is, in general, world-leading.

It is recommended, however, that SRA ensures that the new data collection process and any necessary augmentation does provide for representative measurement (nationally, regionally and locally) of average speeds to be derived at least annually to provide a baseline for speed management and to monitor the effectiveness of multi-sectoral activity in line with good practice.

It is recommended that SRA actively develops the knowledge of other stakeholders in the OLA programme, further develops the methodology for OLA and ensures that outcomes are continuously applied to update relevant policies, standards and guidelines in the sector. Periodic aggregate analysis of the outcomes should be expanded and published.

It is recommended that public opinion tracking is carried out nationally, regionally and locally.

Institutional outputs There is little or no monitoring or evaluation of declarations of interest by stakeholders. At local level the Swedish Association of Local Authorities has identified and promoted a methodology for the evaluation and star ratings of local road safety plans. These are carried out increasingly (some 30-35 municipalities have been rated) in some cases with partial subsidy by the SRA regional offices.

Road haulage industry Swedish trade unions in cooperation with environmental and road safety organisations have developed a ranking system for heavy goods transport. This ranking system is called Q3 and is modelled on Euro NCAP. It is based on working environment, environmental and road safety requirements (<http://www.q3.se/>). While the system has limited coverage to date, it is becoming well accepted and is considered a worthwhile initiative.

Road safety inspection The National Road Traffic Inspectorate was established in 2003. The Managing Director of the Road Traffic Inspectorate reports directly to the Board of the SRA, and otherwise has a separate annual budget, programme and decision-making hierarchy. It has sixteen staff members and an annual budget of around 20,000,000 SEK (\$US 2.6 million). The tasks of the Inspectorate are as follows:

- To monitor and analyse conditions that could substantially affect the design and functioning of the road transport system through taking a holistic view of the road safety goals adopted by public authorities, municipalities and others.
- In dialogue with the stakeholders referred to above, work to ensure that they apply a systematic procedure to prevent road accidents that result in death or serious injury.
- To cooperate with other stakeholders to improve traffic safety on roads.
- To initiate research and development within the road safety sector and monitor research of importance to the operations at the Inspectorate.

The Inspectorate has engaged fully and well with the governmental stakeholders who are involved in the day to day management of road safety, particularly against the background of shared responsibilities being ill-defined. A criticism was expressed, however, that the focus was rather more on SRA's activity rather than on other key governmental and non governmental stakeholders, including some basic regulations that were not being adequately applied by some agencies. As noted by the Road Traffic Inspectorate itself, while the Inspectorate enjoys a large degree of independence, the entirely independent position that was initially intended has not been created.

It is recognised that the declarations of interest by stakeholders do require active monitoring. SRA is moving to provide an increased focus on measurement of levels of achievement.

The establishment of the Traffic Inspectorate is a world-leading initiative.

It is recommended that the Traffic Inspectorate be established as an independent body which achieves a higher profile than achieved to date.

It is recommended that Inspection reports are widely promoted amongst policymakers, Parliamentarians, stakeholders and the media.

It is recommended that in line with international good practice, that the organisation of regulation and inspection functions continue to be separated in transport organisation.

The positions adopted by the Inspectorate confirm the organisation's independence resulting in a healthy tension between the Inspectorate and key stakeholders. However, the Inspectorate's communication strategy and wider advocacy seems to have been somewhat limited and falls short of what might have been expected by other stakeholders.

Research and knowledge transfer

A national road safety research and development programme?

VINNOVA and the SRA are the two national governmental agencies which provide government funding for road safety research. A number of research funding organisations were amalgamated in 2001. There is a large budget for road safety research. A large variety of organisations – both from Sweden and abroad (e.g. TOI and Monash) - engage in national as well as EU-funded research. These include the Swedish National Road Research Institute (VTI), Folksam Research, Chalmers University of Technology, and the Universities of Lund and Uppsala.

At the same time, there is no published road safety research and development programme and little evidence of regular coordination both for short term and long term research needs for Vision Zero. A conclusion of the recent TOI report conducted for VINNOVA stated that 'sharing responsibility between VINNOVA and Vägverket imposes new demands for co-operation between the players if the breadth and long-term perspective of the research are to be dealt with in the best possible way'. The research institutions interviewed for the study emphasised the fact that during the period from 1971-2000 they had relatively stable and predictable funding for example, through thematic programmes, rather than for individual projects.

Several stakeholders expressed concern that a large amount of public resource was going into technology-led research rather than Vision Zero / system-wide road safety problem oriented research. For example, a lot of investment is going into the SAFER partnership hosted by Chalmers University of Technology which seems to address technology-led rather than necessarily road safety priority-need developments. This initiative is chaired by the car industry and four out of its seven members comprises car or car components industry representatives. A further large programme supported by VINNOVA, SRA and the car and truck industry is the Intelligent Vehicle Safety Systems programme which aims at 'moving the emphasis from passive solutions to active systems' which may not be wholly appropriate for road safety in the short term.

Other key research to meet the short term needs imposed by interim target-setting seems limited.

Stakeholders also expressed concern about the loss of key expertise in SRA and elsewhere due to retirement which was creating a gap in certain knowledge disciplines.

Sweden has a long and internationally recognised tradition in road safety research.

It is recommended that the government reviews the 2001 research reforms for effectiveness, particularly in respect of programme definition and coordination.

It is recommended that a multi-disciplinary national road safety research and development programme is formulated in support of the long term Vision Zero goal as well as short term needs in support of the new interim target.

In addition, an advisory panel bringing together multi-disciplinary research expertise could make a useful contribution to annual review by the lead agency and partners of road safety research needs.

It is important to ensure some funding is provided for long term or strategic research and that the medium/short term programme is sufficiently flexible to encourage innovative thinking.

It is recommended that research is carried out towards achieving improved deterrence from police operations. It is also recommended that a clinical study be carried out to identify the extent of drug impairment amongst fatally injured motor vehicle drivers and riders.

It is also recommended that the research sector, as it does successfully in many other countries, becomes more actively engaged in public debate of evidenced-based road safety activity.

It is recommended that professional organisations continue to actively develop tools for knowledge transfer based on good practice covering all safety elements of the road traffic system.

Contribution of research and professional organisations to policy development?

A recent VINNOVA report carried out by the TOI has confirmed that research has had a major impact on Swedish road safety policy development and road safety results.

The SRA maintains a 'total effect' catalogue (last updated in 2000 and currently being further updated) which outlines the effectiveness of different road safety measures.

Engagement of research and professional organisations in knowledge transfer?

The Swedish Association of Local Authorities and Regions has been successful in communicating a wide range of good practice to practitioners in the municipalities for the implementation of Vision Zero strategies e.g. Calm Streets (1998), and to elected representatives e.g. One Moment. It is currently producing a catalogue of proven cost-effective local measures.

The SRA has also funded demonstration projects such as En Route to Vision Zero at Trollhättan to illustrate how Vision Zero can work in practice. Monitoring showed that 75% of the 53,000 inhabitants were positive about the project implementation.

Design and operation of road network

Comprehensive standards set for roads?

The national road network consists of 98,300 km and is the responsibility of the SRA and its 7 regional offices. The municipalities administer another 41,000 km of urban and rural roads, and for these roads they are also responsible for traffic regulations and maintenance. In addition to the public roads there are about 76,000 km of private roads receiving state subsidies and a large number of private roads without state subsidies, most of which are forest roads.

Currently, road network standards are set out in a national design manual which is reported to be continuously updated. Road safety engineering guidelines are developed and disseminated by the SRA and Swedish Association of Local Authorities. It was pointed out to the review that the existing substantial variation in the safety quality of the state road network (including the applicable speed limit) reflects history pre-SRA of 24 counties and to some extent within the 7 SRA regions post 1991. At present, decisions about road safety engineering investment on national roads seem to be taken on the basis of high volume rather than high risk. According to the Road Inspectorate, insufficient attention is being given to safety at the planning stage of projects.

The road network is currently being assessed in accordance with EuroRAP safety ratings (in which SRA has been fully involved at technical level since its inception in 2001). To date, 10,000 km of the existing rural road network have been assessed by EuroRAP, generally for the higher traffic volume routes. Of the assessed roads, 31% meet the four-star rating which correspond to a safe road. Updating and monitoring of the status of the evaluated roads is now underway.

Speed limit setting powers are complex. While a 50km/h default speed limit applies in built up areas, local governments can reduce these limits to 30km/h (or 40km/h from 2008). Any objections to these proposals are referred to SRA for resolution. On the state network, the default speed limit is 70km/h or in the case of freeways, 110km/h.

Given that, according to the EuroRAP, the road network accounts for 60% of all fatal and serious crash consequences, it is recommended that EuroRAP assessment of the whole rural network is carried out and findings reviewed regularly for action.

It is recommended that the SRA accepts the Inspectorate's suggestion to adopt a new safety standard for roads which better matches road design and layout to appropriate speed limits to reduce user risk and increase user protection. This standard should be consistently and systematically applied in terms of speed limits for existing roads and in the design and setting of speed limits for new roads.

It is recommended that a speed limit setting group from the Counties, municipalities and SRA and Police and Justice, be established to advise SRA as part of process of definition of road standards by SRA. It is recommended that SRA is responsible for final decisions on speed limits above 50km/h.

It is recommended that Sweden introduces a 5 stage mandatory road safety audit for all new road projects to be conducted by safety experts outside the design authority, in line with international good practice. The stages are 1) feasibility stage, 2) preliminary stage,

3) detailed stage, 4) pre-opening and 5) post-opening (monitoring).

County councils can seek to reduce speed limits from 90km/h to 70km/h or from 70km/h to 50km/h (e.g. through a village) but if there is any public disagreement it is referred to SRA for decision. SRA has powers to raise limits from 70km/h to 90km/h or to 110km/h on the national road network, usually by regional decision. SRA head office resolves disputes.

Effective speed management in rural and urban areas is generally acknowledged to be a pre-requisite of the Vision Zero strategy in Sweden. The need for more protective medians and roadsides to reduce the consequences of vehicles crashing on the road network is also widely acknowledged as is the EuroRAP finding that the road network generally contributes some 60% of crash consequences. In approving SRA's recommendations in 2007 for a new speed limit classification (limits in 10 incremental bands in the range of 30km/h – 120km/h), the Government has stated recently that road safety needs to be at the core of decisions on the setting of speed limits. In line with this recent governmental decision, SRA is developing a system where an extended range of options for speed limits will be based on safety criteria according to EuroRAP. In support of the new speed classification, the Traffic Inspectorate has recommended that SRA should adopt and apply a standard for a safe road system on the basis of speed limits and protective design appropriate to the type of road use, in line with EuroRAP specifications.

Since the introduction of Vision Zero, a significant amount of innovative safety engineering work has taken place introducing barriers on sections of rural roads, replacing signalised junctions with roundabouts and implementing 30 km/h urban speed zones (particularly in residential areas). In addition, speed limits have been reduced for over 3000 kms of rural road. Since 1998, there has been a large programme of installation of median cable barriers, creating separated traffic on wide roads with 2+1 lanes to address the problem of head-on collisions. However, these only comprise high volume roads. Some 38% of traffic flow on rural roads with a speed limit of 70 km/h or greater is now divided (median barrier separated). By the end of 2006, more than 3500km of roads have separated traffic flows and 1500km of these have 2+1 barriers. Around 25% of the state network is designed to prevent head-on collisions. The SRA strategic plan for 2008-2017 indicates that this work is set to continue. Milling of centrelines to provide a warning to drivers when they are inadvertently crossing the road centreline is commencing and is to be implemented as a standard for the rural network. Safety audit is not mandatory, though it is in general practice, but not conducted independently of the design group.

It is also recommended that area-wide assessment of the potential safety impact of that project on the surrounding area is required and undertaken.

It is recommended that the three largest municipalities enact a strategy to address road deaths and serious injuries on urban main roads. It is recommended that the successful practice of ring-fencing annual funding for road safety improvements be continued by the regional offices.

It is recommended that all road projects above an agreed value are discussed in depth at concept stage by a senior committee of SRA directors and the proposing regional staff. The purpose of this Project Review Committee (PRC) process will be to review issues relevant to the 6 transport goals within projects and resolve policy settings and standards – at least in the road safety field – whenever new approaches are identified as necessary. While this will be a substantial regular demand on SRA senior management, it will provide a forum for knowledge development and transfer and continuous review and improvement to standards and policies.

Since the late 1990s in urban areas, over two thirds of municipalities have implemented 30km/h speed zones (mainly in residential areas) and separated vulnerable road-users from motor-vehicle traffic by more bicycle lanes and pedestrian crossings utilising the Calm Streets guidelines. For example, traffic calming in Göteborg has resulted in a large reduction in the numbers of deaths and serious injuries (VTI, 2004) and a socio-economic benefit of more than 47 times the direct costs.

The Traffic Inspectorate (Annual Report 2006), however, point to “a clear conflict of interest between a safe traffic environment and public demands for accessibility in the three largest municipalities” on the main road networks where 30% of deaths in municipalities occur.

Appropriate resource allocation for road safety engineering is seen as more of a problem than levels of funding by most stakeholders.

Conditions of entry and exit to the road network for vehicles and users

Comprehensive standards set for vehicles?

Sweden continues to be a world leader in its work on improving vehicle safety through support for key legislation and consumer information strategies. The safety quality of the new vehicle fleet in Sweden is probably the best in the world due to fast tracking of key safety equipment. Further improvements will be crucial to realising the ambitious goals of Vision Zero.

Crash protection

In common with other EU countries, Sweden is a signatory to various EU and UNECE type approval agreements for vehicles which limits its ability to regulate for safety on a national basis. Sweden has been a leading advocate at EU level for key safety standards. There remain several important crash protection standards (the need for which has been long identified by research) which still need to be developed or agreed in EU legislation: e.g. car to car compatibility, an effective Phase 2 for pedestrian protection, frontal underrun protection on HGVs.

The main strategy has been to create a market for vehicle safety equipment in Sweden. Public authorities have been encouraged by SRA and partners to create such a market by quality assurance of transport and by consumer information. The SRA has played a leading role in developing, supporting and chairing EuroNCAP, developing and promoting in-house vehicle safety policies and encouraging domestic producers to install new technologies at the earliest opportunity.

In 2006, just over 50% of new cars sold in Sweden were 5* (car occupant rating). Swedish car and truck manufacturers aim to be the leading manufacturers of automotive products in the safety area.

The fitment of seat belt reminders in new cars sold in Sweden has increased from 0% to 80% in just over 3 years.

Sweden has led research internationally on whiplash injury (notably from the Swedish insurance sector) and has made a substantial technical contribution to the work of Euro NCAP in this area. There is concern amongst stakeholders that this has yet to be taken up.

In order to provide improved protection for Swedish road users using known technologies, it is recommended that Sweden strengthens its advocacy for key vehicle safety legislation at EU level especially relating to compatibility e.g. performance standards to improve car to car compatibility, an effective Phase 2 for the pedestrian protection, and frontal underrun protection on HGVs.

The activity of SRA and its partners in creating a national market for vehicle safety equipment through use of consumer information and in-house safety policies is world-leading and should be expanded.

At EU level, it is further recommended that EuroNCAP is encouraged to combine car and pedestrian safety ratings into an additional overall crash protection rating as soon as possible. It is recommended that Sweden pursues a specification within EuroNCAP for car to car compatibility

It is recommended that EuroNCAP be encouraged further to adopt a whiplash specification.

It is recommended that dealers be encouraged to display car occupant and pedestrian safety EuroNCAP ratings on new vehicles for sale in Sweden.

It is recommended that the voluntary fitment of energy absorbing front underrun protection to HGVs is given high priority in the national Vision Zero programme.

It is recommended that all car suppliers to the Swedish market are encouraged to fit seat belt reminders in all rear seats.

A significant number of annual deaths involve trucks and some 50% of those crashes are reported to be head-on. Truck underrun protection is under further development and EU legislation is being sought (although this involves a *quid pro quo* request for an increase in trailer length). Volvo Trucks have expressed full support for Vision Zero.

Active safety

Speed is a central design parameter for a safer traffic system in alignment with Vision Zero. However, new cars sold in Sweden can reach speeds of over twice the maximum road speed limit. No logical reason exists for this position.

In Göteborg, there is a 30km/h vehicle speed limit for public transport.

In total almost 1,000 ISA systems have been installed, of which about one third are in SRA vehicles.

The availability of electronic stability control in new cars in Sweden has increased from 15% to 91% in under 3 years.

While some of the new technology seems to hold potential future promise, the potential contribution to short term targets and longer term goals is largely unknown. A working group comprising the SRA, researchers and car industry has been set up to properly assess the potential contribution of active safety technology which is currently under development.

Integrated safety systems

Swedish research is working towards the provision of integrated safety systems which are active and passive safety measures aimed at crash avoidance, crash protection and injury severity mitigation by using sensing information in real-time about the vehicle and vehicle surroundings including other vehicles movements.

It is recommended that cars with lower top speeds than at present are permitted for use on Swedish roads and lower limit speedometer displays are sought through discussion and agreement with the car industry.

It is recommended that a) speed adaptation systems to assist drivers in keeping to the speed limit are included as a condition of all public sector transport contracts and b) that fitment of ISA to all vehicles registered for use on Sweden's roads be a condition of registration - both by an agreed date.

Motor vehicle inspection

Motor vehicle inspection of all motorized vehicles including motorcycles is carried out annually on vehicles aged 3 years old and above. This is carried out by the privatised Swedish Motor Vehicle Inspection Company. The Company publishes consumer information biennially based on its databases.

Comprehensive standards set for users?

Licensing arrangements for young drivers and riders

While low licensing rates for 18 to 22 year olds have lessened impacts of inexperience and risk taking, there is still substantial over representation in casualty crashes by this age group. The levels of crash involvement by 15 year old moped riders are high. SRA has proposed legislation on increasing age of access to mopeds but this has not yet been accepted.

It is recommended that two stage graduated licensing arrangements are introduced for the first 4 years of driving. It is suggested that consideration should be given to passenger restrictions (Year 1), no mobile phone use, no late night use (Year 1), compulsory alcohollocks for return to driving after any BAC offence (court supervised), a lowered annual demerit point limit and requirements for fitment of speed compliance recorders for offenders (court supervised)

It is recommended that any existing incentives for the use of mopeds are removed. Increased age for moped access should be sought, with no accompanying passengers unless the rider is 18. Also a mandatory requirement should be introduced for helmets to be worn by riders of all ages on all motorized two-wheelers.

Compliance with safety standards and rules in the road environment

Compliance regimes for roads, vehicles, road users and post-crash services?

Roads

As noted above, there is a preparedness to consider new legislation which would make it clear how infrastructure is to be made safer, imposing future responsibilities on SRA as a system designed to achieve these outcomes over time for the existing network upgrade and setting out the means of compliance.

Vehicles

Sweden is a signatory to EU and international agreements for type approval. Vehicle certification and inspection is carried out by the Swedish Motor Vehicle Inspection Company.

Road users

Until recently and against the background of low interest in enforcement by the police in previous years, the strategy for securing increased user compliance with key safety rules has focused on the encouragement and introduction of new vehicle technologies, such as alcohol interlock devices and seat belt reminders in commercial vehicles and private cars. The rate of introduction of such technologies is impressive, as are the results achieved to date. Annual tracking surveys confirm, however, that there is currently a low perception of risk of being detected committing a traffic offence amongst the public. People are not deterred by the combination of current enforcement activity by the courts and the police and publicity supporting enforcement by government.

Penalty and courts systems and legislative settings

The penalty system is gradually being strengthened e.g. recent penalty point increases. However, stakeholders pointed to the need for a more useable penalty points system that would be more readily understood by the public, a review of court practice for high level speeding and the efficacy of current offender schemes needs e.g. :

EuroRAP assessment, mandatory safety audit, area-wide safety impact assessment and executive project review committee processes offer key means of systematically monitoring compliance with new and existing standards.

It is recommended that continuing efforts are made to utilise technology wherever possible in assisting users to comply with key road safety rules especially speed limits.

In order to increase users perception of the risk of detection for key road safety rules, it is recommended that a comprehensive review is carried out on the potential 'deterrence' value of future courts and police enforcement activity and practice and the use of enforcement tools based on international good practice.

Support should be provided to police to assist further development of performance indicators for enforcement activity which reflect good international practice.

- Use of interlocks (have been available on a part suspension trade-off basis)
- Permitted use of mopeds during disqualification from car driving
- Current limited capacity for processing fixed penalties

Police enforcement activity and tools

The National Police Board sets the strategic direction for police work and coordinates and monitors activity and the 21 autonomous police authorities integrate national strategy into local plans and operations.

While Sweden has a long tradition in police enforcement for road safety, road safety policing has only recently started to get back on track after a significant reduction in activity. Between 1997 and 2002, police resources were cut by 16%. In their Annual Report for 2004, the traffic inspectorate were highly critical of police enforcement in support of Vision Zero in the areas of speeding, drinking and driving and seat belt use.

A new Swedish police road safety strategy came into force in April 2006 in support of Vision Zero and the interim target. It sets out overarching objectives for the five years to 2012 to:

- Increase traffic supervision and crash prevention measures
- Ensure that the level of ambition and activity in police road safety work is uniform throughout the country – stakeholders highlighted that there had been a lack of consistency or enforcement in efforts across Sweden
- Ensure that road safety effort is an integral part of other tasks such as combatting crime

The four priority areas for police crash prevention work are: speed, drinking and driving, restraint and helmet use and aggressive driving e.g. headways that are too short, red light running and illegal street racing.

Speed

Speed is an essential element of Vision Zero but remains a socially acceptable behaviour in Sweden, perhaps more so than in some other jurisdictions active in road safety.

The control of average speeds over sections of the network offers both safety and environmental benefits. It is recommended that more speed cameras and more processing capacity are provided. It is also recommended that the efficiency of enforcement procedures e.g. owner liability for camera offences and any issues of perceived limitations on enforceability by police (including concerns about evidentiary requirements) are reviewed by government. It is also recommended that the current courts policy not to accept speed in isolation as a reason for careless driving under speeds of 190 km/h be reviewed urgently. It is further recommended that more mobile cameras are introduced and operated covertly to promote the notion that speeding “anywhere, anytime” will not be permitted and is likely to be detected. Penalties for speeding should be reviewed to reflect the known comparative risks and therefore penalties associated with drink driving .

It is recommended that the ‘deterrent’ effect of current police procedures for excess alcohol be reviewed in line with best practice including high visibility to ensure effectiveness of operations is maximised and detailed reporting against agreed performance indicators be conducted.

More than half of all traffic exceeds the speed limit on state roads and the risk of being caught for speeding is small. More than two thirds of drivers speed on 50 km/h state roads. Heavy goods vehicle drivers exceed the speed limit for about three-quarters of their work-time. There is a wide-spread belief amongst stakeholders that there is an inadequate police presence for speed detection (including the Prosecutor-General) and that a broad communications, police enforcement and technology strategy is needed to reach out to the Swedish public.

Since April 2006, the threshold for reporting speeding in speed checks was revised to 6 km/h above the limit in line with the new police strategy. Road safety cameras started operation in 1999 and are managed in a joint venture between the SRA and the Police. By the end of 2006, more than 700 cameras have been implemented covering 1900 kms of the road network resulting in 16 fewer deaths annually. Monitoring has shown that average speed has dropped by 8% on roads equipped with cameras and that the camera system has been positively received. Together with other parties, the SRA is studying appropriate conditions for the installation of road safety cameras on local authority roads.

Drinking and driving

The SRA estimates that 14,000 trips are made by car each day under the influence of alcohol. Since 1997, the percentage of drivers killed while under the influence has almost doubled and in 2005 (most recent available data) was 34%. The SRA concludes that the increase in the percentage of drink drivers among road deaths in recent years is in part a result of a reduction in the number of drivers killed on the roads while the number of drink drivers has remained largely constant during the 2000s. Around 25% of all road deaths involve excess alcohol or drugs.

The police strategy states that the aim is to carry out 2 million breath tests annually. Since 2001, breath tests have been carried out every time a driver is stopped by a police officer. In 2006, 2.2 million tests were carried out which equates to around 1 in 2.6 licensed motor vehicles drivers and a 25 per cent increase compared to activity in 2005. The increased number of tests performed is estimated using the current assessment model to have led to 15-20 fewer fatalities and 150-200 fewer seriously injured persons per year. The number of tests, the regional allocation and the targeted breath testing times are currently under review.

SRA currently provides supplementary funding for these police outputs. Funding for breathalysers has come from the personalized number plate fund which is administered by the SRA. The SRA runs a Don't Drink & Drive project, which is a nationwide joint project to encourage young people to stay away from alcohol in traffic.

Seat belt use

Front seat belt use is high and is being addressed by the combination of police enforcement activity, information campaigns and seat belt reminders (which were installed in 80% of new cars- for drivers - in 2006). Rear seat belt use is relatively low (74%) compared to European best practice and has been declining. The police report less activity on seat belt enforcement in the last couple of years.

Other issues highlighted during stakeholder meetings include:

- The lack of red light cameras, mobile camera and hand held speed detection devices in use by police
- The lack of automatic number plate recognition which has proved successful elsewhere
- The lack of regular TV deterrence advertising by the police, SRA and other partners
- The lack of public information on fatigue
- The opportunities for insurance premiums to include consideration of compliance record

It is recommended that (1) combined police enforcement and publicity addresses current levels of rear seat belt use to increase use in the short term and (2) the Swedish car industry is encouraged to fit seat belt reminders in all rear seats.

Emergency medical services

Comprehensive standards set?

Several stakeholders believe that post-crash care is a road safety issue which may have had less attention in recent years, although this is acknowledged as being an integral part of traffic system safety.

Emergency services and trauma care

Emergency services are a local or regional responsibility. Regional councils are responsible for ambulance transport. Many of the services are contracted out to private enterprises and in contracts there are often stipulations about response times.

The National Board of Health and Welfare is the national expert and supervisory authority for activities involving the social services, public health, the prevention of infectious diseases, and health and medical care. Its mission, as formulated by the Government, is to deal with issues concerning health and medical care from a holistic perspective.

While the general standard of emergency response and trauma care is understood to be good, there is no legal stipulation about time limits for recovery of crash victims. However, it is further understood that there exists an informal agreement that 85-90 % of the population should be reached by emergency measures within 10-15 minutes of any event such as a crash.

State of the art courses for trauma care developed in the US were introduced in the mid-1990s. One study in Umeå, however, has estimated that further improvements could contribute to a 7% reduction in deaths.

There does not appear to be any 'first responder' training for the emergency services (non-clinical) or in commercial and public transport.

In view of the valuable contribution made by the health sector in Sweden to address other areas of unintentional violence and injury, it is recommended that a review be carried out by the National Board of Health and Welfare of the potential contribution of the emergency medical system and trauma care in Sweden to reduce death and disability following road crashes.

Social costs

Estimates of the social cost of road crashes?

Estimates of socio-economic costs are not established annually. VINNOVA noted in 2007 that the direct costs for killed and injured road users in 2005 in Sweden are estimated to exceed 29 billion SEK.

While Vision Zero is not bound by the traditional model of providing road safety at reasonable cost, decisions are clearly being made in Sweden based on cost which affect road safety, especially in short term road safety work. In order that road safety can compete with other areas of activity successfully (e.g. in police work), it is recommended that annual estimates are adopted by Government of the value of preventing death and serious injury and the total socio-economic cost of road crashes.

Final safety outcomes – fatalities and serious injuries

Available data on deaths, injuries and risks?

In 2006, there were 445 deaths in Sweden, slightly up on the previous year (440) and 70 fewer than in 1997, 3959 reported serious injuries (up 1% compared with 2005) and 22,677 slight injuries. The death rate per 100,000 population was 4.9. The number of cars increased by 1.5% and the number of motorcycles by 11% though there was no change in traffic volume. There were 5.8 million licensed drivers in 2006.

While the police report around 4000 serious injuries annually, the National Board of Health and Welfare reports that around 13,000 people are injured annually with injuries which are sufficiently serious to require admission to hospital following a road crash. This represents a serious discrepancy. Many of these are likely to be minor injuries and different hospitals have different systems for registration of crashes. Studies indicate that the police report 60% of serious injury and that there are problems in classifying injury severity. Work is underway on a new definition of serious injury and several stakeholders pointed to the urgent need to determine the incidence of long term serious, serious or minor road traffic injury in the health system.

A hospital study in UMEA indicates that 6% of all road users attending hospital as out patients or in-patients resulted in disability. The Inspectorate reports that only a proportion of work-related crashes are reported to the Swedish Work and Environment Authority system.

N.B. Since 2001, road deaths due to sudden illness e.g. heart attack, are no longer included in the official statistics which are based on police-reported crashes.

Notwithstanding Sweden's level of ambition for road safety and the fact that the interim final target has not been met, Sweden has one of the lowest death rates in the world.

Sweden has a substantial under-reporting problem in police statistics for serious road traffic injury.

There is an urgent need to determine the incidence of long term serious, serious or minor road traffic injury in the health system and to achieve the 100% cooperation of hospitals with the STRADA system.

Intermediate safety outcomes

Sweden has been at the forefront internationally in the development and use of safety performance indicators to inform the development and monitoring of its road safety goals, targets and programmes. With some notable exceptions, data is available to identify:

(1) network vehicle speeds

No representative data of average speeds in the urban and rural network currently exists. Speed observations were carried out in the rural network until 2004. Monitoring to 2004 indicated that mean speeds increased on State roads from 53% (1997) to 57% (2004). Data, though not as nationally representative of average speeds as once was the case is available for analysis at fixed speed camera sites and 80 other fixed locations. One or two SRA stakeholders noted evidence of speeds going up in their region. In 2006 in Stockholm speeds were measured following the introduction of congestion charging and were lower than comparable stretches of 50 kms of road measured in 2005. In Göteborg, the average speed was comparable with sections of commuter road measured in 2005 and the speed increased in two sections and decreased in three sections.

(2) seat belt wearing rates

The front seat belt wearing rate (2006) is 94% which has been increasing over recent years. The level is 97% in Göteborg. The national rear seat belt wearing rate is 74% (2006) which has decreased from 80% (2004). In 2006 seat belt use among taxi drivers rose significantly to 90% from 83%. Estimated seat belt use by heavy goods vehicle drivers is 40%.

(3) motorcycle and moped helmet wearing rates

No recent surveys have been carried out, though experts believe rates for motorcycles exceed 90% but less for moped use.

It is recommended that in view of the importance of speed reduction to the achievement of Vision Zero, annual measurement of average speeds is carried out in sections and areas which are nationally representative. The national police strategy notes that if average speed was lowered by 2km/h, there would be an annual 10% reduction in road deaths. This opportunity needs to be promoted extensively within and external to government.

(4) cycle helmet wearing

In 2006, 25% of cyclists wore cycle helmets. Helmet use among younger school children (aged 6-12) was 61%, compared with 74% in 2005, although higher than in 2004 when legislation was introduced. Adult use of helmets on public cycle lanes and paths has risen by almost 5% since 2005.

(5) alcohol use in traffic and involvement in crashes

The SRA estimates that alcohol is involved in around 20% of fatal crashes. The number of reported offences involving impairment by alcohol or drugs in 2006 amounted to 27,308 (23,225). Of these, 9,931 (7,416) involved drugs compared with 18,975 in 2002 of which 4,616 involved drugs.

(6) fleet safety standards

In 2006, just over 50% of new cars sold in Sweden were 5* (car occupant rating).

(7) safety rating of road infrastructure

EuroRAP protocols for rural roads have been used to assess the safety quality of the road infrastructure. Of the assessed rural roads, 31% meets the four-star rating which corresponds to a safe road.

(8) recovery of road crash victims

Information being sought.

(9) network volumes

These are reported annually and monitoring has shown that traffic mileage in 2006 was 75625 billion motor vehicle kilometres.

Safety programme outputs

Breath testing

In 2006, 2.2 million tests were carried out which equates to around 1 in 2.6 licensed motor vehicles drivers. Time of day and locations for testing are under review

Seat belt checks

During 2006 the police reported 50,294 drivers and passengers in passenger cars for not wearing seat belts, which is 6 per cent fewer than 2005.

Speed checks

In 2006, 700 speed cameras are operational on the rural road network. It was announced to the media in 2007, that speed checks would only be conducted by use of automatic speed camera equipment.

Median barriers

In 2006, 3500 kms of road has separated traffic flow.

Electronic stability control

In 2006, 91% of new cars sold were fitted with electronic stability control.

Seat belt reminders

80% of new cars sold in Sweden are fitted with seat belt reminders

Appendix 2

World Bank Country Capacity Checklist, 2007

Institutional management functions	Checklist	Yes	Partial/pending	No	
Results focus	Is there an official position on what is an acceptable and achievable level of safety for all road users?				
	Are agency, community and business sector responsibilities and related interventions to help achieve this acceptable level of safety clearly defined?				
	Has a lead agency been formally established to direct the national road safety effort? What form does this lead agency take?				
	Is the lead agency role defined in legislation and/or policy documents and annual performance agreements?				
	Have national and regional targets been set for improved safety performance?				
	Which agencies are responsible for achieving this level of safety and how are they held to account for the performance achieved?				
	Has a vision for improved road safety performance in the longer-term been officially approved?				
	Are regular performance reviews conducted to assess the potential for making short-term improvements to achieve safety targets and longer-term improvements to achieve the safety vision?				
	Coordination	Are interventions being coordinated horizontally across central agencies to help achieve the desired focus on results?			
		Are interventions being coordinated vertically between central, regional and local agencies to help achieve the desired focus on results?			

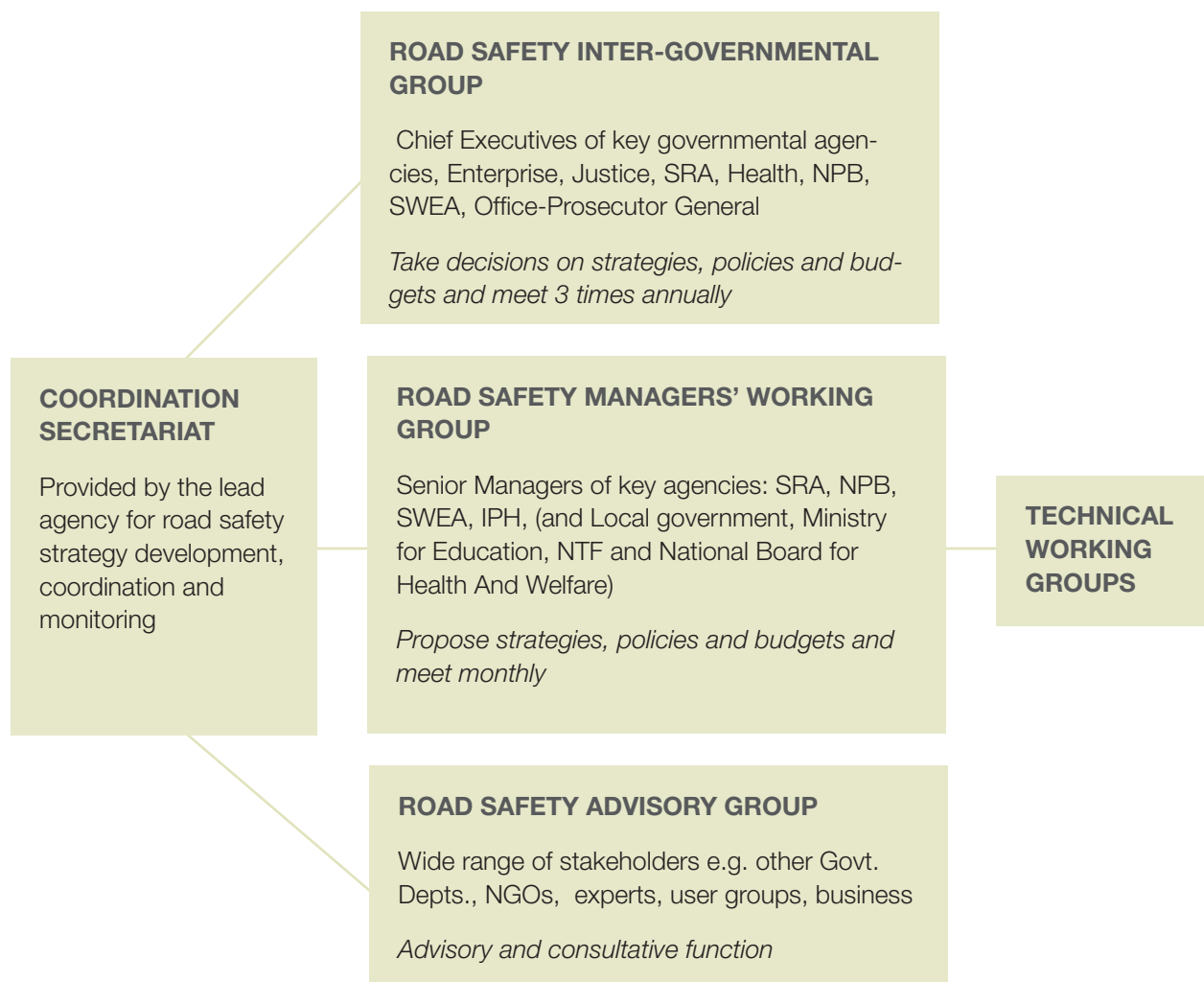
	Have robust delivery partnerships been established where appropriate between agencies, communities and the business sector to help achieve the desired focus on results?			
	Are Parliamentary committees and processes supporting the identified institutional management functions to help achieve the desired focus on results?			
Legislation	Are legislative procedures and instruments supporting interventions and the identified management functions sufficient to help achieve the desired focus on results?			
	Are legislative procedures and instruments regularly reviewed and adjusted to help achieve the desired focus on results?			
Funding and Resource Allocation	Are funding mechanisms and resource allocation procedures sufficient to help achieve the desired focus on results?			
Promotion	Are the government, community and business responsibilities to help achieve the desired focus on results being actively promoted?			
Monitoring and Evaluation	Are systems in place to collect and manage data on road crashes, fatality and injury outcomes, and all related road environment/vehicle/road user factors, to help achieve the desired focus on results?			
	Are systems in place to collect and manage data on vehicle speeds, safety belt and helmet wearing rates, alcohol use in traffic and involvement in crashes, vehicle fleet safety standards and safety rating of road infrastructure, and emergency medical system response times to help achieve the desired focus on results?			
	Are systems in place to collect and manage data on road network traffic to help achieve the desired focus on results?			

	Are systems in place to collect and manage data on quantities of safety interventions implemented (e.g. policing operations, promotional activities, systematic safety engineering treatments, etc) to help achieve the desired focus on results?			
	Are systems in place to regularly monitor and evaluate safety performance against targets to help achieve the desired focus on results?			
Research and Development	Is a national road safety research and development program conducted to help achieve the desired focus on results?			
	Do independent research and professional organizations contribute to policy and program development to help achieve the desired focus on results?			
	Are independent research and professional organizations engaged in road safety knowledge transfer to help achieve the desired focus on results?			
Interventions	Checklist	Yes	Partial/pending	No
	Have comprehensive safety standards and rules been set for roads, vehicles, road users and post-crash services to achieve the desired focus on results?			
	Are compliance regimes in place to ensure adherence to identified safety standards and rules for roads, vehicles, road users and post-crash services to achieve results?			
	Do the identified safety standards and rules and related compliance regimes for roads, vehicles, road users and post-crash services clearly address the safety priorities of high-risk road user groups to achieve results?			

	How favorably do identified standards and rules and related compliance regimes for roads, vehicles, road users and post-crash services compare with international good practice to achieve results?			
RESULTS	Checklist	Yes	Partial/ pening	No
	Are estimates of the social costs of road crashes available?			
	Are data readily and regularly available to identify annual road deaths and injuries?			
	Are data readily and regularly available to identify which road users face the biggest risks of being killed and injured in the road transport system?			
	Are data readily and regularly available to identify which sections of the road network by road function have the highest concentrations of deaths and injuries?			
	Are data readily and regularly available to identify network vehicle speeds, seatbelt wearing rates, motor cycle helmet wearing rates, cycle helmet wearing rates, alcohol use in traffic and involvement in crashes, vehicle fleet safety standards, safety rating of road infrastructure and the recovery of road crash victims?			
	Are data available to readily and regularly identify network traffic volumes?			
	Are data available to readily and regularly identify quantities of safety interventions implemented (e.g. policing operations, promotional activities, systematic safety engineering treatments, etc)?			

Appendix 3

Proposed inter-governmental coordination hierarchy



Appendix 4

List of stakeholders met in the road safety management capacity review, August- September 2007

NAME	ORGANIZATION	ROLE
Siv Gustavsson	Ministry of Industry, Employment and Communications	Transport Division
Lars Darin	Ministry of Industry, Employment and Communications	
Mikael Oskarsson	Ministry of Justice, National Police Board	
Kent Eriksson	Ministry of Education/ National Agency for Education	
Sven-Erik Alhem	Office of the Prosecutor General	
Marie Nordén	Member of Swedish Parliament	Member of the Transport and Communications Committee
Claes Tingvall	Swedish Road Administration	Director of Safety
Anders Lie	Swedish Road Administration	
Christer Agerback	Swedish Road Administration	SRA Regional Office, Eskilstuna
Hans Rode	Swedish Road Administration	Congress Director
Björn Stafbom	Swedish Road Administration	
Thomas Lekander	Swedish Road Administration	Road Safety Analyst Road Users
Torsten Martinsson	Swedish Road Administration	Senior Project Manager Community Processes
Åsa Ersson	Swedish Road Administration	Operations Management HQ
Sverker Hagberg	Swedish Road Administration	Road Safety Expert, Specialist Support
Kristina Mattsson	Vägverket	STRADA
Carl Axel Sundström	Swedish Work and Environment Authority	
Bengt Svensson	National Police Board	
Gunnar Ågren	National Institute of Public Health	

Jan Söderström	Swedish Association of Local Authorities and Regions	
Johan Lindberg	Swedish Association of Local Authorities and Regions	
Lars Bergfalk	National Road Traffic Inspectorate	Managing Director
Hans Wahlström	National Road Traffic Inspectorate	Senior Advisor Road Safety
Peter Larsson	National Road Traffic Inspectorate	Senior Advisor Road Safety
Helena Höök	Group for National Road Safety Cooperation – SRA secondee	Secretariat
Jan Moberg	National Road Safety Assembly	Sekretariatet
Urban Karlström	Swedish National Road and Transport Institute (VTI)	Director
Nils-Petter Gregersen	National Society for Road Safety (NTF)	
Ulf Björnstig	Swedish Traffic Medicine Association	Professor in Surgery University Hospital, Umeå
Magnus Ehrenstråle	Swedish Motor Vehicle Inspection Company (Bilprovningen)	Managing Director
Tom Bjerver	Motorförarnas helnykterhetsförbund (MHF)	Swedish Association of Motorists Against Drink Driving (MHF)
Anna Petre	Saab Automobile AB	Manager Government Relations
Anders Eugensson	Volvo Car Corporation	Governmental Affairs
Lars Göran Löwenadler	Volvo Truck Corporation	Director Product and Road Safety
Cecilia Edström	SCANIA	SVP Corporate Relations
Bengt Dalström	Toyota Sweden AB	General Manager
Maria Spetz	Swedish Automobile Association	Managing Director
Anna-Karin Neikter	Swedish Association of Road Haulage Companies	Director Traffic Safety Research and Analysis
Hans Engström	Swedish Association of Road Haulage Companies	Head of Information

Staffan Moberg	Swedish Insurance Federation	Legal Adviser
Anders Kullgren	Folksam	Head of Traffic Safety Research
Maria Krafft	Folksam Research	Head of Traffic and Society
Anna Nilsson Ehle	Chalmers Institute of Technology	SAFER Programme
Christer Hydén	University of Lund	
Anna-Sofia Wewlander	City of Stockholm	Traffic Safety Management
Eva Westberg	Swedish National Agency for Higher Education	Head of Legal Department
Suzanne Andersson	City of Goteborg	
Marcus Ihre	Swedish Standards Institute	Project Manager Management System
Roger Johansson	SWECO VBB	Traffic Planning Project Manager
Eva Hedkvist Petersen	Former road safety rapporteur – European Parliament Ministry of Industry, Employment and Communications	
Lars Eriksson		Road safety consultant

Appendix 5

List of attendees at Stockholm Workshop, 12.12.07

NAME	ORGANIZATION	ROLE
BAUDUCCO Roberto	Swedish Road Administration	
BJERVEA	Swedish Association of Motorists Against	
BLISS Tony	World Bank	Review Team - Adviser
BREEN Jeanne	Jeanne Breen Consulting	Review Team - Leader
BRODIN Örjan	National Police Board	
DARIN Lars	Ministry of Industry, Employment and Communications	
EHRENSTRÅLE Magnus	Swedish Motor Vehicle Inspection Company (Bilprovningen)	Managing Director
ERIKSSON Lars	SRA Consulting Services	
ERSSON Åsa	Swedish Road Administration	Operations Management HQ
GJERSTAD Sofia	SRA Consulting Services	
HAGBERG Sverker	Swedish Road Administration	Road Safety Expert, Specialist Support
HOWARD Eric	Eric Howard and Associates	Review Team
HULTMAN Sven	Swedish Road Administration	
HYDÉN Christer	University of Lund	
LÅNG Jonas	Swedish Road Administration	
LARSSON Åke	National Road Traffic Inspectorate	
LEKANDER Thomas	Swedish Road Administration	Road Safety Analyst Road Users
LIE Anders	Swedish Road Administration	
LINDBERG Johan	Swedish Association of Local Authorities and Regions	
LINDER Astrid	Swedish National Road and Transport Institute (VTI)	
LÖNEGREN Bo	Swedish Road Administration	

LÖWENADLER Lars Göran	Volvo Truck Corporation	Director Product and Road Safety
LUNDBERG Ove	Umea University	
MAGNUSSON Patrick	Swedish Road Administration	Head of Traffic Section SRA
MARTINSSON Torsten	Swedish Road Administration	Senior Project Manager Community Processes
MATTSSON Kristina	Swedish Road Administration	STRADA
NILSSON-EHLE Anna	SAFER	
NORDÉN Marie	Member of Swedish Parliament	Member of the Trans- port and Communica- tions Committee
NORDQVIST Karin	Swedish Road Administration	
NORRGÅRD Erik	Swedish Road Administration	
RAMSTEDT Anita	Swedish Road Administration	
RYDÉN Lena	National Road Traffic Inspectorate	
SKALIN Hans	Swedish Road Administration	
SKOGLUND Björn	Swedish Road Administration	
SÖDERSTRÖM Jan	Swedish Association of Local Authorities and Regions	
STAFBOM Björn	Swedish Road Administration	
SUNDSTRÖM Carl Axel	Swedish Work and Environment Authority	
TANNERFORS Lars- Gunnar	SCANIA	
TIDSTRÖM Catrin	Ministry of Industry, Employment and Com- munications	
TINGVALL Claes	Swedish Road Administration	Director of Safety
VÄSTIBACKEN Tove	Swedish Road Administration	
WAHLSTRÖM Hans	National Road Traffic Inspectorate	Senior Adviser Road Safety

Apendix 6

Review Team

Jeanne Breen, Jeanne Breen Consulting:

Jeanne Breen is an internationally recognised expert on road safety policy with 30 years of national and international expertise and experience. She has carried out road safety management capacity reviews in Ukraine, Armenia and Bosnia and Herzegovina for the World Bank, in the Russian Federation for the ECMT and in New Zealand, commissioned by the Land Transport Safety Authority.

Jeanne Breen is currently working, in collaboration with Tony Bliss of the World Bank, on a new global good practice guide on institutional arrangements for road safety management. She is also a member of the Editorial Board of the web-based European Road Safety Observatory (ERSO), which is being developed by road safety experts for the European Commission, and has contributed a range of reviews for the ERSO's knowledge base. She was a member of the Advisory Panel which supported the first SUNflower comparative study of road safety in Sweden, the United Kingdom and the Netherlands. Jeanne Breen was also the principal writer of the WHO/World Bank World Report on Road Traffic Injury (2004) and has also produced a teaching course on advocacy for injury prevention for the WHO.

Previous to working as an independent consultant and with a background in road safety research, Jeanne Breen helped to establish and subsequently directed two successful independent non-governmental road safety organizations – the UK Parliamentary Advisory Council for Transport Safety (PACTS) and the European Transport Safety Council (ETSC). Both organizations are associated with the introduction of a range of evidence-based road safety measures in the UK (e.g. compulsory seat belt use and road humps) and Europe (improvements in car crash protection standards, increases in the transport safety budget and the developing EU road safety strategy). During her eleven years directing the European Transport Safety Council, she supervised the production of and contributed to over 20 international best practice reviews on key aspects of transport safety based on independent professional consensus in Europe.

Eric Howard, Eric Howard Associates:

Eric Howard is an internationally recognised expert on the development and delivery of practical, effective road safety strategies including the management and coordination of government and stakeholder commitment and contribution.

Eric Howard has carried out recent road safety management capacity reviews in Ukraine, Armenia and Bosnia and Herzegovina for the World Bank and a mid-term review of the Canadian road safety strategy, RSV 2010, for the Canadian Authorities. He is currently overseeing, on behalf of the Victorian Government, the development of Victoria's next 10 year road safety strategy by the Road Safety agencies.

Eric Howard is currently the Chair of the OECD/ECMT Joint Transport Research Centre Project (2005-2007) Achieving Ambitious Road Safety Targets which is examining recent performance across OECD/ECMT countries in meeting adopted road safety targets, strategies and measures for fatality reductions and will recommend changes in approaches to support improved performance.

Previously, Eric Howard was General Manager Road Safety at VicRoads (1998-2006) during which time he was instrumental in improving the safety outcomes on Victoria's road network. He oversaw the development of arrive alive!, the Victorian Road Safety Strategy 2002-2007, which has led to significant road toll reductions since implementation. The Strategy was built upon extensive analysis of the nature of crashes in Victoria in recent years. Actions to address identified challenges are based upon proven countermeasures and local and international research. The countermeasures focus on improving the on-road environment, addressing road user behaviours through legislation and enforcement activity, upgrading vehicle safety standards and conducting education and advertising programs to engage the community in informed discussion on the key road safety issues and associated culture. Eric Howard has been responsible for introduction of the "safe system" approach to road safety in Victoria and its use as the underpinning rationale to address road safety risk; for its incorporation as the basis for the National road safety research program and for its incorporation into the National Road Safety Action Plan in 2004.

Before joining VicRoads, Eric Howard spent over 20 years in local government culminating in his role as Chief Executive Officer of the Shire of Yarra Ranges in Victoria.

Tony Bliss, Lead road safety specialist World Bank

Tony Bliss is a leading global expert on road safety management. He is the Lead Road Safety Specialist in the Transport Division of the Energy, Transport and Water Department of the World Bank. The focus of his work is on the development and promotion of multi-sectoral strategies to improve road safety outcomes in low and middle income countries, in partnership with Bank sector teams and global, regional and country partners.

Tony Bliss participated in the preparation of the World Report on Road Traffic Injury Prevention, jointly launched by the World Health Organization and the World Bank on World Health Day 2004. He is responsible for related World Bank road safety initiatives and partnerships and is assisting the preparation and implementation of road safety projects in countries throughout the Bank's regions. He is also leading the establishment of a Global Road Safety Facility which will fund global, regional and country capacity building initiatives.

Tony Bliss commenced his career as a transport economist with the Ministry of Transport, New Zealand. He then moved to Australia to join the National Highways Planning Team at the Commonwealth Bureau of Roads and later took up a position with the National Telecommunications Planning Branch of Telecom Australia to undertake policy research on the convergence of telecommunications, computers and transport systems. He then established his own consultancy practice, and for several years was an adviser to the Ministry of Finance and National Economy in the State of Bahrain. In 1994 he returned to New Zealand to join the newly established Land Transport Safety Authority as General Manager of the Strategy Division, where he was responsible for the National Road Safety Plan, the New Zealand Road Safety Programme and the preparation of the new Road Safety Strategy 2010. During this period Tony Bliss participated in a range of international road safety activities including being a member of the Advisory Panel which supported the first SUNflower comparative study of road safety in Sweden, the United Kingdom and the Netherlands. In 2002 he took up his position with the World Bank.

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