# STAYSAFE 59

## ON STRATEGIC PLANNING FOR ROAD SAFETY IMPROVEMENTS IN NEW SOUTH WALES

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# CHAIRMAN'S FOREWORD

Grant McBride MP, Member for The Entrance
Chairman, STAYSAFE
Joint Standing Committee on Road Safety

The views presented in this discussion paper provide an overview of road safety strategic planning in New South Wales. The first decade-long road safety strategy Road Safety 2000 was completed two years ago. A new road safety plan Road Safety 2010 was released in late 1999, and a series of specific actions plans developed under this strategy are being released currently. It is thus an appropriate time to provide a public document discussing fundamental issues associated with road safety strategic planning.

The decision to develop the discussion paper first arose as a consequence of STAYSAFE's annual review process, which provides an assessment of the road safety situation in New South Wales on a calendar year basis. The decision was confirmed when, following the deaths of 38 people on New South Wales roads during the immediate 2000 Christmas-New Year period, the Government acknowledged a 'road safety crisis', establishing a Ministerial Task Force on Road Safety chaired by the Chief Executive of the Roads and Traffic Authority, and commissioning a major review of road user safety.

Six annual reviews have been conducted by STAYSAFE examining the years 1994-1999 inclusive, with the seventh and eighth reviews to examine the 2000 and 2001 road safety situations, respectively, now underway. In recent years, unlike earlier experiences, the process of reviewing the road safety situation in New South Wales has become efficient and informative. It is now acknowledged by government agencies and by road safety workers generally that STAYSAFE's annual reviews of road safety serve a fundamental and valuable role in documenting the depth and diversity of government action to address the ongoing problem of road trauma.

In the annual review of road safety activities in New South Wales during the 1998 calendar year, STAYSAFE noted that the Roads and Traffic Authority had reported that it had commissioned a number of broad strategic reviews preparatory to the development of the new Road Safety 2010 strategy. These strategic reviews were, however, unpublished documents accessible only to a few Roads and Traffic Authority officials. STAYSAFE ordered that the strategic reviews be made available, and the documents were tabled by Roads and Traffic Authority officials in a public hearing in September 1999.

STAYSAFE, on examining the strategic reviews, realised that these documents were a significant source of current road safety information. The strategic reviews have many valuable facets, including: they integrate information from various sources; they contain recent information that is relevant to policy; they were developed by leading individuals and organisations providing most up-to-date information in the reviews; they include information

based on road safety research from throughout the world; and they facilitate a common view on road safety.

These documents require public release.

It is STAYSAFE's view that without wider dissemination among road safety workers and the general community the information contained in the strategic reviews will not be put to its optimum use, as people working to achieve road safety objectives might not be aware of the existence of the strategic reviews. The fundamental principles of strategic planning involve consulting with, and informing, all the stakeholders about the road safety strategy, and reaching a consensus on strategic directions and action. Above all, accountability, transparency and accessibility should be the key characteristics of governments and public policy making – it must be clear at all times who makes decisions, how the decisions are made, why the decisions are made, and who carries responsibilities and accountabilities concerning the decisions. Where there is a climate which is not favourable to transparency and accountability not only is it difficult to justify the public expenditure outlaid in the commissioning of the strategic reviews but it is also difficult to justify later budgetary allocations for implementation and enforcement of new strategies in road safety.

For these reasons, STAYSAFE has decided to include the Roads and Traffic Authority's strategic review documents as the major part of this discussion paper.

In addition, STAYSAFE has identified several other relevant documents which may have a contribution to this discussion paper, and considers that there is a merit in including details of these documents in the discussion paper. In particular, two such documents are the New South Wales Police future directions document for the period 2001-2005 (released in late 2000), and a review of traffic enforcement policies and practices drafted by the National Road Transport Commission and presented at the 1999 Road Safety Research, Enforcement and Education Conference in Canberra. Although traffic policing and traffic law enforcement is a core element of road safety strategic planning processes in New South Wales, the principal responsibility for policing activities rests with the New South Wales Police rather than the Roads and Traffic Authority. As a result, the strategic review documents commissioned by the Roads and Traffic Authority do not provide a strong overview of traffic policing and traffic law enforcement. This fact presents an anomaly in the understanding of the whole process of strategic planning for road safety, and ultimately understanding of Road Safety 2010. For this reason, STAYSAFE considers that the New South Wales Police future directions document and the review on enforcement and compliance prepared by the National Road Transport Commission provide additional and needed information about policing and enforcement within the road transport system.

## Acknowledgments

A significant aspect of STAYSAFE's operation is the bipartisan manner in which the Committee members conduct their inquiries and deliberations. I am grateful for the hard work of my colleagues, whether they are Members belong to the Government, the Opposition, or the cross benches.

During the period of the preparation of this discussion paper, STAYSAFE underwent three changes to its membership.

Following the retirement from Parliament of the Hon. Andy Manson MLC (Vice Chairman) in late October 2000, the Hon. Ian West MLC was appointed to the STAYSAFE Committee and subsequently elected as Vice Chairman. The Hon. Andy Manson MLC was a Member of the STAYSAFE Committee over the period 1995-2000, during which time he engaged in the Committee's inquiries with enthusiasm. In all, twenty four reports of the STAYSAFE Committee bear his name, on topics ranging from driver fatigue and sleep disorders, speeding, pedestrian safety, driver licensing, work-related driving, motor vehicle safety, and the criminal law cocnerning dangerous driving.

In October 2000, Mr Peter Black MP, Member for Murray-Darling, resigned from the STAYSAFE Committee, and was replaced by Mr John Bartlett MP, Member for Port Stephens. Mr Black served on the STAYSAFE Committee over the period 1999-2000, and worked on two reports of the Committee that reviewed and commented on the road safety situation in New South Wales.

In March 2002, Mr Andrew Stoner MP, Member for Oxley, resigned from the STAYSAFE Committee upon his appointment to the Opposition's shadow cabinet. He was replaced by Mr Thomas George MP, Member for Lismore. Mr Stoner served on the STAYSAFE Committee from 1999-2002, and worked on four reports of the Committee that reviewed and commented on the road safety situation in New South Wales, and issues associated with traffic control and safety around schools.

The STAYSAFE Committee is grateful for the efforts of the Hon. Andy Manson MLC, Mr Peter Black MP, and Mr Andrew Stoner MP, in assisting the inquiries during their terms of membership.

In the preparation of this report, the STAYSAFE Committee has been ably served by its Director, Mr Ian Faulks, and the Secretariat: Project Officer, Mrs Cheryl Samuels, Committee Officer, Ms Jodie Young; and Assistant Committee Officer, Ms Susan Tanzer. In particular, Mr Faulks' background in strategic and corporate planning in the Commonwealth and New South Wales public sector, together with a deep knowledge and understanding of the Road Safety 2000 plan, meant that the Committee had direct access to comprehensive and expert assessments of the issues requiring consideration.

I commend this report to Parliament.

# CONTENTS

McIntyre, K.

**Current and emerging strategies for securing compliance with road transport laws**

# INTRODUCTION

1.1 The published road safety strategic plan, which has become the core feature of the road safety approach in the 1990s is a relatively new practice in road safety policy making. Prior to the 1990=s, mention and discussion of what is now termed >road safety strategy= was primarily the province of politics, of Ministerial Statements, Budget speeches, and the like. Major interventions to address road trauma, such as the mandatory wearing of seat belts during the 1970=s and the introduction of random breath testing in the early 1980=s, were developed and implemented without reference to a defined and agreed road safety strategy. Certainly, the agencies involved in road safety practiced strategic planning and thinking, but there just was not much written about it and there was no explicit document for reference or guidance.

1.2 The late 1980=s saw road safety administrators, researchers, and other concerned parties searching for additional solutions to the problem of road trauma. Occupant protection had been enhanced by mandatory seat belt wearing laws, and drink-driving challenged by random breath testing. The problem of speed and its relationship to road trauma, however, remained, and the deleterious effect of fatigue in driving was gaining increasing recognition. At the same time, in the world of organisational psychology and management theory in the 1980=s, new concepts of business strategy and the management of people were being developed. In 1988 in New South Wales, the new Greiner Liberal-National coalition government was elected under the banner of introducing corporate strategy and corporate processes into public sector activities. Explicit road safety strategic planning emerged as a product of these simultaneous legislative, policy and organisational changes.

## The genesis of road safety strategic planning in New South Wales

1.3 Road safety strategic planning in New South Wales has evolved through various stages of policy making and organisational changes, involving a number of agencies concerned with road safety.

1.4 In response to a STAYSAFE report on speed and rural roads (STAYSAFE 9, 1987), Camkin and Croft (1987) wrote a seminal paper, the curiously titled AOption 29: The strategic approach to speed control≅. This paper discussed the issue of speeding and overtaking on rural roads in the context of the broader need to develop an effective program of speed control for road safety. Camkin and Croft argued that if a clear definition of the problem and an understanding of the principles underlying its control could be obtained, then initiatives based on a sound analysis of research and experience could be developed to address the problem of speeding on rural roads.

1.5 Camkin and Croft (1987) examined the set of 28 options for action presented in the STAYSAFE 9 (1987) discussion paper on safe speeds and overtaking on 100 km/h rural roads, arguing that it was essential to pursue a strategic approach for a problem as widespread and as entrenched as excessive speeding. In their view, any formulation and assessment of

the viability of proposed options for countermeasures to any subset of the problem must be undertaken against a comprehensive set of criteria which includes some measure of compatibility within an overall strategic program. The clear choice for an appropriate course of action was, therefore, to pursue a twenty ninth option, namely the development of a strategic program for speed control based on a long term commitment to addressing all facets of the problem.

## Road Safety 2000

1.6 The impact of Camkin and Croft (1987) was soon felt. The New South Wales road safety strategic plan for the 1990-2000 period was released by the then Deputy Premier and Minister for Roads, the Hon. Wal Murray MP, in late 1991 as Road Safety 2000 (Roads and Traffic Authority, 1991).

1.7 Midway through the decade, however, Road Safety 2000 was under some challenge:

- In 1993 New South Wales achieved total road fatalities of 581 deaths (the lowest since 1950) but had rebounded to 647 road deaths in 1994 (+11.3%)
- Road Safety 2000=s principal architects (the Roads and Traffic Authority=s Mr Harry Camkin and Mr Phil Charles, the New South Wales Police Service=s Superintendent Merv Lane, and the NRMA=s Mr Richard Cox and Mr Bruce Searles) had departed through retirement, resignation, or promotion.
- The implementation of actions in one of the four core areas of activity (>Making road safety a major priority in land-use and transport decisions=) was proving to be problematic (see Traffix, 1995)
- New managers responsible for the implementation of actions under Road Safety 2000 were complaining that so-called >hot issues= and impediments associated with political processes in New South Wales and federally were diverting resources away from the agreed program of actions (see, e.g., Roads and Traffic Authority, 1994). In particular, the Heavy Vehicles Agreement (July 1991) and Light Vehicles Agreement (May 1992) and their inclusion as schedules to the National Road Transport Commission Act 1991 (Commonwealth) heralded a significant new regime for addressing road safety and transport efficiency in Australia.

1.8 Throughout the early part of the decade road safety summits were called at various times in response to crisisXa periodic fixture in the public presentation of road safety.

1.9 The election of the Carr Labor government in early 1995 followed shortly after a unexpected and unplanned mid-term review of Road Safety 2000. By 1993, New South Wales had met and exceeded its targets for road trauma reduction by 2000! There was a need for reappraisal of the strategic targets, which culminated in a public commitment to a target of less than 500 road deaths annually and less than 5,500 other hospitalisations for serious road injury annually by the turn of the century (see STAYSAFE 41, 1998, also Roads and Traffic Authority, 1995).

1.10 The establishment of this target was based against a new benchmark of the 1993 road trauma outcomes in New South Wales: 581 deaths and 26,368 injuries in road crashes.

1.11 As the end of the decade approached, further major change and challenge could be seen:

- A previous central stakeholder, the NRMA, moved to a lesser role (although there are significant statutory roles that remain under New South Wales roads and transport-related legislation). In the main, this change reflected the movement of the NRMA from a membership services-oriented motoring advocacy organisation in New South Wales (the National Roads and Motorists Association) to a corporate financial services institution (NRMA Ltd.) actively seeking demutualisation to facilitate expansion and capital growth on a national level. The continued loss of experienced road safety managers and senior staff throughout the 1990=s markedly diminished the capacity of NRMA to continue as an independent critical voice concerning road safety policy.
- At the end of the decade, a process of partial demutualisation of the NRMA through separating IAG (previously NRMA Insurance Ltd.) from the National Roads and Motorists Association (the membership services functions) had the potential to recreate the NRMA=s previous role as an independent critical voice concerning road safety policy. While the National Roads and Motorists Association has been excluded from the new Government Agencies Road Safety council (which replaced the Road Safety Advisory Council in 2000 as the peak advisory body on road safety matters in New South Wales), it has recently reacquired a prominent role in the Minister for Roads' Ministerial Road Safety Taskforce established in early 2001 after concern with a rise in the New South Wales road toll in 2000. The Ministerial Road Safety Taskforce was established with a specific purpose – to identify measures to limit and reverse the rise in the road toll - but has continued to meet over the past two years and now appears to have become generally influential in the development of road safety policy.
- The regulator of compulsory third party motor vehicle insurances in New South Wales, the Motor Accidents Authority, developed from a minor stakeholder role in the early 1990=s to become a central stakeholder in road safety and road injury rehabilitation in New South Wales. The Motor Accidents Authority now has an independent and demonstrable capacity to commission and assess road safety research and policy.
- The urgent demand for skilled staff to work on the challenges associated with Olympic roads and transport needs, together with two major restructures of the Roads and Traffic Authority=s road safety administration over the 1995-1997 period, saw the departure from the Roads and Traffic Authority of almost complete echelons of middle and senior road safety management and the commensurate loss of accumulated expert knowledge (or what might be termed 'corporate wisdom') concerning earlier activities and policy debates within the Roads and Traffic Authority and its predecessor organisations. As well, the abolition of a separate and specialist road safety library facility within the Roads and Traffic Authority further restricted access to expert literature and knowledge addressing road safety matters.
- Throughout the decade the process of policy making and strategic planning became less transparent and publicly accessible. There was an emergence of a system which institutionalised secrecy of action=, with a restriction in the access to road safety knowledge. Despite this knoweldge having been obtained through public funds, it became increasingly known only to the road safety bureaucracy itself and a limited number of external expert consultants. A radical reduction in the publication of road safety research material commenced on the departure of Mr Harry Camkin and Mr Phil

Charles, then the Roads and Traffic Authority=s senior road safety managers, in 1993-94. (In contrast, through the 1970=s and 1980=s there had been a consistent policy in New South Wales, under the leadership of first, Dr Michael Henderson, and later Mr Harry Camkin, of publishing discussions about road safety ideas and the results of research and evaluations of road safety programs.) This reduction in the publication of relevant road safety research and commentary has been maintained since that time. By 1998, STAYSAFE estimated that less than 1-2% of publicly funded research and evaluation effort concerning road safety issues and programs is openly and publicly accessible. STAYSAFE 50 (2000) has addressed this issue explicitly, with recommendations made for increasing the accessibility of relevant road safety information (see similar discussions regarding access to road safety information in other reports, e.g., STAYSAFE 31, 1996; STAYSAFE 38, 1997; STAYSAFE 41, 1998; STAYSAFE 42, 1998, STAYSAFE 47, 1998, STAYSAFE 51, 2000, STAYSAFE 55, 2002).

## Road Safety 2010

1.12 The Road Safety 2010 strategic planning document was released publicly on Wednesday 24 November 1999 (Roads and Traffic Authority, 1999). Following the public launch of the new road safety strategy, the Minister for Roads later answered a Question Without Notice in the Legislative Assembly:

**Road safety**

**Mr David CAMPBELL MP, Member for Keira:** >My question without notice is to the Minister for Roads. What is the Government doing to help reduce the road toll?=

**Hon. Carl SCULLY MP, Minister for Roads:** >In the past three years there have been dramatic decreases in the road toll. The worst recorded result was in 1978, when 1,384 people lost their lives. At the start of this decade 797 people lost their lives on New South Wales roads. During last year 556 lost their lives on New South Wales roads. That is the lowest number of fatalities since 1949, but it is still unacceptable. Last year 26,000 people were injured on our roads. To put it into perspective, approximately 11 people are killed on our roads each week.

The most important part of my job is dealing with road safety. Since its election in 1995 the Government has undertaken a number of very worthwhile initiatives to deal with the road toll: double demerit points; the 50 km/h speed limit in residential areas that has now been adopted by about 100 different councils; the 40 km/h speed limit near school bus stops, and the safer routes to school program, as well as the enormous expenditure we are incurring in country and urban areas of the State to make our roads safer. Examples include the Pacific Highway, the Great Western Highway and the Princes Highway.

A few days ago on behalf of the Government I launched our >Testimonials= television campaign, which some country members would have already seen. This campaign is quite unusual in that the people appearing in the advertisement are not actors, they are relatives, family members, workmates and friends of people who have died on our roads, particularly country roads. As I announced when I launched that program, there is a myth that people killed on roads in country New South Wales are city-based people. That is not true. For every 10 people killed on country roads seven actually live in the country, and most accidents occur within 50 km of the farm gate. Country people are being killed on country roads.

The >Testimonials= campaign is endeavouring to give a message particularly to country folk that they need to slow down. Just because they are familiar with country roads does not mean they are immune to accidents. Speed, fatigue and alcohol continue to be the three most important ingredients in road fatalities in New South Wales. While the road toll is coming down, it is still unacceptable. I ask that honourable members, when they are celebrating New Year=s Eve this year, remember that by the end of the next year more than 550 people who celebrated New Year=s Eve this year will be killed on the roads. That brings it home. Who will those 550 people be? Each of us in this House will say: it will not be me or my parents, or one of my children, or one of my neighbours.

That sort of complacency sets in with drivers. Unfortunately, 550 people who celebrate this New Year=s Eve will be killed on our roads come the new century. That is why I want honourable members to absorb the task we all have, in a bipartisan way, to endeavour to reduce the road toll even further. At various times governments of both persuasions have had this task and they have had varying degrees of success. This Government has developed a 10-year strategy called Road Safety 2010. I invite honourable members to read this document, which will be available from today. It contains a whole range of strategies to deal with speed, alcohol, fatigue, and the failure to wear seatbelts. I find it extraordinary that of the people killed on our roads each year approximately 100 will not be wearing seatbelts, and about 50 of those will die because they are not.

One of the things we have particularly concentrated on is young drivers, the 17-25 year olds. We have found they are being killed on our roads at a higher rate than is warranted by the number of licences held by that age group. The anecdotal superficial response to the question, >Why is that so?= is, >They are reckless; they are indifferent to their safety=. That is not so. Research reveals that 17-25 year olds rank much higher in our accident statistics because of inexperience.

Today I announced a fundamental change to the way in which we license young drivers. At the moment, young people wishing to get a licence have to take a knowledge test to get their L plates. They then undergo a period of

instruction followed by a practical test to obtain their P plates. Twelve months later they obtain a full licence. I announced today that in July next year a different system of licensing drivers will commence. The driver knowledge test will remain. Young people will remain on their L plates for a period, but those instructing young drivers will be expected to certify at the back of a logbook that they have various standards of competency, such as night driving, driving on multilane roads, driving at peak hour, driving at night, etc..

They will still undertake the practical test, but the Government will include something new in that learner-to- P-plate stage logbook. The Government has decided that young drivers need a greater period of supervision. At the moment they have only 12 months supervision and then progress from driving at 80 km/h to full licence and then to driving at 110 km/h. As Minister for Roads I believe it is appropriate that we have a greater degree of oversight and supervision of our young people. We need to keep a closer eye on them as they move from adolescence, to becoming learner drivers and to obtaining experience on the roads so that they can become fully-fledged licensed drivers, driving at a 110 km/h.

Part of the reason why young people figure so often in accident statistics is that we do not have a greater period of oversight or supervision as they obtain that experience through the system. When young people obtain their P plates the Government will require them to hold onto those plates for 12 months, as is the case at present, but they will be able to drive slightly faster at 90 km/h. At the end of that 12-month period they will be required to undertake what is called a computer-based hazard perception test. Effectively, the Government will make videos of certain hazardous situations on the road.

A young person will turn up at a registry, a video will be played on a computer screen and he or she will be required to touch the screen to indicate various responses to hazardous situations. Young persons who can demonstrate that they are knowledgeable in dealing with those situations will then proceed to the next stage to qualify for a provisional two-year licence. They will be required to hold that provisional licence for two years and will be able to drive at 110 km/h. In a sense, experience and knowledge will be rewarded and those who qualify will go to the next stage of a graduated licence system. At the end of the two-year period drivers will be put through another computer test, which will be a mix of advanced hazard perception tests, road safety questions and things of that nature.

Drivers who have completed that test will then be entitled to a full licence. There are a range of other things in this road safety document. I invite every honourable member to read it closely. It contains a range of initiatives right across the area of road safety. The Government is concentrating in particular on dealing with young people so that we can achieve the targets that we have now set of 400 road fatalities by 2005, and 300 road fatalities by 2010. Those are challenging and ambitious targets, and they should be. Road fatality targets

should not be easy to achieve; they should be difficult to achieve so that we do not become complacent about achieving them. I think they are achievable, but they are challenging for governments of either political persuasion. However, we should continue to endeavour to meet those targets.= (Minutes of Proceedings of the Legislative Assembly, Wednesday 24 November 1999, pp.40-42)

## Commentary

1.13 This report was produced with the initial aim of documenting the review and strategic planning process which lead to the drafting of 'Road Safety 2010–A Framework for Saving 2000 lives by the year 2010 in NSW'. Road Safety 2010 is the second ten year strategic plan for road safety in New South Wales, following 'Road Safety 2000' which was introduced in 1991. During the preparation of the report, concern was raised over the high number of road deaths during the 2000 Christmas-New Year period, leading to the establishment of a Ministerial Task Force on Road Safety chaired by the Chief Executive of the Roads and Traffic Authority, and the commissioning a major review of road user safety, which has since been published. The public availability of earlier relevant road safety reviews will assist this new examination of road user safety.

1.14 Road Safety 2010 is based on the same framework as its predecessor the Haddon matrix which provides a basic framework that considers the injurious results of road crashes as arising from an interaction of three temporal factors involved in the crash sequence (events prior to the crash occurrence, the circumstances surrounding the crash itself, and the situation that exists immediately after the crash and subsequently), and three epidemiological factors (the host – the human element; the agent – the motor vehicle; and the environment – both physical and social) (Williams, 1999). This Haddon matrix has been a powerful tool in the conceptualisation of road safety research, policy and practice, and in the organisation of management and administrative structures in roads, motor vehicle insurance, and policing agencies.

1.15 In many ways, Road Safety 2010 is a conceptual document intended to generate a platform of ideas for improving the road safety system, which will then serve as guidelines for strategic planning during the ten year implementation of major road safety plans. In contrast, Road Safety 2000 generated detailed plans for inter-agency and inter-community collaboration to deliver plans with far reaching objectives. The development and review of Road Safety 2000 was an inclusive process of consultation and research which involved various government departments, agencies, community groups and industry. The planning and development of Road Safety 2000 constituted a model of strategic planning in the 1990-1995 period, however it failed in its later implementation and review stages leading up to 2000, particularly from 1997-1998 onward. This legacy of the first ten year road safety plan would seem to have deprived Road Safety 2010 of a valuable statistical and research basis as well as of appropriate guidelines for future strategic development.

1.16 In direct contrast to its predecessor, Road Safety 2010 has involved a very limited consultation with only a handful of key stakeholders. While maintaining a continuum of

ideas and approaches towards road safety, Road Safety 2010 seems to have rejected the planning approach of Road Safety 2000. It provides only an outline of ideas, strategies and future plans, with an objective to achieve a substantial decrease in the road toll within ten years.

1.17 STAYSAFE acknowledges that it is too early within the plan to determine the level of success of the approach adopted in Road Safety 2010. However, the Committee maintains throughout this report that Road Safety 2010 as well as the review papers which led to it, lacks in clarity as to how its ultimate objective of saving 2000 lives is going to be achieved. STAYSAFE believes that rather than fully abandoning the strategic approach of its Road Safety 2000 predecessor, Road Safety 2010 should have built upon its positive elements and addressed the reasons for past failures.

1.18 Current indicators in road safety show an ever increasing need for a constructive and comprehensive road safety strategic planning in New South Wales.

1.19 Indicators of the state of road safety, including the road toll (recording the cumulative total road deaths each year), show many improvements in road safety over the decades. However, after a sharp decrease in road deaths in New South Wales in the early part of the last decade, the road toll has been effectively plateaued since 1996 (and probably since 1993).

1.20 STAYSAFE considers that the plateauing of the road toll would indicate a need for a different form of strategic thinking into road safety, one which would adopt a more holistic and comprehensive perspective of all the issues relevant to road safety. Without limiting the form of new strategic thinking, STAYSAFE considers that new strategies must include important elements which have a direct or indirect impact upon road safety, such as social, cultural, community, environmental, economic, technologic and other issues. STAYSAFE maintains that ongoing consultation and planning with representatives across these diverse and differing fields, and an active engagement with the community in general, will continue to be an imperative in the processes involved developing effective road safety strategies.

1.21 STAYSAFE notes that this form of strategic approach to road safety has not been fully adopted in the development of the Road Safety 2010 strategic planning document.

1.22 STAYSAFE is concerned with two core aspects of Road Safety 2010 strategic planning document: first, with the development process of this document; and second, with the framework of road safety elements defined within the Road Safety 2010 strategic planning document.

1.23 In reference to the development process for the Road Safety 2010 strategic planning document, STAYSAFE questions whether the process which produced Road Safety 2010 was exemplary of a progressive and transparent strategic planning procedure which, by its nature, is able to deliver desired outcomes. As mentioned previously, STAYSAFE is concerned with the lack of transparency and accountability during the development of Road Safety 2010. For this reason, STAYSAFE has included the major review papers commissioned by the Roads and Traffic Authority during the development process for the Road Safety 2010 strategic planning document within this report.

1.24 STAYSAFE is pleased to note that the strategic planning document incoprates many of the major recommendations and ideas developed and published in various STAYSAFE reports during the 1990's (e.g., a 50 km/h general urban speed limit, the revision of the graduated driver licensing system for new drivers, targeting of fleet operators and work-related driving, the introduction of traffic offenders programs and alcohol ignition interlocks for drink driving offenders, and an emphasis on the critical role of local councils in delivering road safety to New South Wales communities), although, curiously, there is scant if any recognition and acknowledgment of this in the review papers.

1.25 With regard to the second point of interest the framework of road safety elements defined within the Road Safety 2010 strategic planning document, STAYSAFE welcomes its broad base and forward looking perspective. The framework includes the following core elements: improvements in road user behaviour; improvements in the road environment; increasing vehicle safety; enforcement and compliance; and community-based action in road safety. Included within each of these elements are a plethora of ideas and plans which will require a high level of resource commitment, as well as appropriate strategic planning and review, by government, community and industry stakeholders over the next ten years. However, STAYSAFE is concerned that the Road Safety 2010 strategic planning document is unclear about how these elements will be administered, co-ordinated, and implemented both within the Roads and Traffic Authority itself and also across Government agencies and non-Governmental organisations. STAYSAFE is additionally concerned that the Road Safety 2010 strategic planning document is unclear as to the definition and establishment of relevant performance benchmarks for road safety activity, how the outcomes will be measured and evaluated, and the processes for reporting completion and achievement of these performance targets.

1.26 STAYSAFE recognises that Road Safety 2010 is a valuable tool for road safety strategies, as it establishes frameworks for action and reduction of the overall number of road fatalities and injuries. For example, the targets for 2005 are 820 lives saved, and 15,500 injuries prevented. For the following five years, these numbers more than double, that is, the targets for 2010 are 2,000 lives saved and 38,000 injuries that will be avoided. Although the document is clear on the targets it is going to achieve in each area of road safety, Road Safety 2010 is unclear on how these targets have been determined, what formula has been used in this process, and whether they are realistic targets, particularly with regard to the long-term framework for planning. Considering that the plan is still in its early stages (with the first actions plans only being released in 2002), STAYSAFE would like to stress the importance of realistic goal setting and strategic planning which incorporates various forms of targets in addition to road toll numbers. STAYSAFE would also stress the importance of regular review of shorter term plans and re-evaluation of original targets, in order to ensure more successful road safety programs.

1.27 A final issue that STAYSAFE has identified in this report is the need for a whole-of-government approach to the development and implementation of Road Safety 2010, as well as an integrated government and community approach to broader road safety issues. STAYSAFE believes that it is important for the Carr Government to encourage full participation in these road safety strategies by ministerial portfolios which do not have a

direct prescribed responsibility for road safety, such as the portfolios for health, local government, education, industrial relations, tourism, etc.. Much effort in the future must be placed on the development of strategies which would encourage this form of integrated approach towards road safety.

1.28 STAYSAFE believes that as a Joint Parliamentary Standing Committee with a long history of reviewing road safety (since 1982) in New South Wales, it is well placed to provide a crucial role in the oversight and integration of road safety strategies. STAYSAFE has been engaged on an ongoing and consistent basis in the review of existing road safety strategies, as well as conducting groundbreaking inquiries which led to development of new strategies. Through its independent and bipartisan approach, STAYSAFE is able to consider the views, policies and programs of different ministerial portfolios and agencies, non-Government organisations, and the community itself, and to make recommendations that facilitate a common platform for planning and implementation of road safety strategies.

## Strategic issues in traffic policing

1.29 The Road Safety 2010 strategic planning document provides comparatively little indication of the role of other government agencies and non-government organisations in addressing road trauma prevention and the treatment and rehabilitation of road trauma victims.

1.30 STAYSAFE was particularly interested in examining the strategic processes associated with traffic enforcement for the decade 2000-2010. Two documents were identified that had a specific bearing on this issue: New South Wales Police Service (2000), and McIntyre (1999). The paper by McIntyre is reproduced in this report. The following section summarises matters relevant to traffic policing from New South Wales Police Service (2000).

*Strategic traffic enforcement issues associated with the New South Wales Police*

1.31 The previous Commissioner of Police, Mr Peter Ryan, provided some strategic comment regarding the future directions of the New South Wales Police over the next five years in his document outlining the structure and operations blueprint for 2001-2005 (New South Wales Police Service, 2000). This document affirms that the primary goal of policing is to make New South Wales a safer community by reducing crime and antisocial behaviour, and that the New South Wales Police should be highly visible on the streets of New South Wales, accessible, rapidly deployed when required, ethical, courteous, well trained and highly professional. It is intended that the New South Wales Police will continue to improve its intelligence, productivity, visibility, rapid deployment capability and customer focus, through both investigating crimes and seeking to prevent crime and breaches of public safety. To do this, it is suggested, the New South Wales Police needs a deployment strategy based on operational requirements rather than historical or political need. As the focus is retained on the core business of crime reduction and maintenance of public safety, there is a need therefore to rationalise current activities that are more appropriately the core business of other organisations, and give consideration to transferring some current functions which should be more appropriately handled by other organisations to those organisations.

1.32 In New South Wales, police currently have particular responsibility for traffic

enforcement, providing a range of traffic services to ensure safe road user behaviour, to minimise road trauma and ensure a free flow of traffic. Traffic management and road safety activities include:

- high visibility traffic patrolling;
- enforcement of traffic laws;
- crash attendance and investigation;
- liaison with other government and non-government bodies (e.g., the Roads and Traffic Authority, local councils, and community groups) involved in road safety, traffic control, street lighting, road design, car design and public education;
- speed-related operations (although not the deployment and operation of fixed speed cameras, which is a responsibility of the Roads and Traffic Authority);
- alcohol and drug detection in drivers (e.g., random breath testing (RBT));
- traffic research, and;
- traffic information management.

1.33 The Wood Royal Commission required a thorough review of all current police functions be undertaken to determine whether they should remain within the charter of the Service (see Recommendation 1). Following this recommendation, an interdepartmental committee reviewed police functions, finding that, while it is appropriate and effective for the New South Wales Police to undertake most of its functions, a number should be transferred to other agencies to release police for front line duties (New South Wales Police Service, 2000).

1.34 In the area of traffic enforcement and road safety, it was proposed that some of the functions of the New South Wales Police would be more appropriately handled by other organisations, including:

- street parking;
- some aspects of traffic management, for example, the operation of red light cameras and speed cameras.

Specifically, it was proposed that the Roads and Traffic Authority be responsible for traffic management and for road user education (and, presumably, the operation of red light cameras and speed cameras), and the Department of Transport also have a role in road user education. Local councils throughout New South Wales should be responsible for local parking enforcement. These changes have since been implemented.

1.35 There are also some other areas relevant to traffic enforcement and road safety where changes are proposed (New South Wales Police Service, 2000), for example, amendment of legislation to consolidate the various laws giving police their powers, providing an opportunity to clarify the nature and extent of police powers. There was also a need to examine privacy legislation, as if the New South Wales Police is to continue its effective strategy of targeting hotspots and active offenders an exemption from certain provisions of privacy legislation (e.g., for data records relating to active offenders and repeat victims) is necessary. A number of proposed changes to court processes were also relevant to traffic enforcement and roads safety matters, including amendment to the Bail Act to disallow presumption in favour of bail for chronic repeat offenders, non-custodial sentences to be handed down *ex parte* with notification of sentence to be by process server, amendment to the Justice Act to provide for forms of communication other than hand delivery (e.g., post, fax or email) of summary briefs of evidence, legislation requiring defence disclosure of contested issues and evidence, consistency

of sentencing guidelines especially in regard to repeat offenders, behaviour management of persons on probation, parole and community service orders, and pre-trial hearings of disputed complex technical evidence.

1.36 STAYSAFE notes that the New South Wales Police is seeking to make the best use of technology to increase its operational and administrative productivity, accessing sophisticated technology to help it work better and faster, especially in the areas of crime detection, investigation, reduction and prevention. New information systems should enable access to information more safely, quickly and effectively. Technology, such as in-car computers and a new police radio system, should allow police officers to spend less time in stations and more time in the field, thus being more visible and available to the public.

1.37 There is also an indication that the New South Wales Police might be seeking to extend the >user pays= principle for traffic enforcement, currently exemplified by the enhanced enforcement program where the Roads and Traffic Authority provides funding for additional police traffic enforcement operations during holiday periods. The New South Wales Police proposes that sponsorship of equipment (e.g., an additional patrol car) will be acceptable when the equipment is available for used in generalised policing of an area, subject to the proviso that such an equipment sponsorship would be restricted to public sector bodies (New South Wales Police Service, 2000).

1.38 By 2005, it is envisaged that activities that divert resources from the core business of crime reduction and maintenance of public safety will have been divested through bipartisan agreements on policing functions, accountabilities and outputs (New South Wales Police Service, 2000). Community policing will be part of a policing partnership where all sections of the community B the public, business, government and non-government agencies and police B will accept shared responsibility for crime prevention, crime reduction and public safety. The New South Wales Police will work with a range of agencies (government and non-government) and the community to provide practical approaches to crime issues stemming from changing social conditions and values. In particular, New South Wales Police is committed to work with government and non-government agencies and the community to address potential problems and identify solutions before they develop into law enforcement issues.

*Some other relevant matters to traffic enforcement*

1.39 STAYSAFE notes the ESCAPE - Enhanced Safety Coming from Appropriate Police Enforcement project in Europe. The aim of the ESCAPE project wa to identify important areas of traffic and driver non-compliant behaviour and to assess the potential of enforcement tools, both traditional and innovative, to improve compliance and thus contribute to safety on European roads. The ESCAPE project is designed to prepare the groundwork for implementing European-wide demonstration projects in enforcement in the future.

1.40 STAYSAFE also notes other relevant research and comment on police traffic enforcement, including: National Highway Traffic Safety Administration (1996), Smith (1998), and Leggett, (1997, see also Homel, 1997).

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# ROAD SAFETY 2010: A FRAMEWORK FOR SAVING 2,000 LIVES BY THE YEAR 2010 IN NEW SOUTH WALES

Roads and Traffic Authority

**Making our roads the world's safest**

The New South Wales Government is committed to making our roads the safest in the world. We have made great progress in reducing the road toll over the past two decades. In 1998 New South Wales had the lowest number of people killed on our State's roads in a single year since 1949. While we have had success we need to do more. In 1998, 556 people died and more than 26,000 were injured on New South Wales roads, a great loss to our community. This represents enormous emotional trauma and personal loss, and has a financial cost of more than $2 billion each year for loss of earnings, emergency medical care, repair costs, insurance, and rehabilitation. To meet our goal of having the safest roads in the world, the State Government has developed Road Safety 2010. This framework sets out how we can halve the road toll, saving 2,000 lives by the year 2010. It also promotes community understanding and involvement in road safety initiatives and strategies. We are all road users at some time, whether as drivers, cyclists, pedestrians or passengers. Road safety is an issue that affects us all. I urge you to become involved in determining how we can make New South Wales roads safer for all of us.

| *Saving lives, avoiding injury:* | *By the year* | *Lives that will be saved* | *Injuries that will be avoided* |
|---|---|---|---|
| | 2005 | 820 | 15,500 |
| | 2010 | 2,000 | 38,000 |

Carl Scully MP
Minister for Roads
Minister for Transport

## The challenge in NSW

Every week, 11 of our friends, neighbours, family members or workmates start a journey that they never complete. Every week, more than 500 people suffer injury on the way to or from work, home, visiting friends, going shopping, doing what they expect to be able to do safely.

Consider Sarah, a 28 year old mother of two children, who worked as a teacher. Sarah was killed in an accident involving a speeding motorist. Sarah's children lost a mother, her husband his wife, her parents their daughter, and our community has lost someone who was making a valuable contribution.

*Road safety progress*

We have done well so far in reducing fatalities. In metropolitan areas, fatalities totalled 199 in 1998, a reduction of 55 compared with 1997. On local roads, the 50km/h Urban Speed Limit Program has reduced the number of crashes. However, while there have been major long term reductions in the number of fatalities in some areas, there have been some increases in country road fatalities in recent years. In 1998 there were 357 people killed on country roads, an increase of 35 over the previous year.

Speeding and driver fatigue, particularly amongst young drivers, and failure to wear seatbelts continue to be road safety problems and are the major contributors to the annual road toll. As such, future safety strategies and initiatives will primarily focus on these issues.

*The future focus*

To achieve our goal of having the safest roads in the world, the State Government will pursue a range of initiatives in three key areas:

- Safer people
- Safer roads
- Safer vehicles.

Better community understanding of road safety issues and solutions is important in achieving our goal. As a community we now have greater awareness and understanding of the factors contributing to road deaths and injuries, and these have changed some of our attitudes. For example, drink driving is now largely regarded as socially unacceptable behaviour. We need to change people's attitude to speeding, driving while fatigued and not wearing seatbelts to achieve a similar change of culture to reduce the road toll.

The over-representation of novice drivers in accident statistics requires a new approach to be taken. A Graduated Licensing Scheme will ensure that novice drivers do not progress to an unrestricted licence until they demonstrate greater knowledge about road conditions and have had more experience behind the wheel.

The Roads and Traffic Authority will also work with the police and courts to develop initiatives that have greater impact on repeat offenders. Such initiatives could require repeat offenders to be ordered by the court to undertake road safety education courses, or have specific devices such as alcohol interlocks fitted to their vehicles.

Improvements to date have been achieved through a whole of government approach between State, regional and local stakeholders working in partnership in the planning and delivery of road safety programs to the community. In recognition of the important ongoing role of Local Government, the State Government will continue its strong support for road safety initiatives such as the 50km/h
speed limit program for council controlled roads.

2,000 lives can be saved

| Road safety initiatives | by 2005 | by 2010 |
|---|---|---|
| Safer people | | |
| Enhanced speed education and enforcement | 185 | 330 |
| Other initiatives | 115 | 350 |
| Subtotal | 300 | 680 |
| Safer roads | | |
| Lower urban speed limits (50km/h) | 135 | 230 |
| Other initiatives | 100 | 365 |
| Subtotal | 235 | 595 |
| Safer vehicles | | |
| Speed limiters | 45 | 160 |
| Other initiatives | 240 | 565 |
| Subtotal | 285 | 725 |
| Total reductions | 820 | 2,000 |

## A new approach

Speeding is the greatest contributor to road fatalities in New South Wales, and young drivers are amongst those who suffer most in road accidents. Traditionally, safety has been seen as only one important factor in the provision of road facilities, which has been balanced with other factors such as cost, access and mobility. Some European countries such as Britain, Sweden, the Netherlands and Norway are taking a fresh approach to road safety. Sweden's Vision Zero strategy turns attention away from crash reduction to injury reduction. The Dutch Sustainable Safety strategy also aims to progressively remove injury risks from the road system.

Just like these European countries, New South Wales aims to further improve road safety through a
systematic change in the planning, design and management of the road networks and road safety strategies.

*New Graduated Licensing Scheme*

New South Wales will introduce a comprehensive revamp of the licensing arrangements for novice
drivers. The new Graduated Licensing Scheme, or 'GLS' as it will be known, will introduce sophisticated new methods suitable to prepare novice drivers for safe and efficient driving in the new millennium. It is over thirty years since New South Wales pioneered graduated licensing by introducing a provisional licence; it is only in recent years that graduated licensing has gained wide acceptance elsewhere, such as in North America. While New South Wales has progressively upgraded its novice licensing arrangements, the Graduated Licensing Scheme will represent a quantum leap in driver licensing practice. Young drivers continue to

be over-represented in accident statistics year after year. The Graduated Licensing Scheme will use the latest technology to assess the competence of novices. Extensive experience under varied conditions will be made compulsory and the novice driver period will be extended to more than twice the current minimum duration. This will ensure greater opportunity for training and experience under controlled conditions. Drivers will be at least 20 years of age by the time they graduate from learner licence through two provisional licence stages, to unrestricted licence level.

*Speed, crashes and injuries*

A major road safety issue is speeding. Speeding is a factor in at least 40% of fatal crashes in New South Wales. No other single factor has a greater contribution to road trauma in our state. There have been many studies which demonstrate that speeding increases both the likelihood of a crash occurring and the severity of injury caused by road crashes. A priority of road safety authorities is to reduce the problem of speeding. If we can prevent motorists from speeding, we will dramatically reduce the road toll.

*Safe speeding campaigns*

A Federal Office of Road Safety study of speed related crashes in 60km/h zones found that:

- the risk of being involved in a crash causing death or injury doubles with each 5km/h increase in speed above 60km/h;
- the risk of a crash associated with speeding is directly comparable to that associated with drink driving: for example, travelling at 68km/h in a 60km/h zone is as risky as driving with a blood alcohol level of 0.08;
- if the vehicles in the study had been travelling below 60km/h, nearly half of the casualty crashes may have been avoided;
- speeding up to 72km/h in a 60km/h zone causes as many casualty crashes as more extreme speeding (greater than 72km/h).

Despite this there are still drivers who persist in driving over the speed limit and who drive too fast for prevailing conditions. The State Government's Safe Speeding: There's No Such Thing campaign aims to alert the community to the crash risks associated with exceeding the speed limit by even a small margin.

Speeding has a much more severe effect on some road users than on others. For example, an unprotected road user such as a pedestrian or cyclist is injured at much lower speeds than are people travelling within a motor vehicle. Driving at lower speeds will allow a better chance of either stopping in time to avoid a collision with an object or a person, or will reduce the severity of impact and injury. When a car hits a pedestrian at 64km/h there is an 85% chance the pedestrian will die. At around 50km/h the chance of death drops to 45%. In areas where there is high pedestrian and cyclist activity, the Government is responding to community calls for safer speed environments. Examples are:

- 40km/h school zones and school bus zones;
- 50km/h speed limits for local streets;
- 10km/h shared vehicle and pedestrian zones.

The implementation of these zones is accompanied by public education campaigns to ensure that drivers are aware of the need to slow down. Where appropriate, there are special engineering treatments to ensure that drivers slow down.

*Lower urban speed limits*

In many European countries the 50km/h limit is widespread, and even lower limits, most frequently 30km/h, are applied in zones where vehicles, pedestrians and cyclists mix. The Dutch aim to have 50% of their local roads zoned at 30km/h by the year 2000. Britain's key pedestrian policy is for local safety schemes, with traffic calming and 20miles/h (32km/h) zones in residential areas. The 1997 trial of the 50km/h urban speed limit in New South Wales demonstrated a significant reduction in casualties throughout the trial areas. More than half of New South Wales councils have implemented this limit on local streets, which has contributed to a reduction in the number of vehicle accidents. Fatalities on local urban streets have decreased from 124 in 1997 to 102 in 1998.

*Speed management*

An important aspect of the management of speed is enforcement. Roads and Traffic Authority research in New South Wales demonstrates that more than 60% of motorists report that they drive at or above the posted speed limit. A number of research studies, including the Roads and Traffic Authority pilot study in New South Wales on the double demerits initiative, have found strong links between speed enforcement, appropriate penalties and reductions in serious casualties. The Roads and Traffic Authority is working closely with the Police Service to ensure that enforcement programs are effective for both heavy and light vehicles. Programs such as the 3 Strikes You're Out are having a dramatic effect in increasing compliance in the heavy vehicle industry. Under this program, a vehicle can be suspended from operating on the road on the third offence if caught flouting road transport laws. Overseas technological advancements are also being examined for ways to improve compliance with speed limits. A recent Norwegian study found that automatic speed camera enforcement can reduce the number of injury accidents by 20%. New South Wales is also looking towards using this type of technology in the future, and has introduced two fixed speed cameras on the Pacific Highway at Burringbar Range on the New South Wales far north coast, a well known blackspot. This initiative has already seen an immediate reduction in speed, and as a result a reduction in serious injury accidents.

## Safer people

Improvements in road user behaviour can save around 680 lives by the year 2010. The State Government will encourage safe behaviour by doing all it can to ensure that drivers keep to speed limits, that they do not drive if impaired by alcohol or fatigue, that all vehicle occupants are using seatbelts, and that novice drivers acquire adequate knowledge and experience before progressing to the next licence stage.

*Speed limits and enforcement*

Speed is the major behavioural road safety problem in New South Wales and to achieve our goal of
halving the road toll in the next decade, compliance with speed limits must be increased as a matter of priority. While 42% of all road fatalities involve speeding, this increases to more than 47% of the deaths on country roads. In 1998, of the 357 deaths on country roads, 167 were speeding related, with most of these fatalities being country people. The risk of a casualty crash associated with speeding is directly comparable to that associated with drink driving. Excessive speeding is particularly dangerous and the Government has recently doubled the penalties for exceeding the speed limit by 30km/h or more. Initiatives that target speeding, such as double demerit points for speeding over holiday periods, have been very effective. In 1998 the double demerit points initiative resulted in the lowest ever recorded Easter road toll. These types of initiatives have strong community support. Educating the community about the risks and consequences of speeding will continue to form a major part of the New South Wales speed management program. These activities are coordinated with highly visible Police enforcement. Speed limits will be even more vigorously enforced. New technology will offer opportunities to improve detection and enforcement. New equipment enables accurate detection of motorists exceeding the speed limits by only a few kilometres per hour and from a greater distance. The use of automated speed camera technology in Europe has played a pivotal role in achieving some of the safest roads in the world. Highly visible, highly publicised automated speed cameras will be trialed at key blackspot locations and, if there are substantial road safety gains, will be used more widely to encourage speed compliance. In addition, the Government will examine how existing technology such as Safe-T-Cam and SCATS could be adapted as speed monitoring and enforcement tools. Safe-T-Cam enables the Roads and Traffic Authority to monitor heavy vehicles travelling at excessive average speeds and drivers exceeding prescribed driving hours, and SCATS is the computerised system which controls traffic signals in major urban centres in New South Wales.

*Tougher action on drink driving*

Of all drivers and motorcycle riders killed or injured in 1998 with an illegal blood alcohol content, 55% were in the high range of 0.15 or more. Police already have the power to confiscate the vehicle keys of drink drivers. Drink driving fines, penalties and periods of imprisonment were recently doubled for many drink drive offences. To ensure that the community is safe from those who persist in drinking and driving, the Roads and Traffic Authority is conducting trials of alcohol ignition interlocks to stop drivers impaired by alcohol using their vehicles. If trials are successful, the Government will consider giving Courts the power to order repeat offenders to fit alcohol interlocks to their vehicles, at their own cost, or to have vehicles impounded.

The introduction of Random Breath Testing (RBT) has had a significant impact on the level of drink driving. It is now generally considered to be socially unacceptable to drink and drive. However, as alcohol is still a factor in approximately one in six fatal crashes, the Government will continue to implement random breath testing (RBT) programs targeted to problem areas, supported by high profile public education programs. The Government will continue to take the lead in the development of alternative transport schemes with the Roads and Traffic Authority and the police working in partnership with Local Government, health authorities,

the liquor industry, transport providers and community agencies, in urban and rural areas. Designated driver schemes and complementary buses and taxis sponsored by some clubs and hotels are good examples of how community organisations can help in reducing drink driving incidence.

*Dangers of driver fatigue*

Driver fatigue is a factor in at least 20% of fatal crashes in New South Wales. Public education and advertising campaigns will continue to be used to ensure that drivers are aware of the dangers of driver fatigue over long and short distances, and what is needed to prevent it. The Government will continue to work with the community and sponsors to improve the provision and operation of Driver Reviver sites throughout New South Wales, to encourage motorists to stop and take a break. To help reduce long distance driver fatigue for both heavy and light vehicles the Government will extend its program of building and upgrading rest areas across New South Wales, and investing in public education and information such as travel maps showing rest areas. Rest areas will be strategically located along key travel routes to provide drivers with opportunities and encouragement to break their journey at least every two hours. The Government will work with the trucking industry, drivers and the Transport Workers' Union to ensure that drivers have safe working conditions and are not required to drive for excessive hours. The Government is also working closely with the heavy vehicle industry to promote lifestyle improvements. Programs such as Healthy Eating on the Road promote a healthy lifestyle as one step in reducing driver fatigue incidence. Other initiatives include the Transitional Fatigue Management Program and other compliance programs, that give heavy vehicle operators more flexibility to better manage their drivers and operations. Existing technology such as the Safe-T-Cam system has recently been expanded to monitor and enforce driving hour legislation. Advances in technology are being explored overseas to detect driver fatigue by monitoring driver behaviour through vehicle 'wobble'. The Roads and Traffic Authority is also working closely with the National Road Transport Commission to develop a driver specific monitoring device to better record the behaviour of heavy vehicle drivers. Investigations and trials will be run to test the feasibility of introducing these technologies into New South Wales.

*The need for seatbelt wearing*

Although 95% of motor vehicle occupants in New South Wales wear seatbelts, in 1998 106 vehicle
occupants who died on our roads were not wearing seatbelts. The non-wearing of seatbelts in rural areas is much higher than in urban areas. Seatbelts save lives and public education campaigns target rural drivers and passengers to promote seatbelt wearing as an important road safety issue for the rural community. These initiatives will be coordinated with enforcement programs. The Government will consider giving Courts the power to order repeat offenders to fit seatbelt interlocks that prevent operation of the vehicle unless seatbelts are fastened. The State Government will lobby for changes to the Federal Government's Australian Design Rules (ADRs) to ensure that interlocks are fitted to all new vehicles. Road safety education programs The extensive road safety education program in schools and children's services will continue to be a key initiative aimed at increasing students' knowledge and skills in road safety. This curriculum-based program is delivered in schools to students

from Kindergarten to Year 12 and is integrated with the school syllabus. The Roads and Traffic Authority has formal agreements with the Department of Education and Training, the Catholic Education Commission, the Association of Independent Schools and the Institute of Early Childhood at Macquarie University to support schools and children's services in road safety education. The program is supported by marketing and public education campaigns such as Hold me close and Take me to the right side of the road. Education will not be restricted to the school environment. Road safety courses will also be developed to enable offenders to change their behaviour and develop safer driving habits.

*Driver licensing*

Year after year, accident statistics demonstrate that young drivers are at risk of death or injury on our roads. While 17 to 25 year old drivers hold 16% of licences, they account for 26% of all drivers involved in fatal or injury crashes. We must provide ways to improve the knowledge and ability of younger people behind the wheel. A radically revised graduated licensing scheme is proposed to ensure that novice drivers demonstrate improved skills and maturity in driving before graduating through the stages of driver training and licensing. This will require a progressive improvement in skills to graduate from learner licence, through provisional driver licence to unrestricted licence level. Importantly, the novice driver period will be extended to a minimum of 3 years and 6 months duration to ensure greater opportunity for training under controlled conditions. The new Graduated Licensing Scheme, which will apply to all provisional licence applicants after 1 July 2000, will be the most significant overhaul of the New South Wales novice licensing arrangements ever undertaken. It will restore New South Wales to the forefront of world novice licensing practice. Under the Graduated Licensing Scheme, entrants will be required to step through three novice stages before progressing to an unrestricted licence. Graduation to the next stage will depend on passing a test. There will be a total of four tests. The two existing tests, the computer-based Driver Knowledge Test and the Driving Ability Road Test, are advanced by world standards; they will continue to be fine-tuned. The two new tests, the Hazard Perception Test and the Driver Qualification Test, will be highly innovative approaches to ensuring that drivers have the necessary knowledge, attitudes and skills for safe driving. They will make use of the latest computer multimedia technologies. Following trials, a Hazard Perception Test will be implemented in all motor registries. It will become a prerequisite to advancing to the second provisional licence stage. In addition to passing the Driver Knowledge Test to graduate from a learner licence to a provisional licence, a driver will have to gain extensive experience under various specified conditions. These will have to be recorded in a log book and signed off by the learner's supervisor, who must hold an unrestricted licence. The minimum time to move from first obtaining a learner licence to an unrestricted licence will be extended by two years. Drivers will be at least 20 years of age before they can obtain an unrestricted licence. Restrictions imposed on novice drivers will be progressively relaxed as they graduate through the stages. This will shield drivers from hazards in the early stages and allow exposure to more challenging driving conditions only when they have demonstrated that they are ready.

*Recent initiatives*

- Penalties increased for drink driving and excessive speeding.

- Police have power to confiscate car keys of drink drivers to prevent danger to themselves and others.
- Introduction of road safety education campaigns, coordinated with police enforcement; increased penalties (such as double demerit points) and community activities over peak travel times, e.g. Easter holiday periods.
- Introduction of Enhanced Enforcement Program, delivering increased police enforcement and public awareness.
- New tough penalties for 'road rage' offences including aggressive and predatory driving.
- Increased public awareness of safe road practices through advertising and education.

*Making it happen: Safer people*

1. Introduction of a new Graduated Licensing Scheme for novice drivers.
2. Rigorous enforcement of speed limits, with the introduction of automated speed camera technology.
3. Alcohol interlock trial commenced for repeat drink drivers.
4. Courts may be given the power to have vehicles of repeat drink drivers impounded.
5. Seatbelt interlocks may be ordered for repeat offenders of non-wearing of seatbelts.
6. Repeat offenders may be ordered by the court to undertake road safety education courses.
7. Implementation of alternative transport schemes for drinkers, in conjunction with liquor industry, transport providers, Local Government, health and community agencies.
8. Provision of information to drivers regarding locations of rest areas, and continuing to work with the community to provide Driver Reviver sites to combat fatigue related accidents.
9. Public education campaigns to ensure road users understand the dangers of speeding, drink driving, fatigue and not wearing seatbelts.
10. School education road safety programs for protection of children and development of long-term safe behaviours.

## Safer roads

Improvements in the road environment can save around 600 lives by the year 2010. The State Government is committed to building and maintaining better and safer roads. Future improvements will ensure that all new roads are built to the most stringent safety standards.

*Speed management*

Safety will be improved by a shift to lower speed environments, especially in areas with high pedestrian activity and vulnerable users. The Government strongly supports the Local Government 50km/h urban speed limit program. By the end of 1999, 100 Local Councils in New South Wales will have implemented this initiative. A number of councils have implemented the Sharing the Main Street Program for improved safety and pedestrian amenity in shopping precincts. Lower speed limits to suit specific conditions may also be introduced in areas where the community demands improved safety. The Roads and Traffic Authority has initiated a review of speed limits on all New South Wales roads to ensure that posted speed limits are appropriate to the function and construction of the road and to enhance the safety of all road users. The road environment will be designed to manage vehicle speeds: for example, innovative use of line marking and other techniques can

influence motorists' perceptions of the safe speed to travel. Electronic variable message signs will be used to vary speed limits to enhance safety in all traffic and weather conditions. Protection of our children requires special care. That is why the Government has introduced school zones with 40km/h limits (60km/h in some rural areas), advised by signposting and road markings, during school start and finish times. A 40km/h passing speed limit around school buses started in January 1999.

*Designing safer roads*

Road design in the future will increasingly focus on the safety of all users. Special consideration is given to road users who are more at risk of serious injury such as pedestrians and cyclists. They will be separated from other traffic where possible, or vehicle speeds will be reduced in appropriate areas. Upgrading existing roads and higher safety standards in new road construction, coupled with greater driver awareness of factors which can cause accidents, will lead to significant savings in road trauma and crash costs. Road maintenance such as resurfacing to improve skid resistance will continue to be a priority.

*Road safety audits*
Innovative techniques in road safety diagnosis and treatment will be applied during the building of new roads and improvements to existing roads. The criteria for new construction will be the highest safety standards. Potential safety hazards will be identified and eliminated even before construction commences through road safety audits.

*Blackspot programs*

Blackspot programs that target locations with high accident histories have reduced injuries and fatalities. Many of the State's worst blackspots have now been completely reconstructed to remove hazards and relieve congestion. The blackspot program includes treatment of blackspots around bus stops, particularly near schools, and on hazardous intersections and sections of road. Increased use of public transport Despite extensive public transport in our cities, New South Wales is still highly dependent on road transport. We have one of the highest levels of car ownership in the world. One of the challenges for this Government is to encourage more use of public transport. The State Government's plan, Action for Transport 2010, aims to increase the use of public transport by making it more convenient, safe and reliable. There are also significant road safety benefits associated with increasing the use of public transport and reducing the use of private cars, especially for journeys to work. Studies have demonstrated that passengers on buses have lower exposure to the risk of road death and injury than occupants of other types of vehicles.

*Promoting roadside rest areas*

To help reduce driver fatigue, roadside rest areas will be more attractive and will be built at strategic locations to encourage drivers to break their journey at least every two hours. The Government will provide information to drivers regarding locations of rest areas via maps and consistent signage of rest areas. Particular attention will be paid to the needs of truck drivers and other professional drivers. Major rest areas, such as those recently completed on

the Mitchell and Barrier highways, have facilities such as toilets, picnic tables, rubbish bins and playground equipment.

*Cyclist safety*

The Government is committed to promoting cycling as a viable transport alternative and to improving safety for cyclists. On and off-road cycle networks and cycleways such as the Meadowbank Bridge cycleway and the Warners Bay to Speers Point cycleway in urban and rural areas help produce a safer environment for commuting and recreational cyclists. Maps of these networks inform and encourage potential riders. Cyclist safety education is provided through school curriculums, Community and Road Education Scheme (CARES) centres and bicycle education parks where children can learn safe riding practice in a controlled environment. Education campaigns also address helmet wearing and sharing the road with other users. The Roads and Traffic Authority will continue to work with Police to educate bicycle couriers on adhering to traffic laws. Safe cycling is promoted to the community during Bike Week and through sponsored bicycle events including the RTA Cycle Sydney and the RTA Big Ride.

*Pedestrian safety*

More than 100 pedestrians were killed in road accidents in New South Wales in 1998. People over 60 and young children account for the greatest number of pedestrian injuries and fatalities. At present 40% of pedestrians killed are aged 60 or over, although only about 17% of the population are in this age group. It is estimated that by the year 2010 the number of people aged 60 years and over will be around one-third higher than current levels. This ageing of the population will increase the proportion of pedestrians at risk. The Government will therefore conduct public education and advertising campaigns targeting this more vulnerable group. The safety of pedestrians will be improved through the provision of adequate road crossing facilities, audio-tactile signals and ramps for wheelchairs, prams and shopping trolleys. Technology can already vary pedestrian signal crossing times for the needs of particular user groups. In the next decade more sophisticated devices will be able to measure the speed at which users cross and lengthen the 'walk' time if a user is at risk. Information programs about the use of such facilities, especially for seniors and children, will be developed by the Roads and Traffic Authority. The Government is also committed to an ongoing program to build pedestrian overbridges, particularly in the vicinity of schools and in other locations of high pedestrian activity, to separate pedestrian traffic. Lower speed limits represent one of the most effective safety improvements. Innovative approaches for separating pedestrians from road traffic will be developed. The State Government will work with Local Government to implement Pedestrian Access Mobility and Safety Plans (PAMPs). These plans examine the local movement of pedestrians, particularly the elderly, and develop coordinated strategies to improve safety and amenity.

*Intelligent transport systems*

Road users already have access to information about hazards, congestion and other traffic and safety issues through radio and variable message signs, before and during their trip. Wet weather alerts and other information assist with safer travel choices and safer driving en

route. The Government will continue to ensure that this information is accessible to the general public. To assist enforcement agencies, traffic signal systems and Safe-T-Cam can be enhanced to provide efficient automated enforcement of some traffic violations. The new Transport Management Centre
plays a key role in improving road safety. It will provide information through variable message signs and support safer and more efficient traffic movement. As well as the safety benefits, vehicle users will enjoy improved travel times, fewer congestion-causing incidents and less frustration. In future, technology may be available to allow the Transport Management Centre to communicate with vehicles directly, for example, automatically regulating vehicle speeds in hazardous conditions. In an emergency, it may be possible to warn and notify motorists over their car radios and to give priority at traffic signals for emergency vehicles. On key traffic corridors such as the F3
between Sydney and Newcastle, the Roads and Traffic Authority, police and emergency services have developed a protocol to ensure that traffic around accident sites is cleared as quickly and safely as possible.

*Recent initiatives*

- Upgrading of roads, particularly those with poor crash records such as the Pacific Highway, and the widening of the M4 Motorway between Penrith and Parramatta.
- Construction of cycleways to separate cyclists from other traffic.
- Removal of blackspots through improvements such as the Homebush Bay Drive grade separation in Sydney.
- 50km/h speed limits introduced in urban streets and 40km/h speed limits in school zones to reduce the risk to vulnerable road users.
- Improved linemarking with longer life, higher visibility and more skid resistance and 'rumble' strips marking lane edges to prevent run-off accidents.
- Road safety audits to assess risk on existing roads and to build safer roads in the future.

*Making it happen: Safer roads*

1. 50km/h urban speed limit in local streets, and even lower limits in areas of high pedestrian activity, e.g. shopping areas and central business districts.
2. Mandatory road safety audits of all new road developments.
3. Expansion of the blackspot program, including treatment of those around bus stops.
4. Development of driver information and speed management systems.
5. Traffic priority systems to ensure quicker responses by emergency services.
6. Improved highway treatments to alert drivers to the onset of fatigue, and provision of quality rest areas.

## Safer vehicles

Improvements in the safety of vehicles can save around 725 lives by the year 2010. The next decade will see the emergence of even more improvements in vehicle safety.

*Speed and smarter vehicles*

Many technologies which already exist can be developed or adapted in future for road safety purposes. For example, the engine management systems in new cars here and overseas could be modified to restrict vehicle top speeds. Over the next 10 years it may also become feasible to communicate local speed limits to vehicle computers, and hence restrict the speed of the vehicle to these limits. Smart card technology which is being developed in other industries could be adapted to motor vehicles. These could impose different speed limits for different drivers, for example provisional licence holders or repeat offenders, even in the same vehicle. As vehicle control systems become more computerised, greater numbers of cars will be fitted with increased safety features such as collision avoidance and intelligent cruise control equipment. Over the next decade
vehicles may eventually be able to detect hazards through radar sensors to help drivers avoid collisions. On board computers are already able to locate a vehicle's position and help the driver navigate, reducing potentially dangerous distractions. These types of technologies are being used by the road transport industry, the bus and coach industry and the taxi industry to improve safety not only for their drivers but for the community at large.

*Making safety a selling point*

Compared to 20 or 30 years ago, today's vehicles offer far more protection. Better structural design, improved seats, more advanced seatbelts and airbags have all dramatically reduced the chance of occupants receiving serious or fatal injuries in a crash. The next decade will see the emergence of even more improvements in vehicle safety with great potential to save more lives. The European Transport Safety Council estimates that 50% of all fatal and disabling injuries to occupants could be avoided if all cars being used had all of the best safety features already available. The Government will provide better information on the safety performance of new and used vehicles to encourage the purchase of new cars with higher levels of safety performance. Society is already changing, with consumers increasingly aware of the importance of safety in motor vehicles, and demanding higher safety standards and performance. Manufacturers are increasingly seeing that safety can be a real selling point. Programs such as the Australian New Car Assessment Program (NCAP) will continue and will develop new types of tests. Information shared with international NCAP programs plays an important part in influencing manufacturers to build safer vehicles and consumers to buy safer vehicles. Consumer demand for safer cars will be increased by up-to-date information on safety performance of vehicles, enabling consumers to pressure manufacturers for safer products through their buying power. The Government will ensure that all vehicles purchased or leased by State Government bodies provide the highest practicable levels of protection for their occupants and other road users. This will not only ensure maximum safety for these fleets but will also provide a pool of safer vehicles for future used car buyers. The Government will also encourage purchasing policies amongst leading private sector fleet operators to further increase the usage of safer vehicles.

*Age of the fleet limits improvements*

Australian vehicles tend to be older than in many other countries, with an average vehicle age of over 10 years. It will take more than a decade at the current rate of vehicle turnover before a significant proportion of vehicles have the benefit of improvements such as airbags, antilock braking, enhanced resistance to side penetration and other safety features. Older

vehicles are significantly over-represented in crashes where deaths and serious injuries occur. In the 15 years leading to 1995, the vehicle safety performance of the Australian fleet improved by only 13% despite significant changes in new vehicle technology, a symptom of the age of the fleet delaying the environmental and safety benefits of new technology. The State Government will support initiatives by the Federal Government making it financially more attractive to all motorists to purchase newer vehicles. The State Government will take the lead. Its annual purchase of around 15,000 light vehicles for the state fleet will set the highest safety and environmental standards.

*Safety interlocks*

It is estimated that alcohol contributes to at least 16% of fatal crashes. Alcohol ignition interlocks preventing operation of a vehicle when a driver is impaired by alcohol are already in use in the United States of America and Canada. They are currently being trialed for use with repeat drink drivers in New South Wales. Not wearing available seatbelts is a factor in at least 23% of vehicle occupant fatalities. The Government will consider giving Courts the power to order repeat offenders to fit seatbelt interlocks. The Government will also request changes to Australian Design Rules to ensure these devices are fitted to new vehicles.

*Faster medical attention*

Advances in technology could enable a vehicle's location to be automatically transmitted for fast emergency response in the event of a serious crash. Faster, more responsive medical attention will save lives and reduce the severity of injuries from road trauma. Innovations in this area will be closely monitored.

*Protection of occupants and other road users*

Occupant protection technologies that reduce crash injuries are vital. Frontal and side airbags minimise the forces that cause injury to occupants, as do seatbelts and improved seat designs. Current developments in vehicle engineering will ensure that all systems within a vehicle will combine to provide optimum safety levels. There will also be an emphasis in vehicles of the future on minimising harm to other road users such as motorcyclists, cyclists and pedestrians. Continually increasing safety standards for all vehicles will play a key role in ensuring these safety improvements are achieved.

*Recent initiatives*

- The Australian New Car Assessment Program (NCAP) has encouraged manufacturers to build safer cars.
- More and better information has been provided on vehicle safety for purchasers of new and used cars.
- The effectiveness and use of child restraints has been improved through testing and community information.

*Making it happen: Safer vehicles*

1. Introduce interlocks and other controls to ensure the safe operation of vehicles.
2. Increase the use of the most advanced safety features available in vehicles.
3. Implement a Safe Fleet Policy for the Government's own fleet and promote this to other corporate fleet buyers.
4. Encourage consumer demand for safer vehicles and equipment through promotion of the Australian New Car Assessment Program results.
5. Work with manufacturers and other jurisdictions to ensure Australia's vehicles match world's best practice.

## Community based action

The State Government will encourage involvement in and support of road safety initiatives throughout the community, particularly at a local level.

*New strategies in road safety*

During the next decade the State Government will seek to lead changes in community perception of the importance of road safety by:

- raising the level of awareness of road safety issues
- improving community understanding of what we are doing in road safety and why
- increasing the ability of Local Government to implement initiatives and improve road safety at a local level
- promoting greater involvement and better coordination with all road safety stakeholders.

*Community involvement*

Road safety is something that affects us all, and the direction for the future involves the entire community. This approach is being used in Safer Routes to School, through Road Safety Officers, and joint projects between the Roads and Traffic Authority and Local Area Health Services. Increasingly, road safety will operate at two levels in New South Wales. Many programs will continue to be delivered at the statewide level. In parallel, programs will be initiated to meet the needs of local communities and address their specific road safety issues. The role of Local Government and community organisations will become increasingly important in the delivery of community based road safety programs. Continued State Government support of Local Government Road Safety Officers will ensure the delivery of road safety outcomes at the local level.

*Role of Local Government*

Local Government has a major role in increasing community understanding of road safety and initiating road safety improvements at the local level. The New South Wales Local Government road safety program includes the Road sand Traffic Authority, the Local Government and Shires Association (LGSA), the Institute of Public Works Engineering Australia (IPWEA, previously the Institute of Municipal Engineering Australia, IMEA) and Council Road Safety Officers (RSOs). This program has been very effective in enhancing road safety through:

- increasing the priority of road safety at the local level
- increasing the expertise of road safety practice in Local Government
- encouraging the development of Council road safety strategic plans and integrating these into Council management plans
- enhancing community ownership and participation in road safety through behavioural and educational programs
- increasing Councillor awareness and understanding of road safety.

Road Safety Officers provide a means of identifying local road safety problems and population groups who are particularly at risk or who cannot be reached readily by mass media. Examples of locally-based initiatives are:

- breath testing equipment for patrons of hotels and clubs
- young driver campaigns developed in conjunction with youth forums
- workshops with older pedestrians to reduce the risk of involvement of seniors in accidents
- development of alternative transport schemes for patrons drinking at local venues
- implementation of school zone education and enforcement projects to address road safety issues in and around schools.

*Safer Routes to School*

The State Government and the community both have roles to play in ensuring that our children are as safe as possible when they travel to and from school each day. The Safer Routes to School Program aims to reduce the number and severity of injuries to primary school children on their journey. The program involves parents and carers, school communities, councils, the Roads and Traffic Authority and the police working together to identify road safety issues affecting children between home and school. The program increases parent and carer participation, and increases the level of awareness and knowledge in local communities of child road safety issues. To date over 100,000 families across the state are participating in the program. Community-based consultative programs such as Safer Routes to School encourage all those involved to work together to provide solutions for local road safety issues.

*Working with the private sector*

To assist in reaching the community, groups representing industries such as road freight, hospitality, vehicle manufacturers, medical practitioners, taxis and insurance will continue to be involved. Agencies and industry organisations will be strongly encouraged to implement projects that enhance road safety. An example of industry involvement is The Road is There to Share campaign for trucks, where the heavy vehicle and freight industry played an active role. Employers will be encouraged to participate in the advancement of road safety, and address road safety as a critical Occupational Health and Safety issue. Companies with professional drivers, as well as those whose employees use the road frequently, will be strongly encouraged to adopt safe driving policies. Initiatives will also encourage corporate fleet buyers to purchase fleet vehicles with high safety standards. These policies and programs have the potential to reduce the costs of road trauma, as well as making a substantial contribution to road safety overall.

*Whole of government approach to road safety*

The aim of the whole of government approach is to engage every government agency in issues of concern with road safety. Thus a key strategy is to develop effective partnerships between the Roads and traffic Authority, the New South Wales Police Service, the New South Wales WorkCover Authority, the Motor Accidents Authority, the Environment Protection Authority, the Health Department, Local Government and other organisations, to effectively raise and resolve community road safety concerns.

*Recent initiatives*

- A comprehensive Local Government Road Safety Program has been implemented which includes 53 Council Road Safety Officers developing and implementing community based road safety programs.
- A joint commitment to deliver road safety programs has been formalised through Memoranda of Understanding with the four School Education sectors, and is currently being formalised with Local Government (LGSA and IMEA) and the New South Wales Police Service.
- School child safety initiatives enlisting community participation, such as the Safer Routes to School Program, have strengthened the links between schools and communities to achieve safer school travel practices.

*Making it happen: Community based action*

1. Continued support of Local Government Road Safety Officers.
2. Providing road safety project grants to Councils to enhance locally based road safety initiatives.
3. Facilitate the delivery of road safety at the local level by better targeting community based organisations/agencies, e.g., NSW Health Department, Area Health Services.
4. Employers will be encouraged to implement active occupational road safety programs and policies that address work-related road crashes and injuries.
5. Hospitality industry promoting responsible service of alcohol.
6. Implement community programs of alternative transport options for drinkers.
7. Corporate fleet buyers will be encouraged to purchase vehicles with the highest safety standards.
8. Whole of government approach to resolving community road safety concerns.

## Towards 2010

Making roads in New South Wales the safest in the world and saving 2,000 lives by the year 2010 is a challenge, but success will mean a substantial increase in the quality of life for us all. The State Government is committed to ensuring that:

- people do all they can to ensure that they, and others, are not needlessly exposed to the risk of death and injury on our roads
- lives are not endangered because of excessive speed
- offenders who break road laws and endanger the lives of others will be appropriately penalised

- the safety of vehicles on New South Wales roads is equal to the best in the world.

Implementing Road Safety 2010 will require close cooperation and consultation between the community and all agencies and organisations involved in road safety. Road Safety 2010 sets out what the challenges are in road safety, what is being done in other leading countries, and many
initiatives which will be taken in New South Wales between now and 2010. It is intended that this plan will encourage informed debate enabling us all to have a much better understanding of future directions in road safety, and a stronger commitment to improving the progress of New South Wales towards having the safest roads in the world.

# ROAD SAFETY BENCHMARKING STUDY

Haworth, N., Vulcan, P., Fildes, B. & Tingvall, C.
Monash University Accident Research Centre

*SOURCE: Haworth, N., Vulcan, P., Fildes, B. & Tingvall, C. (1999). road safety benchmarking study – Final Report. Unpublished report. Haymarket, NSW: Roads and Traffic Authority.*

## CONTENTS

## SUMMARY

The purpose of this project is to identify critical issues and to objectively compare New South Wales initiatives and performance against leading national and international road safety authorities. The secondary purpose of the project was to facilitate the Road Safety International Benchmarking Study process and to summarise the results of the study tour for input into the development of the Road Safety 2010 strategic plan for New South Wales. The main report identifies the critical issues in road safety which arose from stakeholder interviews, discusses best practice in road safety (from a review of the literature and the study tour), discusses the applicability of identified best practice measures to New South Wales and make recommendations for strategic directions for Road Safety 2010. The Appendix to the main report documents the data collection and literature review phases and incorporates the findings of the study tour.

*Critical issues to road safety*

Interviews were conducted with internal and external stakeholders to identify the critical issues in road safety related to strategy development and coordination. The interviews revealed a lack of strong partnership in strategy development. Some external stakeholders noted that consultation has taken the form of communication of individually developed strategies rather than working together to develop policy and strategies. The factors contributing to this lack of partnership in strategy development appear to be:

- agencies having different aims;
- agencies having different measures of road trauma;
- allocation and availability of resources;
- political factors.

The interviews also showed that coordination in strategy implementation could be improved. The factors needed to ensure good coordination were identified as:

- adequacy of communication mechanisms;
- keeping all other stakeholders informed of planned campaigns;
- strong links between policy and implementation.

It was noted that now that it is harder to reduce road trauma, it is necessary to improve coordination to achieve further gains. The most useful and productive relationship among stakeholders may be one in which there is a common financial investment and common ownership. There is also a need to convince other people in stakeholder organisations that made safety is part of their core business in order to gain maximum cooperation. Other critical issues in road safety were identified as:

- the lack of adequate marketing and communication of New South Wales road safety;
- performance and successes;
- a need to generate new partnership;
- implications of future technological changes.

*Potential benchmarking partners and best practice*

The comparison of fatality rates from Australian states and territories suggests that Victoria would be an appropriate domestic benchmarking partner in terms of fatality rates. The international comparisons show that there are several countries for which each of the three types of fatality rates is lower than that of Australia: the United Kingdom, the Netherlands, Norway, and Switzerland (Iceland is excluded because the rate is based on only 10 fatalities). While the fatality rate expressed in vehicle-kilometres is unknown for Sweden, the other fatality rates for Sweden are lower than for Australia. Among these jurisdictions, the United Kingdom, Switzerland and Sweden not only have low fatality rates but have also experienced reductions of about one-third in both per capital and per vehicle rates since 1990. Thus these countries present themselves as possible international benchmarking partners for overall road safety performance. In the United States of America, the states of California, Illinois and Maryland merit further investigation as possible benchmarking partners.

In general, more detailed information about travel patterns and programs is required to be able to identify potential benchmarking partners at the program level.

The literature review, study tour and Partnerships in Road Safety Workshop found that the road safety strategies programs and operating environments of countries with good road safety results have quite different characteristics. Yet there are similarities among these jurisdictions. In general, there is a strong commitment to speed management, with speed limits related to the function of the road. There is an emphasis on lower speed limits (often 30 km/h) on roads which serve as access to homes and either safer infrastructure or lower speed limits (to compensate for poor infrastructure) on roads which xxxx??? were a transport function of the road.

Other characteristics of best practice which were identified included:

- collaboration between stakeholders (researchers, administrators, politicians);
- building partnerships by linking costs and benefits;
- linking road safety and environmental goals;
- central local government involvement in strategy development coordination;
- investing in road safety to achieve unprecedented savings;
- agreed and achievable targets.

The applicability to New South Wales of the best practice principles was discussed in terms of:

- patterns of development and speed management;
- geography and infrastructure;
- structure of local government and road safety strategy development and implementation;
- commitment to road safety;
- police enforcement and social control; and
- philosophy of government and implementation of road safety strategies.

*Recommendations for strategic directions*

Generally, road trauma is a consequence of an imbalance between the mobility and the inherent safety of the road transport system. Two distinct alternatives for strategic directions towards the goal of a safer road transport system therefore exist:

1. To reduce mobility, that is, to reduce speeds (to reduce overall exposure is not necessary to improve safety); or
2. To increase the inherent safety of the system.

Given the amount of public or political resistance and the balance between mobility and investment, it is advisable to explore this question further. This leads to the recommendation to link the safety of the infrastructure to the speed limit gradually, with the alternative to either invest or reduce speed.

Neither of the alternative strategic directions described above can be followed strongly enough to produce radical reductions in road trauma unless dramatic changes are made. The recommendations seek to build support for road safety by;

- changing the philosophy of road safety
- generating partnerships
- generating bipartisan support
- linking road safety and environmental concerns
- government setting an example as a road user
- improving communication by issuing an annual review of road safety, and
- setting ambitious goals and challenging targets.

# INTRODUCTION

## 1.1 Background

The Roads and Traffic Authority is the lead agency for road safety in New South Wales. It has developed and maintained Road Safety 2000. The plan for road safety in New South Wales and has coordinated and managed its implementation. The vision of Road Safety 2000 is to make New South Wales roads the safest in the world.

The Roads and Traffic Authority is currently reviewing the New South Wales Road Safety 2000 strategic plan as part of the development of the new strategy Road Safety 2010. To assist in the review of the current strategy and development of the new strategy, the Roads and Traffic Authority wished to compare New South Wales with other best practice road safety jurisdictions nationally and internationally. Best practice was to be identified through research and benchmarking.

Several projects were undertaken as part of the review of Road Safety 2000 and the development of Road Safety 2010. A Road Safety International Benchmarking Study tour of Europe was undertaken in September 1998.

## 1.2 Purpose

The purpose of this project was to identify critical issues, with a focus on strategy development and coordination, and to objectively compare New South Wales initiatives and performance against leading national and international road safety authorities.

The secondary purpose of the project was to facilitate the Road Safety International Benchmarking Study process and to summarize the results of the study tour for input into the development of the Road Safety 2010 strategic plan for New South Wales.

The project did not aim to develop goals and targets for specific areas or performance indicators.

## 1.3 Structure of the report

The main report identifies the critical issues in road safety which were identified from stakeholder interviews, discusses best practice in road safety (from literature review and the study tour), discusses the applicability of identified best practice measures to New South Wales and makes recommendations for strategic directions for road Safety 2010.

The Appendix to the main report documents the data collection and literature review phases which provide much of the background data required to identify the critical issues and strategic directions. It also presents the findings of the study tour and the Partnerships in Road Safety Workshop held in Cologne.

# CRITICAL ISSUES IN ROAD SAFETY

Interviews were conducted with internal and external stakeholders to identify the critical issues in road safety related to strategy development and coordination.

The Program Managers within the Roads and Traffic Authority's road safety area were interviewed regarding the performance of their areas, future changes, coordination with internal and external stakeholders and resource allocation. Interviews were also held with senior staff of other sections of the Roads and Traffic Authority, including Marketing, Traffic Management, Driver Licensing and Vehicle Registration.

Interviews were also held with representatives of key external stakeholders in New South Wales: the Department of Health, Department of School Education, Local Government and Shires Associations, Motor Accident Authority, NRMA, Police, and the STAYSAFE Committee. The representatives were asked about their organisation's role in road safety,

measuring their success, coordination of road safety stakeholders, road safety and other demands and challenges for the future.

## 2.1 Strategy development

The interviews revealed a lack of strong partnership in strategy development. Some external stakeholders noted that consultation has taken the form of communication of individually developed strategies, rather than working together to develop policy and strategies. They suggested that the best approach would be for the major stakeholders (Police, Roads and Traffic Authority, NRMA, Motor Accidents Authority) to sit down together to develop strategies issue by issue. They should work together and share resources for maximum effectiveness.

The factors contributing to this lack of strong partnership in strategy development appear to be:

- agencies having different aims
- agencies having different measures of road trauma
- allocation and availability of resources
- political factors.

### 2.1.1 Agencies having different aims

The responsibilities and priorities of the road safety partners differ and will continue to differ. The Motor Accidents Authority consider that various agencies have a lead role in particular parts of the injury management continuum (see Table 1) with the Motor Accidents Authority having a broad role.

The Department of Health and the Motor Accidents Authority (through compulsory third-party insurance premiums) together pay for much of the cost of road trauma. The legislation requires the Motor Accidents Authority to minimise the effect of the cost of injuries to: ensure that the scheme remains affordable. For that reason, they have a strong interest in prevention programs which will reduce the cost (not necessarily the frequency) of road trauma.

The road safety aims of some partners are somewhat more political. The NRMA is the largest organisation representing road users, having nearly two million members, and one of its roles is as an advocacy group for motorists. It focuses and activities are constrained by the wishes of the members of the organisation; the NRMA needs to be seen to be acting independently (rather than in partnership with the Roads and Traffic Authority). While the NRMA concentrates mainly on the safety of drivers and passengers, some members are cyclists and all are pedestrians. It conducts some smaller, localised programs to improve the safety of unprotected road users.

**TABLE 1. The Injury Continuum**

| *Prevention* | *Emergency Response* | *Treatment* | *Rehabilitation* |
|---|---|---|---|
| RTA | Ambulance | Health | Community Rehab Service |
| Police | Health | | Ageing and Disability Services |
| Education | Police | | Health |
| NRMA | | | Private Providers |

STAYSAFE, the New South Wales Parliament's Road Safety Committee, identified it's main role as keeping road safety high on the political agenda. It is a bipartisan political group which reviews road safety issues.

### 2.1.2 Agencies having different measures of road trauma

Traditionally, the Roads and Traffic Authority has analysed data according to the police-recorded injury severity levels and has had to be responsive to changes in the road toll. Thus, its primary focus has been on fatality reduction.

For other agencies, numbers of fatalities are not the best measure of road trauma and so the problems areas identified have differed. For example, the Motor Accidents Authority examines the significant problems derived from its claims profile. Because of the cost issues, fatal crashes are not the focus of attention for the Motor Accidents Authority. The insurance claim costs are often much greater for some types of serious injury (e.g., spinal injuries) than for fatalities. Therefore some of the major factors coming out of claims data may be very different from the ones that Roads and Traffic Authority would identify. Bed-days may be a more important measure for Health than the Police-coded injury severity levels used as a measure by the Roads and Traffic Authority.

The road toll is viewed as a performance measure by the public (through the media) and the politicians and some senior police. Yet, among the police there is a move to try to use other indicators and to look at longer-term measures. Some of the measures being used to assess the effectiveness of drink driving enforcement are numbers of tests conducted, rate of alcohol in crashes and number of tests that are positive.

### 2.1.3 Allocation and availability of resources

The Program Managers in Road Safety at the Roads and Traffic Authority noted that current vacant positions are hampering progress and there has been a reduction in the corporate body of knowledge.

For both the Roads and Traffic Authority and the police, road safety is a high priority item of core business. For other agencies, however, road safety must compete with other demands for their resources. The extent of past success in reducing road trauma may have contributed to lowering the priority given to road safety by the Health community. The Health representative noted that the level of investment is very high for road safety compared with other forms of injury.

For the Motor Accidents Authority, the decision is not one of allocating resources to road safety versus other issues but the allocation of resources between injury prevention and rehabilitation. There has traditionally been an emphasis on treatment and rehabilitation but the allocation resources to prevention is gradually increasing.

### 2.1.4 Political factors

In general, the different agencies involved in road safety in New South Wales are all part of different State government ministries. The strategies of different ministries are largely independently developed and there is no clear impetus to show that they are integrated.

The political nature of road safety can sometimes constrain the agencies' ability to develop a longer-term, more strategic approach, which incorporates more scientific allocation of funding.

## 2.2 Strategy implementation

The interviews revealed that coordination in strategy implementation could be improved. The factors impairing coordination were identified as:

- inadequacies in communication mechanisms;
- failure to keep all other stakeholders informed of planned campaigns;
- lack of strong relationships between policy and implementation personnel.

### 2.2.1 Adequacy of communication mechanisms

A number of stakeholder representatives expressed some disappointment with the functioning of the Road Safety Advisory Council (RSAC). It was seen as a useful forum for finding out about the activities and policies of the Roads and Traffic Authority. However, it was felt to be not well managed because it was the only forum for some smaller stakeholders to communicate with the Roads and Traffic Authority and this took up a lot of time.

The police noted that the lack of real consultation sometimes results in actions being taken without an understanding of the practicalities of enforcement. Examples cited were designating the third lane of a motorway as a transit lane and the proposed Variable Speed Limits Program.

The establishment of formal agreements and working relationships between stakeholders was considered to be one of the major achievements of Road Safely 2000 by one of the stakeholders representatives. However, it was noted that some stakeholders were not acknowledged and were not given the opportunity to contribute.

It was noted that some stakeholder representatives are involved in a large number of committees. One representative feel that there was too much reporting at too many levels and that left too little time for actually talking about strategies. Multiple working parties were often generated which took up even more time. Several representatives felt that there is potential for electronic communication of information, leaving meetings more free for policy development.

### 2.2.2 Need to keep all other stakeholders informed of planned campaigns

There is a need to ensure that other stakeholders are informed of planned campaigns. Several stakeholders mentioned difficulties that arose because they were not informed about the proposed launch of the Motor Accidents Authority/Roads and Traffic Authority speed campaign. The lack of coordination does not lead to optimal utilisation of resources.

### 2.2.3 Strong links between policy and implementation

Some programs, such as the enhanced enforcement and local government road safety programs, have strong links between those developing policy and strategies and the personnel implementing the programs, However, it was reported that, in general, there was a feeling of detachment from regional implementers, a lack of capacity to directly influence implementation and a lack of capacity to prescribe program frameworks. This difficulty was particularly noted by Roads and Traffic Authority Program Managers.

## 2.3 Improving coordination

It was noted that people working in health promotion appear to be much better at partnership than people in road safety. One possible factor could be that health promotion has so little resources that partnership is a necessity. It was noted that now that it is harder to reduce road trauma, it is necessary to work together to achieve the gains.

Health noted that the most useful and productive relationship among stakeholders is usually one in which there is a common financial investment and common ownership. This is the model which is being developed for the Safe Communities Program. The establishment of the Injury and Risk Management Research Centre was held out to be a major current and future source of cooperation among New South Wales Health, the Motor Accidents Authority and the Roads and Traffic Authority.

Thee is also a need to convince other people in stakeholder organisations that road safety is part of their core business in order to gain maximum cooperation. One possible approach would be to calculate and inform the management of the stakeholder organisation what the cost of road trauma is to its organisation.

## 2.4 Other critical issues in road safety

### 2.4.1 Marketing and communication of New south Wales road safety performance and success

Both internal and external stakeholders commented that the Roads and Traffic Authority does not adequately publicise its successes. There needs to be better communication of its achievements to increase its profile and maintain and enhance funding for road safety programs. The lack of Roads and Traffic Authority representation at national and international conferences was considered to be hampering gathering of information by the Roads and Traffic Authority and lowering its profile.

The comment was made that the Roads and Traffic Authority does not communicate road safety statistics well. It was maintained that the Roads and Traffic Authority annual statistics should be structured to reflect the Road Safety 2000 structure and be available on the Internet.

Better documentation of the Roads and Traffic Authority's work was seen as necessary for better coordination and acknowledgement of the Roads and Traffic Authority's efforts. In addition, it would help Roads and Traffic Authority to safeguard corporate knowledge intact against loss of key personnel.

### 2.4.2 Generating new partnerships

There is potential for bringing insurers into partnership in injury prevention. Unfortunately, private companies are of the view that the benefits of their involvement will go to their competitors. Health insurers are interested in reducing costs of injury to older people, but their current emphasis is on keeping afloat, rather than funding research and other program.

### 2.4.3 Implication of future technological changes.

Internal stakeholders identified a number of future technological changes which could have road safety implications.

New South Wales Health noted that the most useful and productive relationship among stakeholders is usually one in which there is a common financial investment and common ownership. This is the model which is being developed for the Safe Community Program. The establishment of the Injury and Risk Management Research Centre was held out to be a major current and future source of cooperation among New South Wales Health, the Motor Accidents Authority and the Roads and Traffic Authority.

There is also a need to convince other people in stakeholder organisations that road safety is part of their core business in order to gain maximum cooperation. One possible approach would be to calculate and inform the management of the stakeholder organisation what the cost of road trauma is to its organisation.

Stakeholders identified a number of future technological changes which could have road safety implications.

Traffic management:

- Behavioural aspects of traffic management, for example, the variable speed limits trial;
- Pedestrian confusion about flashing red pedestrian signals;
- The future emphasis will be on getting the best out of the infrastructure and improving infrastructure for public transport.

Driver licensing:

- Many options may become economically feasible with future technological developments, for example, a licensing system with more (and enforceable) graduations and licences for other road users;
- The expressed desire to reduce congestion and improve road safety by moderating demand for vehicle travel is likely to be partly achieved through driver licensing.

Vehicle regulation:

- Existing technological systems could be further developed to increase their road safety benefit;
- The Safe-T-Cam system has potential for application to the problem of car driver fatigue for enforcement or for research purposes;
- Future moves to address the problem of vehicles with emission levels may have some safety benefits in reducing the total distances travelled by older vehicles.

# BEST PRACTICE IN ROAD SAFETY

## 3.1 General issues in benchmarking road safety performance

Benchmarking is the process of searching, finding, adapting and implementing outstanding practices that lead to superior performance.

There are a number of general issues in benchmarking which need to be addressed before potential benchmarking partners can be identified. Perhaps the most basic issues are:

What can be benchmarked?

What are the characteristics of a potential benchmarking partner?

The second questions spawns a host of subsidiary questions.

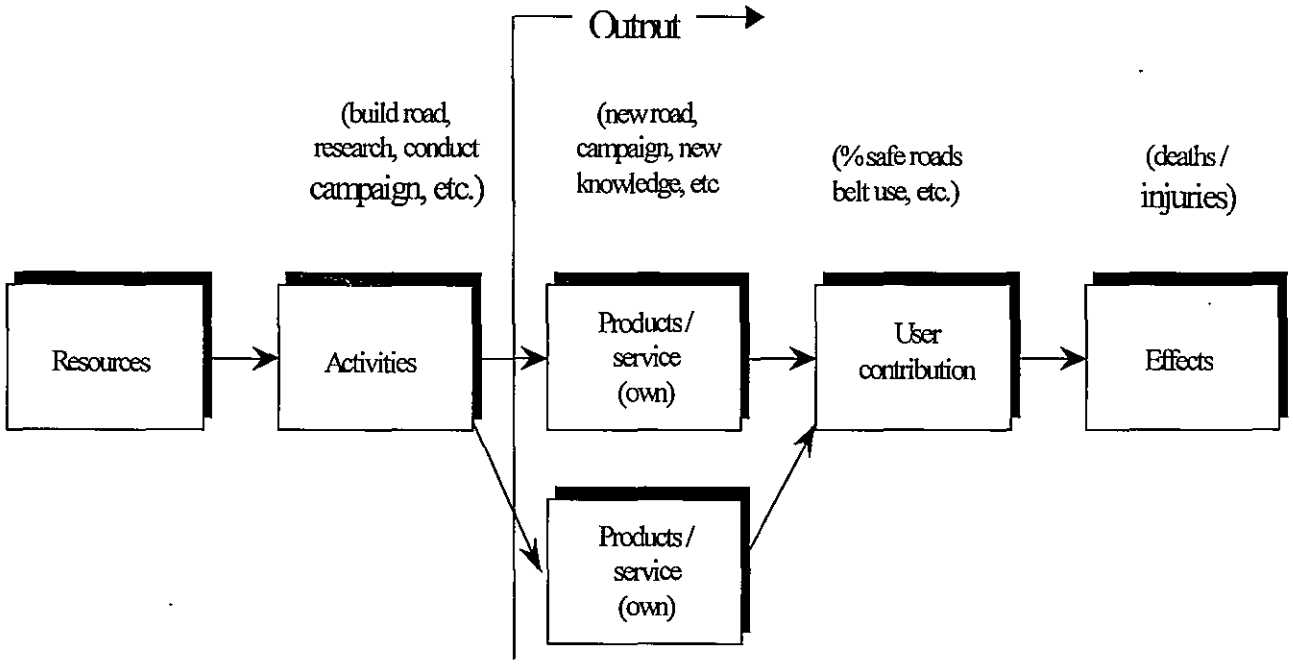
- Should there be one or many benchmarking partners?
- How similar do the jurisdictions need to be and how can similarity of jurisdictions be assessed?
- What is the importance of relative road safety performance?
- What index of road safety performance should be used in assessing best practice current level or amount of percentage improvement in recent years?

### 3.1.1 What can be benchmarked?

In strict terms, only those aspects which can be measured are suitable for benchmarking.

Therefore, one can potentially benchmark on fatality and injury rates (overall and for particular road user and age groups), behavioural indices (e.g., Seat belt wearing rate, percent of killed drivers with illegal BAC), enforcement activities financial parameters (e.g., % government revenue spent on road safety, % of total spending on road safety that is not contributed by the road safety that is not contributed by the road authority), and other measurable quantities. It is not easy to quantify processes, such as the extent of intersectoral cooperation, and so while best practice in these areas can be identified, benchmarking is more difficult.

*Figure 1. Model of road safety system and possible levels of benchmarking*




Another issue is how specific should the measure be on which benchmarking is based. Very general benchmarking could occur on overall measures or there could be benchmarking on problem specific measures.

The system itself could be benchmarked, not only performance indicators for individual behaviour. Such indices could be percentage of the road (or travelled distance) with high safety standards (i.e., speeds or speed limits that are in balance with the level of infrastructure safety). Other indicators could be percentage of the care population that reaches a certain safety level, percentage of agencies and companies with a safety policy, etc.. A possible model is shown in Figure 1. Benchmarking or performance indicators could be set on all levels, but on a national level, the two at the right (user contribution and Effects) seem most appropriate. On an organisational level, benchmarking and targets could concentrate on the two in the middle (Products/services - own, Others products/services).

**3.1.1.1 Choice of appropriate road tra uma measures for benchmarking**

In general, fatality rates are more widely available and unambiguous than injury rates. There are large differences in the number of injuries, per fatality which are likely to reflect reporting practices for injury, rather than differences in injury severity.

For most jurisdictions, a number of fatality rates are available (e.g., per 10,000 population, per 100,000 registered vehicles, per 100 million vehicle-kilometres) and there has been considerable discussion about which is the most appropriate to use in benchmarking. Hollo (1997) argues that the rate of mortality (fatalities per 10,000 population) has advantages that both the numerator and denominator are reliable and similarly interpreted in most countries. The mortality rate also allows comparisons to be made between accidents, diseases, epidemics and other causes of death. Unfortunately, the rate of mortality does note take road

traffic exposure into account and may have a low value in countries where the degree of motorisation is low and the traffic safety level is also low.

The number of accident fatalities in relation to vehicle kilometres can from one aspect be considered as the best index of the actual accident fatality risk, since the fatalities are the consequences of collisions between moving vehicles or between vehicles and other road users (e.g., pedestrians), or possibly a even of collisions with some solid object (Koornstra, 1996 in Hollo, 1997).

However, the drawback of this measurement is that the quality of the estimate of total number of vehicle kilometres differs among countries and it not available for some countries.

□ further problem (with fatalities in relation to total vehicle kilometres) is that passengers and drivers of the various motor vehicle categories participate in road traffic with a considerably different risk of fatality. Considerable differences can be found between the countries in, for example, the proportion of two-wheeled vehicles in the vehicle fleet (p.148).

Hollo (1997) suggests that countries be judged, not on the basis of their actual rates, but on whether the rates are higher or lower than that predicted from Smeed's law given their level of motorisation.

From a discussion of the issues of population density and inner density (the relative size of the activity area per inhabitant), Ernvall (1997) concludes that:
it is obvious that those traditional exposures such as number of inhabitants, care fleet or driving licences do not describe the traffic safety situation very well (p.551).

### 3.1.2 Characteristics of potential benchmarking partners

#### 3.1.2.1 Single or multiple benchmarking partners

Whether performance on one measure or performance on a number of measures is being benchmarked, there is a choice between comparing against one jurisdiction or comparing against a group of jurisdictions. The opportunity exists to compare against a group which combines data, such as the OECD or the European union. Benchmarking could occur against the median of the group or against the best performing member of the group or both.

### 3.1.2.2 Required extent of similarity among jurisdictions

The extent of similarity between the jurisdictions to be compared may depend on the nature of the parameter that is being compared. For example, little similarity may be required if the parameters are very global, e.g., the overall fatality rate per 100,000 vehicles. However, if the parameter is very specific (e.g., the percent of persons killed who are motorcyclists), then similarities in climate and composition of the vehicle fleet may be required for the benchmarking exercise to be meaningful.

There are a number of parameters of similarity among jurisdictions which are likely to have implications for road safety performance, policy and implementation. These parameters include:

- Structure of government
- Geographical and demographic factors
- Degree of motorisation/development of the transport system
- Road user mix in the jurisdiction.

*Effects of the structure of the government on road safety*

The structure of government and allocation of responsibilities varies considerably from country to country. This affects who does what in road safety. Countries differ according to the number of levels of government and a number of state governments (e.g., United States, Germany, Australia) while others have so system of states. Often local government is stronger where there are no states. For instance, while local government in Australia is responsible for most of the road system, in Britain it is also responsible for education, social services and land-use planning. Thus, the percentage of the total spending on road safety which is not contributed by the central road authority may not be easily compared across countries where the structure of government differs.

*Effects of the degree of congestion and urbanisation on road safety*

The ratio of injured persons to killed persons is higher when traffic is more congested and therefore travel speeds are lower. An example given by Zaidel and Makinen (1997) is that there are 69 people injured for each person killed in Israel (congested and urbanised) compared with 24 people injured for each person killed in Finland (less congestion and urbanisation). They note that the same pattern is also found in small but motorised countries such as Austria, Belgium, the Netherlands and Switzerland. Shorter road network also contributes to higher level of enforcement (other factors being equal). More urbanisation probably also contributes to better reporting rate of accidents.

In Israel, the average population density is somewhat misleading because most of the people live in the coastal strip that covers about one-third of the area of the country. There are some similarities with New South Wales here.

In addition, urbanisation also contributes to a high involvement of unprotected road users in accidents. In Israel, 30% of persons killed are pedestrians, the corresponding figure in Finland is 18% (the corresponding figure for New South Wales is 22%).

The characteristics of Israel, Finland and New South Wales are compared in Table 2. New South Wales is much more like Finland than it is like Israel. The New South Wales motorisation level is high (548 vehicles/1000 population). New South Wales has a very large road network of which only 11% is in the urban area (defined as Sydney Statistical Area). Yet 60% of the driving occurs on this 11% of the road network. In New South Wales there are only 34 people to pay for each kilometre of road, compared with 55% in Finland and 385 in Israel. Population per kilometre of road network is a measure of both congestion and the affordability of the road network.

Climatic conditions also affect exposure patterns, and crash rates and patterns. In Finland, for example, the accident rate in winter is 1.5 to 2.0 times greater that in summer (Zaidel and Makinen, 1997).

**TABLE 2. Basic facts and figures of Israel and Finland (1995) and comparisons with New South Wales. From Zaidel and Makinen (1997) and Road Traffic Accidents in NSW - 1996**

| Parameter | Israel | Finland | New South Wales |
|---|---|---|---|
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* Urban defined as Sydney Statistical Region. Data supplied by the Roads and Traffic Authority

## 3.2 Potential benchmarking partners

### 3.2.1 Comparisons of Australian Jurisdictions

The comparison of fatality rates from Australian states and territories in Table 3 showed that the Australian Capital Territory had the lowest number of fatalities and fatality rates. After Victoria, New South Wales had the next lowest fatality rates. On both per capita and per vehicle fatality rates, New South Wales, Victoria and Tasmania improved their relative ranking from 1990 to 1995. This suggests that Victoria would be an appropriate domestic benchmarking partner in terms of fatality rates.

**TABLE 3. Comparisons of numbers of fatalities and fatality rates among Australian States and Territories. Data from the Federal Office of Road Safety (1998)**

| Jurisdiction | Number of fatalities (1997) | Fatalities per 100,000 population | | Fatalities per 10,000 registered vehicles | |
|---|---|---|---|---|---|
| | | 1995 | % reduction since 1990 | 1995 | % reduction since 1990 |
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| Australia | 1764 | 11.17 | 18 | 1.84 | 20 |

Within jurisdictions there are also regional differences in fatality rates. Table 4 shows that the very large differences in fatality rates for the entire state become very much smaller when capital cities and other urban area from the different states are compared. One may conclude that it is high crash rates in rural areas in largely rural states, which contribute largely to their overall high fatality rates.

**Table 4. Fatal crashes in 1992 per 100,000 population in capital city and other urban areas among Australian states and territories*. Data from Hakkert and McGann (1996).**

| *Jurisdiction* | *Capital City* | *Other urban areas* | *Entire state* |
|---|---|---|---|
| New South Wales | 5.0 | 5.6 | 9.5 |
| Victoria | 4.4 | 3.3 | 8.0 |
| Queensland | 6.0 | 7.4 | 11.7 |
| South Australia | 5.6 | 2.8 | 9.5 |
| Western Australia | 4.5 | 3.0 | 1.03 |
| Tasmania | 3.7 | 2.9 | 11.9 |
| Northern Territory | 3.9 | 3.5 | 25.7 |
| Australian Capital Territory | 4.1 | - | 5.4 |
| Australia | 4.9 | 5.2 | 9.7 |

*State population from ABS 1992, capital population from ABS 1995

### 3.2.2 International comparisons

Table 5 presents comparative statistics for road accidents and road usage in OECD member states. The international comparisons show that there are several countries for which each of the three types of fatality rates is lower than that of Australia: the United Kingdom, the Netherlands, Norway and Switzerland (Iceland is excluded because the rate is based on only 10 fatalities). While the fatality rates for Sweden are lower than for Australia. Among these jurisdictions, the United Kingdom, Switzerland and Sweden not only have low reality rates but have also experienced reductions of about one-third in both per capita and per vehicle rates since 1990 (see Table 4 in the Appendix). Thus these countries present themselves as possible international benchmarking partners for overall road safety performance.

Overall, the road safety performance of United States appears to be inferior to that of New South Wales and Australia as a whole (except when fatalities are expressed in terms of distance travelled). In 1995, the national rate for the US was 16 per 100,000 people compared to 11 for Australia and 10 for New South Wales. Yet there are huge differences among states.

**TABLE 5. Comparisons of numbers of fatalities and fatality rates among Australian States and Territories. Data from the Federal Office of Road Safety (1998)**

| Jurisdiction | Fatalities | Fatality rates | | | Fatalities per 100,000 Population | |
|---|---|---|---|---|---|---|
| | | Per 100,000 population | Per 10,000 vehicles | Per 100 million | Pedestrian | Bicyclists |
| Australia | 1970 | 10.8 | 1.80 | *1.21* | 1.92 | 0.31 |
| Germany | 8758 | 10.7 | 1.81 | 1.44 | 1.44 | 0.73 |
| Italy | 6688 | *12.3* | 1.90 | | | |
| United Kingdom | 3740 | 6.4 | 1.39 | 0.82 | 1.77 | 0.35 |
| France | 8541 | 14.7 | 2.96 | 1.7 | 1.79 | 0.54 |
| Spain | 5483 | 14 | 2.81 | | 2.45 | 0.26 |
| Netherlands | 1180 | 7.6 | 1.75 | 1.07 | 0.70 | 1.50 |
| Portugal | 2730 | 28.9 | 4.52 | | 6.62 | 0.80 |
| Belgium | 1356 | 13.4 | 2.59 | 1.67 | 1.53 | 1.18 |
| Sweden | 537 | 6.1 | 1.22 | | 0.84 | 0.55 |
| Austria | 1027 | 12.7 | 2.26 | 1.53 | 1.95 | 0.91 |
| Switzerland | 616 | 8.7 | 1.48 | *1.14* | 1.53 | 0.67 |
| Denmark | 514 | 9.8 | 2.34 | *1.36* | 1.29 | 1.68 |
| Finland | 404 | 7.9 | 1.80 | 0.95 | 1.36 | 0.90 |
| Norway | 255 | 5.8 | 1.08 | 0.86 | 1.12 | 0.16 |
| Ireland | 453 | 12.4 | 3.38 | 1.31 | 3.15 | 0.60 |
| Luxembourg | *68* | *16.7* | | | 1.69 | 0.48 |
| Iceland | 10 | 3.7 | 0.70 | 0.52 | 0.74 | 0.37 |
| United States | 41907 | 15.8 | 2.08 | 1.06 | 2.04 | 0.29 |
| Japan | 11674 | 9.3 | 1.58 | 1.59 | 2.62 | 1.16 |
| Canada | 3082 | 10.3 | 1.79 | | 1.54 | 0.20 |
| New Zealand | 514 | 14.1 | 2.16 | | 1.73 | 0.36 |
| Hungary | 1370 | 13.4 | 4.98 | | 4.23 | 2.16 |
| Czech Republic | 1568 | 15.2 | 3.86 | *4.9* | 4.31 | 1.54 |
| Republic of Korea | 14551 | 32.3 | 13.55 | | 12.21 | 0.71 |

* includes cars and trucks to New South Wales data but only cars in US data

The road safety performance of New South Wales and the best performing US states is compared in Table 6. It shows that some of the best performing states have much high population densities (and so likely greater congestion) than New South Wales (Maryland, Massachusetts, New Jersey and New York). Some of the States with lower population densities than New South Wales also have relatively fewer pedestrian fatalities (Minnesota, Virginia, Washington). From Table 6 it appears that California, Illinios and Maryland merit further investigation as possible benchmarking partners. California has been shown in the past to have good enforcement and Department of Motor Vehicles programs as well as having an urban/rural mix and climate similar to New South Wales

**TABLE 6. Road safety comparisons of New South Wales and the best performing US states (with greater than 400 fatalities). US data are 1996 figures from Insurance Institute for Highway Safety (1997).**

| *State* | *Fatalities* | *Fatality rate* | | *Passenger vehicle occupants (%)* | *Motor cyclists (%)* | *Pedestrian (%)* | *Population density persons per km$^2$ (1990) census)* |
|---|---|---|---|---|---|---|---|
| | | *per 10,000 population* | *per 100,000 registered vehicle* | | | | |
| California | 3,989 | 13 | 18 | 50 | 6 | 20 | 73 |
| Illinois | 1,477 | 12 | 17 | 62 | 7 | 14 | 79 |
| Maryland | 608 | 12 | 16 | 59 | 4 | 21 | 177 |
| Massa- | 417 | 7 | 9 | 60 | 8 | 18 | 281 |
| Minnesota | 576 | 12 | 16 | 60 | 7 | 8 | 20 |
| New Jersey | 818 | 10 | 13 | 58 | 6 | 22 | 384 |
| New York | 1,564 | 9 | 15 | 55 | 5 | 24 | 142 |
| Ohio | 1,395 | 12 | 16 | 65 | 8 | 9 | 102 |
| Pennsylvan | 1,469 | 12 | 17 | 59 | 7 | 15 | 102 |
| Virginia | 875 | 13 | 17 | 58 | 4 | 13 | 59 |
| Washington | 712 | 13 | 16 | 52 | 6 | 13 | 28 |
| | | | | | | | |
| Australia | 581 | 9 | 17 | 65* | 10 | 22 | 77 |

* Includes cars and trucks and trucks in New South Wales data but only cars in US data

International comparison should be seen in the context, not only of population density but also of road user mix and road user interests. Overall population density overlooks the presence of vast barren areas in some countries (such as Australia). The pedestrian fatality rates will be affected by the amount of pedestrian travel and the use of alternative transport (such as bicycles in the Netherlands). Detailed travel mode information - where people log every journey and map where they are going and where they are coming from - may be necessary to gain a fuller understanding of road safety issues.

## 3.3 Operating environment of each potential partner

The operating environment of each potential benchmarking partner is summarised in this section. The summary emphasises the roles of different agencies in road safety and how these are coordinated. A background is given to the development and thrust of the new road safety strategies, *Vision Zero* and *Sustainable Safety.*

The material relating to the overseas jurisdiction be based on material collected and discussions held with representatives of agencies in those countries during the Road Safety International Benchmarking Study tour of Europe and during the Partnerships in Road Safety Workshop, held in Cologne during the study tour.

Further details of road safety planning and activities in these jurisdictions and other local and international jurisdictions can be found in the Appendix to this report.

### 3.3.1 Victoria

The Victorian road safety strategy, Safety First covers the period 1995 to 2000. The groups who produced the strategy were VicRoads, Victoria Police and the Transport Accident Commission. Other groups involved in road safety in Victoria include: Parliamentary Road Safety Committee, Road Safety Executive Group, Road Safety Management Group, Road Safety Reference Group, Traffic Safety Education Group and community Road Safety Councils. While many of the stakeholders in road safety in Victoria are the same as those in New South Wales, there are some real differences in the way they function which have affected strategy development and implementation.

#### 3.3.1.1 Role of the Transport Accident Commission

The Transport Accident Commission (TAC) provides no-fault transport accident compensation to all injured persons in road crashes in Victoria. In 1986, the Victorian Parliament passed the Transport Accident Act which led to the establishment of the Transport Accident Commission. The aims of the Act were to:

- provide medical treatment and rehabilitation for people injured in transport accidents,
- provide compensation to those injured - or to the dependents of those killed, and;
- reduce the incidence and cost of transport accidents.

The Transport Accident Commission is a genuine partner in road safety because it is called to do so in the Act and because it alone benefits financially from reductions in road trauma, through reductions in its claims. The Transport Accident Commission views funding road safety programs as an investment which has yielded good returns:

- Victoria's coordinated approach to accident prevention, which primarily involves VicRoads, Victoria Police and the TAC has resulted in an estimated saving of more than 2500 lives and $875 million in TAC claims payments since 1989" (Transport Accident Commission 1997 Annual Report, p.29)
- The Transport Accident Commission paid a dividend to the Victorian government of $256 million in 1996/97.

As part of Safety First, the Transport Accident Commission's focus has been on changing road user attitudes and behaviours. It is the largest commissioner of road safety advertising (under its own auspices, rather than providing funding for advertising commissioned by the road authority) and in 1996/97 provided funding for 25 mobile radar units and 60 laser speed detection devices for the Victoria Police.

The Victorian example shows that a monopoly third-party insurer can be a powerful and important partner in road safety, because road trauma reductions provide it alone with direct benefits from its own investments.

#### 3.3.1.2 Speed camera enforcement

One difference in road safety practices between New South Wales and Victoria is in the level of speed camera enforcement. The number of infringement notices issued for speeding detected by speed cameras is markedly greater in Victoria than New South Wales. The high level of enforcement has been shown to have contributed to reductions in both travel speeds and casualty crashes. Processing of the large number of infringements was made possible by the establishment of a special Traffic Camera Office to process infringements. Funding for the speed cameras was provided by the Transport Accident Commission.

### 3.3.2 Sweden

#### 3.3.2.1 Why Sweden has had a relatively low road toll

Nordic countries are traditionally more law abiding. Swedes tend to respond to requests, for example, when surveyed the usual response is around 80%. Representatives interviewed in Sweden stated that the main problem for road safety in Sweden is that the roads themselves are dangerous in relation to actual speed limits. This is largely due to a tradition of neglect (road safety-wise) by the Swedish National Roads Administration (Swedish National Road Administration) and other agencies.

#### 3.3.2.2 Which agencies are accountable for road safety

Generally, the Swedish National Roads Administration (Swedish National Road Administration), police and the municipalities are responsible for road safety. The Swedish National Road Administration carries the prime responsibility. There are 288 municipalities in Sweden which have the power to levy taxes and the responsibility for providing most public services, that is, schools, etc.

The Minister for Transport and Communications determines the broad policy framework and budget levels but cannot direct the Swedish National Road Administration. However, the Minister appoints the head of Swedish National Road Administration to a six -year term.

A Road Crash Commission has been recently established to independently audit the road safety performance of the Swedish National Road Administration. There are similar commissions in existence for air safety, rail safety and occupational safety. The Commission investigates all fatalities from a systems approach, as a complement to the police investigation, that looks at the road user and if someone has done something wrong in relation to the road user legislation.

There is also a non-government organisation, the National Traffic Foundation, which is funded by the Ministry for Transport and Communications to assist people to get road safety action from the government administration (Swedish National Road Administration).

### 3.3.2.3 What are the funding sources?

The national government allocates the budget (30 billion SEK, of which about 2 billion SEK is for safety) to the Swedish National Road Administration and others in road safety e.g., the NFT (65 million SEK). Municipalities fund roads to the level of 2-3 billion SEK. One Australian dollar is equal to approximately 5 SEK.

Funding Vision Zero has required a change to the composition of road funding budgets. The ten-year program for road construction comprised 30.5 billion SEK for investments into new infrastructure, or major redesign of existing infrastructure. Of the 30.5 billion SEK, safety was initially allocated 4.5 billion. The consequences this program would have been that while the safety investments would have saved about 50 lives annually, speed reductions would have been needed to balance the poor effectiveness of the infrastructure investments, so that, in total, the whole investment program would have resulted in lower mobility. The investment program would lead to a reduction in travel time of almost 20 million hours. But the reduction in speeds would increase travel time by approximately 60 million hours. This was not acceptable to the government. The government wanted the safety investments to be made in the first four years of the ten-year period, and probably an overall increase in the safety orientation of the program throughout the ten-year period. In addition, the government wanted a higher return on safety investments, closer to one reduce fatality per 30 million SEK invested.

### 3.3.2.4 Vision Zero

In October 1997, the Swedish Parliament passed the Vision Zero Bill. Vision Zero is a different way of thinking about the problem of road trauma in which the focus is on the elimination of serious injury, rather than accident prevention. The thinking is that humans will always be fallible and make mistakes but these mistakes should not be punishable by death or serious injury. Whereas currently in most jurisdictions, road safety focuses on the control of risk, the new philosophy focuses on the elimination of risk. The goal of Vision Zero is no loss of health. xxxx The interim elimination of risk. The goal of Vision Zero is no loss of health. The interim target is to halve the road toll by 2007 to 2.7 fatalities per 100,000 population.

Although the traditional (Haddon-style) analysis finds that human factors are involved in 90% of serious injury road crashes, by looking at the problem of road injury from the perspective of the road system user versus the system provider one finds that 80% of crashes involve a failure of the system. It is therefore the responsibility of the system provider to design and build a road traffic system which will allow human error. This means that the starting point is the parameter of the amount of physical violence the human body can withstand without suffering a serious injury or human tolerance to mechanical force. The definition of serious injury will be changed to □injury where the victim does not recover within a certain period, meaning that, for example, soft tissue neck injuries will come into focus.

If the road environment cannot accommodate a crash without the crash resulting in a serious injury, the speed limit should be reduced to a level commensurate with a non-serious injury crash. Whenever a pedestrian is likely to come into the vehicle traffic environment the speed limit is 30 km/h. On high-speed roads, the opposing traffic must be separated by a physical barrier. The edge of the road should be clear of any object which could cause a serious injury whilst a vehicle is travelling at the legal speed.

The adoption of Vision Zero has implications for the balance of countermeasures in that:
The focus will be shifted towards injury prevention measures that are largely aimed at improving the design of the road transport system rather than enhancing the ability of the individual road user (Belin, Johansson, Lindberg and Tingvall, 1997, p.1)

Vision Zero has included government purchasing as a lever for improving road safety. The procurement of road transport is a common phenomenon within the operations of large parts of the public sector. In this context, these authorities are in a position of being able to demand that both passenger and goods transport are done in a way that is both safe and environmentaly sound. In addition to authorities being able to place basic demands that all aspects of transport services are carried out according to regulations, further demands can be made under the condition that they occur in open competition in a non-discriminatory manner. (Belin, Johansson, Lindberg and Tingvall, 1997, p.9)

A coalition of road construction agencies has been the main antagonist to Vision Zero. They have a tradition of building bigger roads and bridges, motorways, etc., and are a powerful vested interest group. The construction engineers within the Swedish National Roads Administration have this predisposition as well. The police have questioned the viability of such a vision.

## 3.3 The Netherlands

### 3.3.1 History and social environment of road safety

While the Netherlands is a small country (in area) its population is 60 million and it carries a considerable amount of through (European) traffic as well. The Dutch have build a number of canals which provides for boat commuting.

A strong tradition of bicycle riding exists in the Netherlands. It is so strong that the Minister for Transport has even publicly declared that cars are a nuisance. The idea that bicyclists should be made to wear helmets is seen as a taboo suggestion. The problem is the threat posed by cars. Therefore the prime focus of road safety has been to address the behaviour of motor vehicle controllers and the physical separation of different road user types.

### 3.3.2 Why the Netherlands has a relatively low road toll

The government has invested a great deal of resources into providing a safer road infrastructure. Systems to improve the environment for segregated road use are clearly apparent. Moreover, the speed limit hierarchy is designed to protect vulnerable road users. Areas where there is the potential for conflict with pedestrians or cyclists are posted at 30 km/h. The general urban speed limit is 50 km/h.

The motorways where vehicles can drive fast (90-120 km/h) have a good safety record, according to the representatives interviewed. Lanes are marked clearly and driver information systems are extremely sophisticated. Variable speed limits are activated by loops in the road to set appropriate speed limits when there is congestion ahead (they detect braking vehicles/slowing traffic). People generally comply with these signs, as it is obvious that they will need to slow down anyway. Variable message signs explain where and how far the length of the backed-up traffic is. The variable speed limits are also used for road works with extra heavy penalties for non-compliance.

Enforcement tolerance on motorways and for all speed camera enforcement is zero. Drivers rarely dispute a speed infringement and judges usually support the Police in these matters, even where the office uses only visual/manual observations to determine a vehicle's speed.

### 3.3.3 Which agencies are accountable for road safety

The Dutch Ministry of Transportation and Water Management carries the primary responsibility for road safety. There is also a Parliamentary Committee which partially looks into road safety matters. The Dutch strategy while centrally driven aims to get a cost share commitment from local government.

The Dutch National Police only police the motorways. This group is active, and the motorways have a good safety record. The Regional Police are autonomous. It is difficult, therefore to get policy consistency throughout Holland.

The SWOV is the main research agency and carries a lot of influence within the Netherlands road safety agencies and the community.

### 3.3.4 What are the funding sources?

Sustainable safety is a concept that was borrowed from ecologically sustainable environments. It is the idea that the future generation should not have to suffer death and injury resulting from the current needs/desires of people. It looks to future generations with a sense of urgency to redesign or repair the unsafe road environment.

The SWOV initially prepared a proposal for sustainable safety based on the idea that the government may make decisions not to achieve the optimal safe road environment: but that the government should be aware and informed about the choices available to it. There may be reasons for not pursuing optimal road safety now - perhaps because it may not be what people want. But when the solutions can be implemented and are cost effective (in a macro sense) the choice not to invest in road safety should be an informed and acknowledged choice.

SWOV developed the idea of sustainable safety, consulted and marketed it to other leading road safety research institutions and then put the idea to the Parliamentary Committee which reviews road safety matters. SWOV deliberately did not put it to the Ministry (as is the usual custom) because broad bipartisan support for it was necessary. It was too radical for the bureaucrats and Minister to be able to support on their own. There was an appreciation for

the practical implications to be too overwhelming unless the national government was prepared to put their full weight behind it.

There is no clear opposition to the strategy but there is some scepticism that the goals can be achieved and that the authorities will commit sufficient resources.

### 3.3.4 Great Britain

#### 3.3.4.1 Which agencies are accountable for road safety

The Department of the Environment, Transport and the Regions (DETR) has overall responsibility for road safety policy and planning but most road safety programs are implemented at the local level. The big issue is how to get people committed. There are over 200 local government groups, some of whom are strongly committed, and some barely interested in road safety.

One problem that the Department of the Environment, Transport and the Regions experiences is to ensure that funds intended for local road safety schemes are spend where they are supposed to be and that results are evaluated. Local government monitoring is largely ad hoc, and the Department of the Environment, Transport and the Regions is considering publishing a local government road safety league table.

Since the 1988 Road Traffic Act, local government has a statutory duty to provide information about road safety, and has a key role in involving and educating the public and the community. Some councils have done better against targets than others and there are substantial variations between local government authority performance, but with no clear reason why they should so differ. There is a need to develop Performance Indices for death and serious injury for local government to better understand this. Development of targets for local authorities is a key role for the Department of the Environment, Transport and the Regions.

Other important players in road safety in Great Britain are the Parliamentary Advisory committee on Transport Safety (PACTS), Transport 2000 (a lobby group) and the Royal Society for the Prevention of Accidents (RoSPA).

PACTS is a registered charity which comprises a small number of staff, trustees, technical working parties (covering road safety, transport safety, etc., and the full membership of PACTS, including all organisations which subscribe to it. PACTS started looking at transport safety, and not just road safety, because of common factors (e.g., special needs of people with disabilities) and because mode shifts (e.g., from cars to public transport) affect safety.

Because of its perceived independence, PACTS can itself generate topics for debate without locking the government or any other organisation into a commitment. Recently, PACTS suggested mandatory publication of crash test data in new car showrooms in order to initiate public discussion about this issue. Once issues are identified, they are put before the appropriate audience; such as members of Parliament, civil service, etc..

RoSPA takes an Occupational Health and Safety perspective, promulgating the benefits of road safety training to the employer and the community. Approximately 800 out of the 3500 fatalities annually are work-related, so major fleet operators can have significant influence on improving road safety generally.

The British equivalents of Institute of Municipal Engineering Australia and AIPTM are used to influence local government by:

- helping councils to target their blacktops
- training of council personnel (especially engineers)
- demonstrating savings to councils of safety programs.

#### 3.3.4.2 Road safety planning

The current approach in Great Britain is to integrate road safety into overall transport planning. The Department of the Environment, Transport and Regions released A New Deal for Transport: Better for Everyone on 20 July 1998, and the road safety section is appended.

In 1987, targets were set to reduce road traffic casualties by a third by the year 2000 compared to the average of 1981-85. The casualty targets set for fatalities and serious injuries were met by 1997, but slight injuries have not reduce. These are mainly car occupants, and as cars are made safer, serious injuries are replaced by less serious one.

The strategy is reviewed every three years to track how reductions are being achieved. At present they only know the source of less than 50% of the reductions. The DETR have identified that speed is the key factor in road safety; it is a contributor to around 33% of casualty accidents. The Department of the Environment, Transport and the Regions is running an advertising campaign – "20-30-40" campaign - demonstrating survival rates in accidents at different speeds to emphasise the importance of lower urban speed limits.

It is claimed that the Department of the Environment, Transport and the Regions and the industry are good at producing research, but not as good at disseminating research results and implications for policy and implementation. A recent conference in York on road safety education helped disseminate research findings and develop discussion, and similar conferences are planned to exchange information within the industry and set it down on paper, and to get research scientists and policy people together. It is generally agreed in Great Britain that this research - policy link is critical.

### 3.3.5 Norway

#### 3.3.5.1 Characteristics of Norway

Norway (population 4.4 million) is a thinly populated country with an average of 13.5 inhabitants per square kilometre. Norway is mountainous and has many rivers and lakes, has many fjords, subterranean and sub-sea tunnels, bridges and 127 ferry connections. It should be noted also that there are 5 months of winter and darkness every year in Norway.

In general roads expenditure per capita in Norway is high in comparison with other OECD countries. This may be due to the large size of the country (with respect to its population) and the need to build roads to withstand climatic conditions.

### 3.3.5.2 Why Norway has a relatively low road toll?

Norway has traditionally performed well in comparison with other OECD countries both in terms of low fatalities per population and in fatalities per vehicle kilometres travelled. This may in part be due to the comparatively law compliant behaviour advised by the Swedes with regard to Nordic peoples. It is claimed that the Norwegians are also a very local community minded people. Local community groupings of about 10,000 people are very cohesive and there is a strong tradition of locally governed local communities.

Dr Rune Elvik of the Institute for Transport Economics attributes the relatively low road toll to a number of factors including:

- the fact that speed limits have always been in force in Norway and are low by international standards (maximum 90 km/h on freeways)
- a limit on driver blood alcohol level was introduced as early as 1936 with very stiff penalties for violations (imprisonment, loss of driver's license for at least 2 years)
- cars are very expensive in Norway and mass ownership of cars is comparatively recent (due to import restrictions until 1960). However, Norway has maintained a low road toll despite sharp road travel growth from the late 1960's;
- large parts of the road system are not designed for high speeds (for main roads, this has been changing in recent years);
- road safety has been a central issue in roads and traffic policy and agencies have taken knowledge of the effects of safety measures seriously and continuously update their knowledge.

Some of the most effective measures carried out in Norway are:

- keeping the speed limits low;
- converting junctions to roundabouts;
- law requiring the use of daytime running lights; and
- speed enforcement by means of speed cameras.

### 3.3.5.3 What agencies are accountable for road safety?

The Ministry of Transport and Communications is responsible for overall policy direction for road safety. The Road Directorate of the Norwegian Public Roads Administration is accountable to the Ministry and is responsible for carrying out government policy for road safety. The Road Administration plans, builds and maintains national and county roads and is responsible for vehicle testing, conducting driving tests and issuing driving licences.

Nineteen County Roads Offices carry out regional programs with direction from the Roads Directorate of the Public Roads Administration for National Roads and from the County Authorities for County Roads. The Ministry of Justice is accountable for setting priorities for Police in traffic safety. The ministry of social and health affairs has a role in advancing safe communities projects. The Ministry of Church, Education and Research is accountable for school travel safety regulation.

Local municipalities made up of 10,000 people are traditionally the level of administration communities identify with. This is a strong tradition in Norway and county Assemblies of

representatives of municipalities determine funding levels for services e.g, health, schools and roads.

There are 200 Police mobile Officers employed by the national government with 11 regional offices and 54 Police districts. There are also 230 Sheriffs officers. However, there are quite low levels of enforcement activity as traffic enforcement has a low status among the police.

**3.3.5.4 What are the funding sources?**
The prime sources of funds are from the national government administered through the Ministry of Transport and communications or through the Public Roads Administration. Counties also have the capacity to levy taxes and contribute up to 40% of funding for some road safety activities such as school education. The County Assemblies determine how much funding will go to roads, schools and other services, but are somewhat limited by national laws which stipulate what they are required to provide.

## 3.4 Best practice in strategy development and coordination

The literature review, study tour and Partnerships in Road Safety Workshop found that the road safety strategies, programs and operating environments of countries with good road safety results have quite different characteristics. The relative emphasis on different types of programs (driver, vehicle, road infrastructure) differs markedly. Great Britain and Germany have highly developed motorway systems but high travel speeds outside urban areas. In Norway the quality of the rural road system is lower but lower speed limits help to counter this problem.

Sweden has relatively poor roads but generally law-abiding drivers (except for seat belt wearing). The Netherlands and Denmark have a strong emphasis on ensuring the safety of cyclists and pedestrians with low urban speed limits. In addition the Netherlands is a small, densely populated country which has the resources to fund a well-developed road system.

Yet there are similarities among these jurisdictions. In general, there is a strong commitment to speed management, with speed limits related to the function of the road. There is an emphasis on lower speed limits (offend 30 km/h) on roads which serve as access to homes and either safer infrastructure (or lower speed limits to compensate for poor infrastructure) on roads which serve a transport function.

Other characteristics of best practice which were identified included:

- collaboration between stakeholders (researchers, administrators, politicians)
- building partnerships by linking costs and benefits
- linking road safety and environmental goals
- central and local government involvement in strategy development and coordination
- investing in road safety to achieve unprecedented savings
- agreed and achievable targets

### 3.4.1 Researchers and administration working together to develop policy and monitor implementation

The major road safety Institute in the Netherlands, SWOV, initially prepared a proposal for *Sustainable Safety.* It developed the idea, consulted and marketed the proposal to other leading road safety research institutions and then put it to the Parliamentary Committee. The *Sustainable Safety* report is co-authored by the Ministry and researchers. As part of *Sustainable Safety,* there is also a bimonthly meeting of government organisations, interest groups and researchers to discuss road safety issues together.

### 3.4.2 Developing bipartisan support

The experience of the Netherlands and Sweden has shown that the introduction of bold new road safety strategies is likely to be more successful if done in a bipartisan manner. With bipartisan support, targets can not only be more ambitious, but can be set over a much longer time period if desired. It is interesting to note that environmental targets are often set over a longer time period than road safety targets.

SWOV presented *Sustainable Safety* to the Parliamentary Committee which reviews road safety matters. It deliberately did not present it to the Ministry (as is the usual custom) because broad bipartisan support was necessary. The concept was too radical for the bureaucrats and Minister to be able to support on their own. There was an appreciation that the practical implications would be too overwhelming unless the national government was prepared to put its full weight behind it.

### 3.4.3 Partners who benefits from road trau ma reductions

Dr Rune Elvik of the Norwegian Transport Economics Institute has claimed that road safety has no true stakeholders and that no one individual is willing to make sacrifices for the sake of improving safety. He claims that most road users see current road trauma levels as acceptable and so are reluctant to change their behaviour. Given that the risk to any one individual is very low, this behaviour might seem rational.

For most of the commonly identified stakeholders, a reduction in road trauma would actually result in a reduction in their revenue and activity. Reductions in road trauma lead to reduced funding to hospitals, less revenue for insurance companies, less work for lawyers and vehicle repairers and so on. Rune Elvik calls for the creation of genuine partners who benefit from road trauma reductions.

The Transport Accident Commission in Victoria is a genuine partner in road safety because reductions in road trauma benefit it financially by reducing claims. The TAC views funding road safety programs as an investment which has yielded good returns. The Victorian example shows that a monopoly third-party insurer can be a powerful and important partner in road safety, because road trauma reductions provide it with direct benefits.

### 3.4.4. Centralised versus decentralised road safety policy and implementation

Different models exist for the relationship between central and local government in road safety. The Netherlands is an example of the centralist model, while Norway is very much more decentralised.

There seem to be different paradigms possible for the roles of central and local government in strategy development:

1. Develop central road safety plans based on good research and make the effort to ensure that community groups are committed to the plans over the long term, or

2. Encourage community groups to develop their own plans that adhere to a (centrally set) target, and reward them if they achieve the target, but run the risk that many plans will be poorly based, or

3. The difference between 1. and 2. may be short-lasting because, in practice, most community groups will request central advice to maximise their ability to achieve targets. This may not occur immediately, and many will fail initially. Later many will utilise central advice and support.

In the United Kingdom, much road safety work is undertaken at the local level with no clear reporting of programs and outcomes to the national level. As a consequence the Department of Environment, Transport and the Regions is unable to account for more than half of the improvement in road safety. Clearly, decentralisation requires clear evaluation frameworks and data collection processes if overall trends are going to be able to be monitored and explained.

### 3.4.5 Linking road safety and environmental goals

Traditionally, road safety and environmental concerns have been viewed as conflicting. More recently, particularly in Sweden and the Netherlands, many road safety and environmental measures have been shown to be mutually beneficial. For example, a reduction in speeding is likely to result in a reduction in fuel consumption. A number of speed management systems improve traffic flow and thus reduce fuel consumption. A number of speed management systems improve traffic flow and thus reduce fuel consumption. Importantly, any efforts to reduce travel for environmental reasons are likely to reduce levels of road trauma.

Linking road safety and environmental goals may serve to increase support for both types of goals. Concepts and implementation processes used in the environmental movement may have the potential to provide models for road safety planning and implementation. In the development of the Netherlands road safety strategy, the concept of *Sustainable Safety* was borrowed from 'ecologically sustainable environments. The idea is that the future generation should not have to suffer death and injury resulting from the current needs/desires of people. It looks to future generations with a sense of urgency to redesign or repair the unsafe road environment.

# APPLICABILITY IN NEW SOUTH WALES

This section addresses the extent to which the identified best practice elements in strategy development and coordination can be applied to New South Wales. The effects of the characteristics of the NSW operating environment on implementation of best practice measures is discussed. The section commences with a comparison of the patters of

development in Europe and Australia and discusses the implications of these patterns of development for road safety strategies. The applicability of best practice elements in the light of other demographic, political and cultural aspects of new South Wales is then discussed.

## 4.1 Patterns of development and speed management

In Europe, the general pattern of development was that cities were established and grew before cars were invented. Most people lived close to the centre of the city and public transport networks (mainly rail and tram) were developed to provide for the transport needs of the population (supplemented by walking and cycling). Thus there was an adequate public transport infrastructure in place before motorisation occurred. This reduced the need for the private car (and the strength of demands for infrastructure to serve private cars) because of the availability of alternative modes of transport. While motorisation and congestion have increased in most European cities, the availability of other modes of transport has moderated the extent of this problem.

In the United States, Canada and Australia, the growth of many cities occurred at largely the same time as motorisation. The response was to spread suburbs further and further from the centre of the city, and thus making the private car more attractive and public transport less feasible. In addition, dependence on the private car let to demands for infrastructure to serve the private car both within the centre of the city and to reach the suburbs.

There are a large number of environmental, road safety and social consequences of the North American pattern of development. Perhaps the most important effect in terms of development of road safety strategies relates to speed management. Urban speed limits in NSW (and other jurisdictions in Australia) are higher than would be found in most European jurisdictions. In Europe, congestion appears to be conducive to lower speed limits and probably encourages travel as an unprotected road user (e.g., bicycling and motorcycling) which against contributes to demand for lower speed limits. In Sweden and the Netherlands, for example, the generally view appears to be that pedestrian area should have speed limits no higher than 30 km/h.

Future increases in congestion in Australian cities may make lower urban speed limits more acceptable.

## 4.2 Geography and road infrastructure

The overall population density of NSW is considerably lower than that of the potential benchmarking partners. Yet the population distribution in NSW is far from even, being a combination of highly urbanised areas (mainly Sydney, Wollongong and Newcastle) and large areas with low population density. This leads to a lower overall affordability of road infrastructure.

The low affordability of roads in New SouthWales makes it difficult to adopt the German model of having an extensive network of roads built to high design standards as a means of

ensuring safety. A more affordable alternative is the Swedish approach of reducing speed limits on roads to levels which minimise the risk of serious injury. While this may not be an attractive prospect for the community, the alternative of maintaining the current level of infrastructure and speed limits severely restricts any ability to drastically reduce road trauma.

## 4.3 Structure of local government and road safety strategy development and implementation

Local government in New South Wales has much narrower responsibilities than in many European countries. In those countries, local government has some control over taxation, education and policing, and therefore it is not surprising that is play a larger role in road safety.

The European experience shows that setting road safety targets for geographical areas (with funding attached in the French *Minus 10* program) can increase local government interest and involvement in road safety with significant statewide benefits. However, most of these targets have been set for geographical areas with greater populations (and therefore large crash numbers) than most of the local government areas in New South Wales. Thus, setting of targets for individual local government areas in New South Wales may not be feasible (with perhaps some exceptions of populous local government areas). Nevertheless, setting targets in conjunction with groups of local government areas may prove beneficial.

There is a lesson to be learnt from the united Kingdom, in which much road safety work is undertaken at the local level with no clear reporting of programs and outcomes to the national level. As a consequence the Department of Environment, transport and the Regions is unable to account for more than half of the improvement in road safety. Setting targets at local levels would help to avoid this happening in New South Wales.

## 4.4 Community commitment to road safety

In a democracy, the level of resources committed to road safety is influenced largely by the true (or perceived) community commitment to road safety.

One of the factors that allowed *Vision Zero* to be developed in Sweden was that only 2 to 3% of the community were satisfied with the current target of 500 fatalities. In contract, 40% said that zero was the acceptable number of road deaths. It is unclear what would be the response if the same question were presented to the people of New South Wales.

## 4.5 Police enforcement and social control

Enforcement patterns are largely similar in New South Wales and the best performing road safety jurisdictions. In each of the jurisdictions, deterrence is the major component of traffic

enforcement activity and there is widespread use of electronic methods of enforcement. Nordic countries appear to rely less on enforcement because of the law-abiding character of most of the population. This is probably not applicable to New South Wales, particularly in the case of speeding. Yet compared with Victoria, there is relatively low level of speed camera enforcement in New South Wales. This appears to be related to a lack of effective infrastructure for processing large numbers of infringement notices and a desire to avoid the public perception of revenue raising.

In the Netherlands and Norway, there is an expectation that social control will act as an informal enforcement mechanism. That is, that neighbourhoods or small communities will make it socially unacceptable for their members to exceed speed limits in residential areas, etc. It is unlikely that communities in New South Wales are sufficiently close-knit for this mechanism to be effective although it may be most likely to work in smaller rural communities.

## 4.6 Philosophy of government and implementation of road safety strategies

The role which government plays in road safety varies among jurisdictions. In many European countries the government agencies (or organisations with very strong links to government) conduct research, formulate strategies and policies and implement programs.

Road Safety Authorities in Australia have undergone significant changes recently in the way they function. In New South Wales, the Roads and Traffic Authority has adopted a strong service provider approach where the corporate group purchases services provided by the operational directorates (largely Roads and Traffic Authority regional offices). At all level of government in this state, there is a large degree of outsourcing of services, ranging from road construction and maintenance, to policy advice and review. Key stakeholders are usually involved in decisions of mutual benefit and consequences.

Outsourcing has considerably support as governments push for smaller, responsive and more accountable departments. With outsourcing, there is always the potential for difficulties ensuring that central policies are adhered to and this must be constantly guarded against. During the stakeholder interviews, there was some concern expressed that the purchaser-provider model may contribute to a lack of ability to direct influence implementation and capacity to prescribe program frameworks. Clearly, there is a need for close scrutiny to ensure government policies are achieved.

# RECOMMENDATIONS FOR STRATEGIC DIRECTIONS

## 5.1 Alternative strategic directions

Generally, road trauma is a consequence of an imbalance between the mobility and the inherent safety of the road transport system. Two distinct alternatives for strategic directions towards the goal of a safer road transport system therefore exist:

1. To reduce mobility, that is, to reduce speeds (to reduce overall exposure is not necessary to improve safety); or

2. To increase the inherent safety of the system.

Both of these alternatives include the road users but in different ways. While reducing mobility substantially will create opposition from the public, investments in infrastructure will instead be a matter of the states' willingness to pay.

Reduction of speeds can be achieved in mainly two ways; making the road users obey speed limits to a higher extent, or reducing speed limits. The first alternative might seem logical, but it seems impossible to gain sufficient effect from only such an approach, speed limits must therefore be reduced.

Other means of better road user behaviour mainly address drink-driving. While efforts in this area are important, they alone will not reduce death tolls to a level which is desired.

Given the amount of public or political resistance to the balance between mobility and investment, it is advisable to explore this question further. This leads to the recommendation:

**Link the safety of the infrastructure to the speed limit gradually, with the alternative to either invest or reduce speed.**

## 5.2 Building support for road safety

Neither of the alternative strategic directions described above will be followed strongly enough to produce radically reductions in road trauma unless dramatic changes are made. Yet there is an increasing perception in Australia that most of the road safety gains have been made, that the remaining problem is under control and that there are more important social issues to address.

In contract to this feeling of satisfaction with current levels of road safety, implementing major changes would require significant injection (and probably redirection) of resources. In Sweden, the National Road Administration found that to implement *Vision Zero,* they would need to spend three years of funding allocation in the first year. A related issue is that major changes probably can be funded if they are carried out over the long term. The *Sustainable Safety* policy in the Netherlands, for example, has a 30-year time span. Yet long-term plans required long-term commitments from the funding agencies.

In general, major changes can only be implemented if the strategies have widespread and strong support. The following recommendations seek to build support for road safety.

- changing the philosophy of road safety

- generating partnerships
- generating bipartisan support
- linking road safety and environment concerns
- government setting an example as an annual review of road safety
- setting ambitious goals and challenging targets

### 5.2.1 Changing the philosophy of road safety

It seems necessary to create an atmosphere of crisis for the road transport system. From a more or less objective standpoint, the system is unsafe, over-powered (consumes too much energy), environmentaly unfriendly and expensive. It is therefore important to street the consequences of the road transport system for public health and the sustainability of the society.

It is also important to realise that the individual road user is more or less a victim of an ill-planned and unethical approach from the designers of the system. In the long term, the society must provide its citizens with a better system, that of course must be used within the restrictions of the system. One of the most crucial points is to link the mobility allowed to safety, and not allow a balance between safety and other benefits.

Starting to discuss the road transport system and its future on the basis of a crisis, will put the safety issue on the political agenda, and not as a problem for the individual road user to solve.

Non-governmental groups may play an important role in creating the atmosphere of crisis.

### 5.2.2. Generate true partnerships

True partnerships require that each partner is responsible and accountable for their actions, each partner contributes resources and receives identifiable benefits from the outcome of their actions, and that the partners have similar policies and goals.

The European Workshop concluded that there are very few true partners in road safety and that there is a need to identify or create partners who benefit from improved road safety. Fleet operators and others who benefit from reduced fleet accident costs may be examples. The interview of road safety stakeholders in New South Wales identified that the most useful and product relationship is usually one in which there is a common financial investment and common ownership.

Generating true partnerships is needed as part of stimulating the demand for road safety.

A monopoly third-party injury insurer can be a powerful and important partner in road safety, because road trauma reductions provide it with direct financial benefits. The Victorian example shows that such an organisation will invest in road safety measures which will reduce its claims costs.

The automotive industry can in some sense be seen to be a partner, as their future market will rely on the attractiveness of the road transport system. While the automotive industry has traditionally been seen as a foe (or at best, a reluctant partner) in road safety, the automotive industry does not want to become the cigarette companies of the 21st century.

### 5.2.3 Develop bipartisan support

The Dutch and Swedish examples have shown that the introduction of bold new road safety strategies is likely to be more successful if done in a bipartisan manner, rather than as a party political more. With bipartisan support, targets can not only be more ambitious, but can be set over a much longer time period if this is necessary.

The Roads and Traffic Authority is responsible to a government minister, who is part of the political process. Therefore any policy development or initiatives by the Roads and Traffic Authority are open to criticism as part of the adversarial nature of the political system. While the STAYSAFE Committee was established as a bipartisan committee, developing bipartisan support has seemed to have played a lesser role in its activities than has acting as a watchdog over the activities of the Roads and Traffic Authority.

The establishment of an independent body to provide expert advice to the RTA would help to develop bipartisan support (in addition to other benefits). In Great Britain, the Parliametary Advisory Committee on Transport Safety (PACTS) is an independent body that helps to focus bipartisan support for road safety. In Sweden, a Road Crash Commission has been established to provide a review of safety failures of the road traffic system that is outside the political process.

### 5.2.4 Link road safety and environmental goals

Traditionally, road safety and environmental concerns have been viewed as conflicting. More recently, particularly in Sweden and the Netherlands, many road safety and environmental measures have been shown to be mutually beneficial. For example, a reduction in speeding is likely to result in a reduction in fuel consumption. A number of speed management systems improve traffic flow and thus reduce fuel consumption. Importantly, any efforts to reduce travel for environmental reasons are likely to reduce levels of road trauma.

Fuel consumption and emissions are related to each other, as well as to safety (in terms of speed and non-aggressive driving). It is recommended that fuel consumption be used as a performance indicator for all transport operations.
Linking road safety and environmental goals may serve to increase support for both types of goals. In addition, concepts and implementation processes used in the environmental movement may have the potential to provide models for road safety planning and implementation. For example, environmentalists appear to have been more successful in making the point that the environment is paramount, than road safety agencies have been in stating that safety is paramount.

In the environmental area, it has been possible to achieve a global insight into the problems, and that the problems cannot be reduced simply by individuals behaving better. Instead, environmentalists have been successful in showing that the major changes must be made on the systems level, including states and private industry. Nature and individuals have been seen as the victims of poor environment rather than the states being victims. This is very different from safety in road transport, where the road user has traditionally been seen as the victims of poor environment rather than the states being victims. This is very different from safety in road transport, where the road user has traditionally been seen as the agent and the

state is the victim. Furthermore, in the environmental area, critical load limits have been set up for humans and nature (e.g., permissible levels of noxious chemicals). These are viewed as limits that cannot be exceeded in a sustainable development of the society, while in road safety, life and health have been balanced to other benefits, primarily mobility.

There are a number of reasons that RTA should try to merge road safety and the environment. There are true areas of mutual benefit, such as reduced energy consumption which is related to both pollution, carbon dioxide emissions and speed which is related to safety. A more even distribution of vehicles, with less power, is also beneficial, as well as redesign of built-up areas. Given the strong role of the environmental area, this could mean that there is more and stronger support for safety issues.

Those within RTA are probably in favour of an attractive road transport system for the future. It is likely to be easier to achieve a fundamental understanding if safety and environmental interests and solutions have synergies instead of being in conflict.

Better communication between people working in road safety and environment will facilitate the establishment of links. The Roads and Traffic Authority can play an agenda-setting role here in a number of practical ways. One possibility is for the Roads and Traffic Authority to sponsor the development of a conference which explores and addresses the advantages of linking road safety and environmental goals. Presentations on the ways in which these links have been made in other countries – for example, in *Vision Zero* and *Sustainable Safety* – could provide some impetus to thinking in this area. Interchange of staff between road safety and environmental agencies might also further the development of links.

### 5.2.5 Produce an annual review of road safety in New South Wales

It is recommended that an annual review of road safety in New South Wales be prepared. It should be a comprehensive statement of current road safety issues and describe programs which have been implemented and their effectiveness. The review should include road crash statistics not just numbers of crashes and fatalities, but also in terms of the costs to the community.

It is proposed that the annual review be part of the ongoing review process for Road Safety 2010. Ideally the annual review would be prepared by an independent body, with input from all of the agencies involved in road safety in New South Wales.

The annual review would help to address the concern expressed by many internal and external stakeholders that the Roads and Traffic Authority does not provide sufficient information about its activities and achievements to both market road safety in New South Wales and show that it is accountable to the people of New South Wales.

Widespread dissemination of the annual review is important to achieve this goal. It is recommended that the review be made available on the Internet. This will allow it to be internationally available, and may help to promote international cooperation and benchmarking. In addition, the electronic version will available at no cost to whoever is interested (including public, schools etc) and will reduce demand for paper copies (which have a cost associated with their production and handling).

### 5.2.6 Government setting an example

The New South Wales government is a large consumer of transport services. Government purchasing should be used as a lever for improving road safety. Government can require that any passenger and goods transport that it purchases be done in a way that is both safe and environmentally sound. According to the Swedish model further demands (on transport service providers) can be made under the condition that they occur in open competition in a non-discriminatory manner (Belin, Johansson, Lindberg and Tingvall, 1997, p.9).

The link between safety/environment and commercial thinking will be crucial. It is recommended that transport services are purchased only if they are provided by the right driver, the right vehicle and in a way that is safe and environmentally friendly.

The Roads and Traffic Authority could start this process by introducing a policy for their own transport requirements, including purchase of cars, rental cars, staff driving and taxi use to serve as a good example for the rest of government.

### 5.2.7 Set ambitious goals and challenging targets

A clear distinction should be made between goals (which describe the desired direction of change) and targets (numeric levels to be reached in the shorter term). Both have value in road safety strategies.

Targets should not be expressed in terms of fatalities alone but should incorporate serious injuries as well. Translation of these targets into measures more directly related to the activities of partner organisations (e.g., hospital bed-days, insurance claim costs) may also be useful.

There is a need to assess whether absolute targets or targets expressed in forms which take into account changes in road use are more useful. During implementation of the strategy, mobility should be monitored and road safety programs adjusted in the light of mobility changes.

The overall target for *Road Safety 2000* was to reduce the number of traffic fatalities and serious injuries to 25% below the 1988-1990 average. Specific targets were expressed in terms of serious casualty rates, numbers and rates of recorded crashes, numbers and rates of fatal crashes and numbers and rates of fatalities. All of these targets related to statewide data.

Recent European experience suggests that there are benefits in the central government and regional organisations working together in setting targets and reaching them. The extent of collaboration can vary. Where there is complete collaboration the regional representatives are involved in setting the targets and programs in collaboration with the national body, then the regions have the responsibility for reaching the targets related to statewide data.

Recent European experience suggest that there are benefits in the central government and regional organisations working together in setting targets and reaching them. The extent of collaboration can vary. Where there is complete collaboration the regional representatives are involved in setting the targets and programs in collaboration with the national body, then the

regions have the responsibility for reaching the targets. The role of the central agency is to support, assist and evaluate. A lesser level of collaboration may involve □regional contracts in which regional organisations agree to meet certain targets (or show that they have met certain targets) in order to receive funding (or additional funding). In Europe, involvement of the regions in target in road safety. An additional advantage is that regional targets help to guide monitoring an devaluation of the strategy.

It is recommended that the Roads and Traffic Authority set stateside goals and targets and then meet with regional representatives to set regional targets within the framework of the overall statewide goals and targets. The regional targets should consider the particular characteristics of the regions in terms of urban or rural nature, major routes in the region, population changes, etc. The regional targets should be published and monitored along with the statewide targets.

It is advisable to create a model for a safe road transport system that will provide integration of program areas and partners, in order to focus not only on short-term but also long-term development. Such a model can incorporate alternative directions, such as reduced speed or increased inherent safety, as well as distinguishing between road-user oriented countermeasures and more system-oriented countermeasures.

One air of the model will be to link together program activities and products/services with user contributions and effects (see Figure 1). The model will show the different levels and types of targets. For example, targets at the intermediate outcome level (e.g., set belt wearing rates) may be more appropriate targets at the local levels than targets at the level of serious injuries.

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# HOW MANY DEATHS AND INJURIES WILL WE CHOOSE TO ACCEPT?

Peter Makeham
Director, Federal Office of Road Safety

*SOURCE: Makeham, P. (1997). How many deaths and injuries will we choose to accept? Keynote address to the 1997 Road Safety Research and Enforcement Conference, Hobart, Tasmania, 9-12 November 1997.*

The executive summary to the National Road Safety Package of 1996 noted:

"Since 1992 there has been no advance in reducing the level of road trauma in Australia.

On present trends we are unlikely to (meet) the year 2001 target.

- 10 fatalities per 100,00 population, or less
- equivalent to about 1,900 fatalities nationally"

Both propositions were true at the time (see Figure 1).

**Figure 1: Road fatalities in Australia 1989-1996**

In 1993, a period of very rapid improvement in national fatality figures ended. From then until the end of 1996, the trend was flat. In fact, there was a slight upward trend nationally, though some states (notably Tasmania) have registered significant improvements since 1992.

## Success in "locking in" the improvements of the early 90's

This plateau in the fatality figures was disappointing, but it is worth remembering that a few years ago we were concerned about the possibility of a much worse outcome.

Some of the reduction in the early 90's was attributable to economic factors, and there was concern that the road toll would increase significantly as the economic outlook improved. That did not happen.

There was also concern that some of the gains would be unsustainable for other reasons:

- community backlash against unprecedented enforcement intensity;
- sustain ability of enforcement effort;

- "shock" effects wearing off.

These predictions have also proved wrong (see Figure 2).

**Figure 2: Road fatalities in Australia 1989-1997**

At the time, in 1996, it was true to say that "On present trends we are unlikely to (meet) the year 2001 target".

That statement in the National Road Safety Package was not a prediction that the trend ***would*** remain flat. It was a reminder that:

- We cannot rely on good luck or the force of gravity to bring the road toll down.
- If as a community we want a lower road toll, then we need to *take* action to bring it down.

Collectively, we *did* take action, and we are seeing the results:

- The latest 12-monthly figure show us well below the year 2000 target.

Taking a longer term view (1984–1997, see Figure 3), we have seen plateaus in the road toll before.

In the 1980's some people thought we had reached the end of the line, in terms of significant improvement. The view I want to put is that we should never accept a "natural level" of road trauma.

**Figure 3: Road fatalities in Australia, 1984-1997**

Equally, experience should teach us not to assume complacently that a falling trend will continue, without continuing action and new initiatives.

## Have we run out of ammunition?

Have we run out of ammunition? Are further significant reductions in road trauma possible, or are we approaching some sort of ultimate limit, or point of diminishing returns? Are there no more silver bullets, and fewer and fewer lead pellets?

The real question is not "Where are the trend lines pointing at the moment?" but "Have we run out of options for making a significant impact on the road toll?"

There are grounds for optimism. We have not yet seen the full benefits of existing measures. We can point to other silver bullets. We don't yet know everything. And good research can still produce surprises, and new options.

Let me be more provocative ...

## Choices

There are plenty of effective options. As a community, we can have virtually any level of road trauma we like depending on the "price" we are willing to pay.

## What price safety?

The "price" of improved safety is not necessarily a net economic cost. There are many:

- net economic costs;
- "up front" payments for cost-effective measures;
- sacrifice of personal liberty;
- discomfort, inconvenience, or personal effort;
- sacrifice of pleasure and enjoyment;
- the risk of looking ridiculous;
- the bother of re-thinking traditional beliefs.

## Full benefits of existing measures ...

I would like to outline some of the options still available:

- areas where we can be fairly confident that significant safety gains can be made
- depending on the trade-offs the community is willing to accept.

Before talking about new options, there is the important issue of getting full benefit from existing, prove measures.

One indicator of the scope for further improvement is the unevenness of the progress that has been made so far.

Whether we look at the rate of improvement over this decade, or at other measures such as fatality rates per population or distance travelled it seems clear that some jurisdictions have achieved significantly better results than others.

And of course, it is not just a matter of State/Territory differences. There are important regional differences within most jurisdictions.

Different regional circumstances often required different solutions or approaches a point highlighted in the Rural Road Safety Action Plan.

Nevertheless, I believe there is still scope for substantial gains through wider implementation of current "best practice" approaches.

**Uneven implementation**

- speed and alcohol deterrence
- levels of enforcement, public education and penalties vary significantly between jurisdictions (and regions)
- prospect of uneven implementation of 50 km/h residential limits

Specific examples of uneven implementation of demonstrably effective measures are not hard to find, for example, in the key strategic areas of speed and alcohol enforcement, we know that levels of enforcement, investment in public education, and penalties for offences all vary significantly between jurisdictions. In fact, enforcement levels also vary a lot from region to region:

- addressed in 1997 National Package

Existing measures

Improved vehicle design

Severe injury risk by year of manufacture
(Source: MUARC, 1997)

Improvements in new-vehicle safety are an investment in the future a bit like planting a tree

Analysis undertaken by MUARC shows the improvement in vehicle crash worthiness of recent models resulting from a combination of improved regulatory standards and heightened consumer awareness (the two effects acting synergistically). This data series ends at the 1995 model year since then, decisions have been taken to adopt new ADRs on:

- side impact protection;
- offset frontal protection;
- as well as new rules for other classes of vehicle;
- in line with the latest international developments.

It will be many years before we see the full effects of these improvements

*<future prospects in vehicle standards discussed later>*

Existing measures:

Road improvements

- black Spot programs
- Highway upgrades
- LATM treatments

- All have a major safety impact, with very good cost-benefit ratios.
- Investment is continuing, and benefits will be long-term.

Seat belts

- Despite high usage rates in the general population, one in five occupant fatalities are still unbelted.

- Halving the non-usage rate would save about 100 lives per year.

With front seat wearing rates of 95% + (98% in some regions) surely we have no more to gain from this measure?

- despite high usage rates in the general population one in five occupant fatalities are still unbelted.

- halving our non-usage rate would save about 110 lives per year (8% of total occupant fatalities).

- over a decade, total lives saved would be roughly double what might be achieved over 10 years by fitting airbags to all new vehicles.

- There is no evidence of an inevitable "natural limit" to belt usage. Significant improvements could well be attainable through:

- "more of the same" (conventional primary enforcement and public education).

- new technology (for example: use digital or photographic images from speed cameras to fine non-users).

- application of the "zero-tolerance principles" tell the community, truthfully, that unbelted drivers are prime suspects for alcohol offences, unregistered and unlicensed driving, vehicle defects and other offences, and will be targeted accordingly by police patrols).

Alcohol

- If there is a point of diminishing returns from increasing RBT, it has not yet been reached (Homel. In press)
- scope for more strategic targeting of RBT effort
- effective enforcement / deterrence in rural areas still a concern
- penalties for low-range offences are minimal in some states (National Package)
- server liability concept not well established (driver, pedestrians)
- interlock programs
- rehabilitation and diversionary counselling
- vehicle impoundment.

Where to from here?

I have given examples of a few areas where we can expect continuing improvement, on current policy settings.

But current measures do not exhaust the options available.

US Commissioner of Patents, 1844:

The advancement of the art (of invention) from year to year...seems to presage the arrival of that period when further improvement must end.

It is all too easy to assume that we have already tried everything that might be worth doing.

I would like to canvas a range of emerging options.

Some are variations of existing themes, or otherwise familiar and "respectable" others may seem more outlandish.

I should emphasise that these are POSSIBLE OPTIONS, not policy proposals.

Some may not be viable in the short term and some may not be viable at all.

Some may be technically impractical, and some may be unacceptable to the community.

As I suggested earlier much depends on the trade offs that the community is willing to accept in the interests of reduced risk.

It is worth noting however that most of the major gains in road safety to date have come from the implementation of measures that could reasonably have been assessed or unrealistic (on technical or political grounds) or plain crazy only a few years before they came into effect.

And of course, new research evidence can be important in shaping community ideas about what is worth trying and what is not.

Speed

- It is not necessary to reduce traffic to a crawl to reduce deaths, injuries and property damage significantly.

There is strong and growing evidence that quite small reductions in vehicle travel speeds could have a big safety impact it is not necessary to reduce traffic to a crawl to reduce deaths, injuries and property damage significantly.

Speed management is the classic example of trade offs

- between safety travel times and fuel consumption/emissions
- to be honest, we would add "fun" to the list

It is by no means clear that we have already arrived at the optimum balance between these competing goals.

**Speed: new evidence**

- Urban case control study: casualty crashes in 60 km/h zones

- Vehicles with free travel speeds:

  - risk of crash involvement doubles with every 5 km/h over 60

  - nearly half of these casualty crashes probably would have been avoided, if none of the case vehicles had been avoided, if none of the case vehicles had

Research Undertaken by RARU for FORS: soon to be published. Provides new evidence abut the risks associated with speeding in urban areas.

- Case-control study:
  - travel speeds for vehicles involved in casualty crashed in 60 km/h zones in Adelaide (determined by crash reconstruction)
  -control data on the speeds of non-crash-involved in a 60 km/h zone doubles with every 5 km/h over 60

- Results:
  - risk of casualty crash involvement in a 60 km/h zone doubles with every 5 km/h over 60
  - if none of the crashed vehicles had been travelling above the speed limit, nearly half of the casualty crashes in this sample probably would have been avoided or reduced to non-casualty crashes.

Results show a striking parallel between the speed and alcohol risk curves:

- both show exponential risk increases, with increasing severity of offence
- speeding just 10 km/h over the limit involves a four fold increase in risk, relative to travel at 60 km/h
  -similar to the relative risk of a BAC of 0.8

Important implications:

- changing public understanding of speed risks
  - public acceptance of "moderate speeding
  - public attitudes of speed enforcement

- strengthening the case of intensive speed enforcement
  - and tighter enforcement tolerances

- penalties for "low level" speed offences are mild, compared to alcohol penalties for offences of comparable risk

Other results from this study underline the potential safety benefits of lower urban speed limits.

Speed options

- improved compliance
  - enforcement
  - tolerances
  - public education
- speed limits
- new technology

Speed limits:

By international standards we have quite intensive speed enforcement BUT permissive legal limits on most of our network

- residential streets
- non-freeway urban arterials
- two lane undivided rural roads (100 is high; the increasingly common 110 is very high)

Only our safest rural roads (freeways), have limits that are strict by international standards.

If we are striking the right balance between safety, emissions and travel time then much of the rest of the developed world must be wrong.

And if the balance is right on some of our roads, it must be wrong on others

- since crash costs vary enormously on roads with similar speed distributions

Speed new technology

Speed options

- improved compliance
  - enforcement
  - tolerances
  - public education
- speed limits
- new technology

Speed: ITS and other new technology options

- improved enforcement (eg digital imaging)
- "intelligent" speed warning devices or limiters
  - responsive to local limits
- platooning
- speed monitoring devices for insurance / fleet management purposes
  - positive results in recent SWOV study
- Variable speed limit signs

Also options with established technology:

- Synchronising traffic signals to the legal limit rather than a higher speed
  - an option that is available right now

ITS: Intelligent Transport Systems

- advanced traffic management
- intelligent cruise control / platooning
- advanced traveller information
- advanced public transport systems

There here are many other emerging ITS technologies with the potential for significant safety impacts.

How much could new technology improve safety?

Perhaps we get close to the right answer by re-phrasing the questions:

- How much could be gained by drastically reducing the role of human errors and foibles in the casual chain of road crashes?

Of course, there is always a price, and as usual in road safety the psychological price may be at least as important to the community as the economic one:

- as a driver, how much control and autonomy are you prepared to hand over to your car's computers?

Vehicle design

- advanced occupant protection systems
- pedestrian safety
- vehicle compatibility

<u>Advanced occupant protection</u>

- Exiting improvements in new-vehicle design will provide benefits for many years to come.
- Australia is engaged in the international research effort on enhanced standards

- including the next generation of offset frontal and side impact standards
- we also hope to engage with industry & researchers on methods of optimising design to reduce total Harm across the full range of real-world crashes and occupant physiques

- In addition, there is a move beyond the traditional concern with designing a vehicle to protect its occupants, to a focus on impacts on other road users:

- design for pedestrian protection
- vehicle compatibility

Vehicle design

- advanced occupant protection systems
- pedestrian safety
- vehicle compatibility

Vehicle compatibility:

- When a small, light car collides with a larger, heavier, more rigid vehicle the odds are stacked heavily against the occupants of the smaller vehicle.

- For years, this has been accepted as a matter of basic physics.

- Now, vehicle designers and safety agencies have redefined this problem is it an ultimate limiting factor in safety design, or the great challenge?

- what design changes, in both large and small vehicles, will produce a better outcome on a fleet-wide basis?

- This is not the stuff of pipe dreams we have already seen evidence of the potential for dramatic improvements in "vehicle compatibility":

- truck under-run barriers

But vehicle compatibility goes beyond design/engineering issues

- is there a place for financial or other incentives that would increase the market share of less "aggressive" vehicles?

This is linked to the challenge presented by environmental issues:

- how can we reduce fuel consumption and emissions (smaller, lighter vehicles would help) while maintaining or improving occupant protection? (Larger, heavier vehicles can help, at least for the individual consumer).

Occupant head protection

MUARC & RARU (in Press)

- Bicycle style helmets would give a significant reduction in car occupant head injuries
    - saving - $380 million per year
    - significant added protection, even for driver with airbags
    - significantly more effective than improved vehicle interior padding
    - head bands could delivery 50% of these benefits

There are cheap, low-tech options as well, that do not involve buying a state-of-the art vehicle.

Vehicle occupant head protection

Expected improvement in outcome (RARU)

*(Graph of percentage of head-injured cases)* (Page 28 of the original document)

Head protection: economic benefits
(MUARC)
Total annual harm reduction ($m)
*(Graph of head and face injuries Page 29 of original document)*

Other problem areas / options

- Young/novice drivers
- car driver fatigue
- drugs other than alcohol
- demand management and modal shifts

In some areas, we can be confident of big gains, if we want them enough. It is harder to predict potential gains in other areas, some of these areas have proved relatively intractable in the past, in others, we do not even have a good fix on the magnitude of the problem. One prediction I would make with some confidence we have not seen the last good research proposal in any of these areas.

## A reasonable target

So, what is a reasonable target? Some would argue that no level of road trauma should be regarded as "acceptableXthe "target zero" slogan is gaining currency in some countries. But there is no point in a zero target if we are not fair dinkum about implementing all the changes needed to achieve it.

We have derived great benefit from a strategic approach toward road safety planning, backed by good research, and with a strong emphasis on partnerships and collective ownership.

But strategic planning won't work without a cast iron commitment to implementation. In the final analysis, it is only what is actually done that counts. That which is debated, agreed upon, aimed for or hoped for is stillborn without determined action.

The target we set should be the target we seriously intend to meet. We must be honest enough to say that the level of trauma we set as our target is what we regard as "acceptable", at least for the moment, because we are not willing to implement any available options that would reduce it further.

# PREDICTING ROAD FATALITIES FOR 2001 AND BEYOND

Peter Vulcan
Monash University Accident Research Centre

*SOURCE: Vulcan, P. (1997). Predicting road fatalities for 2001 and beyond. Keynote address to the 1997 Road Safety Research and enforcement Conference, Hobart, Tasmania, 9-12 November 1997.*

I have been asked to respond to the statement below and to look further into the future:
"Since 1992 there has been no advance in reducing the level of road trauma in Australia. On present trends we are unlikely to reduce the 1996 national road toll rate of 10.79 (fatalities) per 00,000 of population to the year 2001 target of 10.0 or less"
*from Executive Summary of the National Road Safety Package prepared by a sub-group of the National Road Safety Strategy Implementation Taskforce.*

## Introduction

In setting road trauma safety targets for the short term (1-4 years) the constraints placed by lead-time on the extent of improvements to vehicles and the road system must be taken into account. On the other hand, experience has shown that considerable changes in road user behaviour can be achieved within this time frame. Another factor which can affect predictions for a particular date is the state of the economy which can affect road casualties by a factor larger than merely changes in distance travelled.

In the longer term (10-20 years) on the other hand, large reductions are possible, given the necessary resources and both community and government commitment to dealing with 'road trauma, the modern epidemic'. Thus, for example, approximately half the vehicles involved in casualty crashed in Australia are more than 10 years old, but in 20 years virtually the whole vehicle fleet can be renewed. Similarly the Australian national highway system was completed in about 20 years, so major improvements to our roads are possible in that time frame.

Estimate of the future level of road trauma can be made in several ways. One crude way is to linearly extrapolate past trends. This has little scientific basis and is not recommended. As shown in Figure 1, if used in 1994, this method would have predicted zero road deaths by about 2006. Figure 1 also shows the progress Australia has made since 1970 in reducing its fatality rate compared to other countries regarded as leaders in road safety. In 1995 only Japan, the U.K. and Sweden had lower rates and those countries have fewer vehicles per head of population.

Smeed[2] showed that the fatality rate (deaths per 10,000 registered vehicles) for many countries could be related to the level of motorisation by the equation.

$$\frac{F}{V} = A\left(\frac{V}{P}\right)^{-B}$$

Where F = number of fatalities
V = number registered vehicles x $10^4$
P = population x $10^5$
A is a scaling constant for a particular population
B was estimate as $\frac{2}{3}$ for most populations studies

Newstead[3] showed that for Victoria. 'Smeed's Law" applied reasonable well provided it was modified by additional factors to represent step shifts relation to specific countermeasures, as shown in Figure 2. In this case, B was 2.03 and a varied in a stepwise way according to the time period.

This means that while Smeed's Law (unmodified) may be useful for predicting fatality rates in the absence of major effective countermeasures, it is of limited value if such major measures are to be taken into account.

Some countries (States) have set future targets based on statements like:

"By the year we will have the lowest fatality rate of any country (any State in Australia)".

This approach has some merit, provided the geographic, climatic, socio-economic, road infrastructure, vehicle mix, difference between the two countries (States) are not too large.

A more scientifically based approach is to consider the countermeasures likely to be implemented and estimate the probable effectiveness in crash or casualty reduction of each one in turn. This approach will be adopted to the extent possible in the paper.

## Scope for Reduction in Road Casualties

In considering the range of approaches to reduction of road trauma, Haddon's matrix shown in Figure 3 represents a good way to visualise the scope for countermeasures[4].

**Factors**

| Phase | HUMAN FACTORS | VEHICLE FACTORS | PHYSICAL ENVIRONMENT |
|---|---|---|---|
| Pre-event | | | |

| Event | | | |
|---|---|---|---|
| post-event | | | |

Pre-Event Phase: all factors that determine whether the event leading to injury will take place
Event Phase: all factors that determine whether an injury will occur once the incident has been initiated.
Post-Event Phase: all factors that determine the final damage and the permanent handicap stemming from injury.

**Figure 3 The Haddon Matrix**

I consider that a third dimension would well be used in the matrix, with each cell having layers for each category of road user, namely, vehicle occupants, pedestrians, motorcyclist and bicyclists. This is equivalent to having a separate Haddon matrix for each road user category:

Another concept which is useful in estimating the effect of countermeasures is the fact that any road crash and its injury outcome, is the result of a chain of events and if any one link in that chain can be broken, the outcome can be prevented. When considering the whole population of crashes the extent to which progression from one event to the next can be reduced by a specific countermeasure (i.e. the effectiveness of a countermeasure) can be used in calculating ultimate trauma savings. The concept is shown in Figure 4.

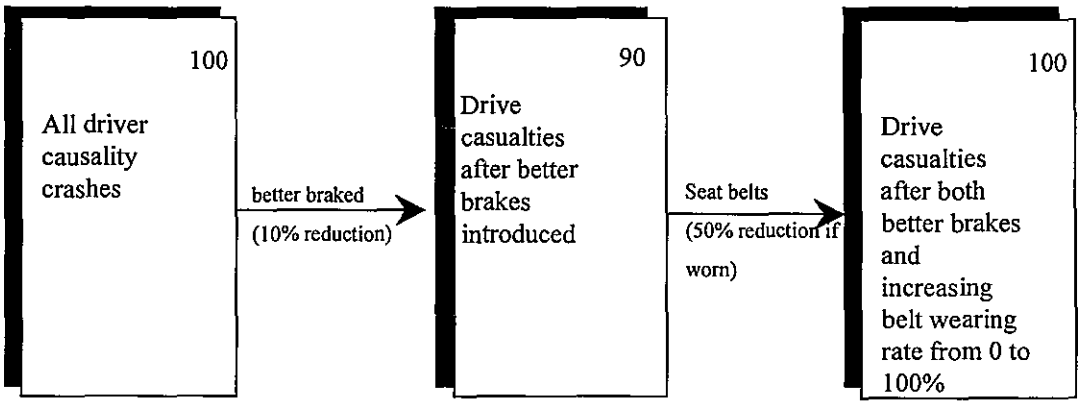


Figure 4 – Some Links in the trauma chain

The concept of a multiplicative model is also illustrated in Figure 4, namely if better brakes will prevent 10% of driver casualty crashes, then for every 100 driver casualties only 90 are expected after implementation of this measure. If seat belts are assumed to reduce injuries by 50% for drivers who wear them, then a measure which increased seat belt wearing from 0 to

100% would reduce driver casualties by 50% of 90 45. (Note this second measure is applied to the 90 injured drivers remaining after the better brakes countermeasure).

## 3. Fatality Reductions by 2020

### 3.1 Overview

This paper will first attempt to estimate the likely reductions in fatalities by the year 2020 and then derive estimates for 2001. The effects of vehicle safety standards, road system improvements and road user behaviour will first be considered separately and then combined using the multiplicative model.

In estimating the changes in future fatalities, it will be necessary to consider the effect of increases in the vehicle fleet (or distance travelled) and/or the total population over the time period. This will be done in Section 3.7 when the individual reductions for vehicles, roads and road users are combined, while the effectiveness of specific improvements are calculated below, assuming there is no growth

### 3.2 Vehicles

#### 3.2.1 Improved occupant protection standards

It should be possible to almost completely renew the vehicle fleet by the year 2020 with more than 90% of vehicles incorporating all safety standards set by 2001. Given the usual lead time in developing new vehicle safety standards and for manufacturers to meet them, such standards would need to be limited to technology virtually fully developed at this stage.

APPENDIX A discusses various vehicle occupant protection measurers which come under this category. Their total effect is likely to provide approximately 26% reduction in the total road fatalities by 2020, assuming no growth in the vehicle fleet.

#### 3.2.2 Improved crash avoidance standards by 2001

Speed limiters set at a maximum of 120 km/h would be likely to reduce total fatalities by 5-10%. Furthermore, if fitted with sensors to set the speed limiter at 15 km/h above the local speed limit, fatalities could be reduced by a further 10%, after the system for transmitting the local speed zone to the vehicle had been implemented. This could be done by transmitters at the entry to each speed zone or by geographic information system.

Alcohol interlocks which would prevent a person exceeding the legal blood alcohol limited from starting and driving a vehicle, could reduce the fatality rate by 1%. If fitted to all vehicles driven by convicted drink drivers for an average two years after that offence. If ultimately fitted to all vehicles, a 15% reduction in fatalities could be expected (allowing for 25% of interlocks being disconnected or by-passed).

After allowing for some overlap between speeding and drink driving, the combined effect of the above measures would provide approximately 20% reduction in total road fatalities by 2020 assuming no growth in the vehicle fleet. (The 20% would be reduced to about 11% if the lesser of each option were adopted, i.e., only limit maximum speed and only apply alcohol interlocks to convicted drivers).

### 3.2.3 Vehicle safety features beyond 2001

It is expected that a further set of vehicle safety features which are currently in various stages of development as part of the ITS (intelligent transport systems) and other programs will be progressively implemented during the period 2005 to 2020. These include:

It is expected that a further set of vehicle safety features which are currently in various stages of development as part of the ITS (intelligent transport systems) and other programs will be progressively implemented during the period 2005 to 2020. These include:

- devices which will detect impaired driving performance (Fatigue, alcohol, drugs) in order to avoid false positives, these devices could warn the driver at a threshold level (perhaps equivalent to .08% BAC for the average person:
- further improvements in occupant protection particularly in rollover and side impacts through further vehicle standard improvement, including padding for head impact areas, improved occupant restraints including airbag type devices and "sculptured" seats;
- reduced aggressivity of cars and heavy vehicles, towards cars, two-wheeled vehicles and pedestrians;
- ultimately virtually automated driving will be possible at least on major roads and highways. Automatic speed control to a level appropriate for the conditions and possibly automatic direction control can be envisaged. Collision warning and avoidance systems particularly against fixed roadside object and at intersections could also be envisage.

The effectiveness of each of the above future countermeasures is difficult to estimate precisely at this time and will require considerably more research than was available for this paper. A crude estimate of likely combined effect is given in Table 1.

**Table 1 – Reduction in fatalities from safety features being developed**

| | **Reduction in Fatalities** when fully by 2000 implemented | |
|---|---|---|
| occupants of cars, 4WDs and utilities | 45% | 12% |
| heavy vehicle occupants | 20% | 5% |
| pedestrians | 20% | 5% |
| motorcyclist and cyclist | 20% | 5% |

The reduction in all road fatalities in 2020 would be about 9% and 36% when fully implemented (perhaps by 2040).

## 3 Total effect of vehicle safety features

Total multiplicative effect of the vehicle safety features discussed in 3.2.1 and 3.2.2 would be an approximate reduction in total fatalities of 41% by 2020 [100 – 100 (.74 x .80)].

When the safety features still being developed (Section 3.2.3) are included by the multiplicative method the effect on fatalities is likely to be a total reduction of 46% by 2020 and by 62% when fully implemented.

## 3.2 The Road System

This section includes both major new road construction and progressive improvements to the existing road system, including accident black spot (route or area-wide) programs. In general terms, the extent of reductions depends on how much is spent on safety related improvements to the road system, such as divided roads, limited access freeways, roadside hazard removal, separation of vulnerable road user, intersection controls, roundabouts and channelisation, skid resistant pavements, improved delineation and shoulder sealing.

## 3.3 Accident Black Spot Programs

It has been known for many years that accident black spot programs are high effective in reducing crashes and injuries, with benefit considerably greater than their costs. The evaluation by the Bureau of Transport and Communications Economics of the Federal Government's Black Spot Program, which was implemented during the period 1990/91 to 1992/93 was undertaken on a sample of 254 sites treated during the first years of the program. It found an average reduction of eight fatalities pr annum at these sites (plus reductions of 186 hospitalised injuries per annum and 434 other injuries per annum)[8]. The total expenditure on these sites were $25.5 million which corresponds to an average $3.2 million per fatality (plus the associated injuries) save per annum over the life of the treatment.

Evaluations of the accident black spot program in Victoria implemented in 1994/95 and 1995/96 found an average reduction of 11 casualty crashes per annum per million dollars. This represents approximately $3.8 million per fatality save per annum, or 26 fatalities per annum for $100 million program (1995 dollars )[9]. To allow for diminishing returns if a large scale program were implemented over the next 23 years, a conservative rate of 20 fatalities per annum (plus some 800 injuries) save per $100 million dollars will be used.

The current Federally funded accident black spot program is $36 million per annum and the additional amounts of State funded programs are not known. Assuming total expenditure on accident black spot programs (including route and area-wide treatments) can be established at $80 million per annum for 1998 to 2020, fatality savings building progressively to 368 per annum (23 x 16 per annum) could be expected by 2020, fatality savings building progressively to 368 per annum (23 x 16 per annum) could be expected by 2020. It is considered a program of this size could be maintained for 23 years and still maintain acceptable benefit/cost ratios.

## 3.4 Other Roads Expenditure

It is more difficult to estimate the extend of fatality reductions from new or improved roads which also have a safety component. There are safety as well as operational benefits in projects such as provision of limited access freeways, divided roads and pedestrian over-or under-passes. For the purposes of this paper, it is probably reasonable to assume reductions of at least one-eighth of those from accident black spot programs, say 2.5 fatalities per annum for each $100 million spend on major road construction and improvement. Assuming an expenditure of $700 million per annum this would provide fatality savings building progressively to 403 per annum (23 x 7 x 2.5) by 2020.

### 3.5 Total effect of Road System Improvements

In section 3.3.1 it was suggested that an annual expenditure of $80 million on accident black spot programs would save some 368 fewer fatalities per annum in 2020. In section 3.3.2 it was suggested that expenditure of $700 million per annum on major road construction could be 403 fatalities per annum in 2020. These two reductions are additive and would gradually build fatality saving of 771 per annum by 2020. This corresponds to a reduction of 39% of the 1970 fatalities which occurred in 1996. Again this assumes no growth in traffic.

### 3.4 Road User Behaviour

It has been shown that a concerned attack on drink-driving, involving an increase in high visible random breath testing to at least one test per two licensed drivers per annum, supported by massive publicity and conducted by Police in a very intelligent manner can yield considerable reductions (approximately 20%) in the extent of serious casualty crashes, during high alcohol hours. It would be reasonable to expect reductions down to a level where only 1-2% of hard core offenders continue to drink excessively then drive, resulting in about 15% of drivers killed having BAC above 0.5%. Taking into account the variation in existing drink driving throughout Australia this would represent a reduction in total fatalities of about 8%. Further reductions would probably require the use of alcohol interlocks as described in section 3.2.2.

Similarly it has been shown that a large scale speed camera program with major publicity support and appropriate penalties, including loss of demerit points leading ultimately to license suspension, again including high intelligent application by Police, can result in considerable reductions in casualty crashes mainly in low alcohol hours (about 20%). Other speed enforcement programs, such as those using hand-held or car mounted laser equipment could probably reduce total fatalities by a further 5%. Taking into account the wide variation in excessive speeding throughout Australia, this would represent a reduction in total fatalities of about 12% not only among vehicle occupants but also among unprotected road users. In addition, reductions of up to 30% of pedestrian and cyclist deaths could be expected if built up area speed limits were lowered to 50 km/h (as in many European cities) and enforced. Further reductions would probably require the use of technology to control vehicle speeds as discussed in Section 3.2.2.

Seat belt and child restraint wearing has been shown to be very effective in reducing deaths and severe injuries in a crash. While front seat belt wearing rates throughout Australia generally are in the range 90-96%, some 20% of vehicle occupants killed are estimated not to

be wearing a seat belt or appropriate restraint. It would be reasonable to expect a further 3% reduction in vehicle occupant deaths resulting from continued enforcement and promotion of seat belt wearing including improved fitting and use of child restraints and use by heavy vehicle drivers. Further reductions could be expected by the use of seat belt interlocks.

A range of other enforcement programs including red light cameras and police blitzes aimed at specific offences could probably yield further reductions in fatalities of about 5%.

Drivers aged under 25 have a crash over-involvement rate of nearly 2:1, (Up to 4:1 for novice drivers in their first year). It is hoped that as a result of continuing research leading to programs that improve cognitive skills of notice drivers and implementation of further graduated licensing, some reductions particularly during the first three years of driving will be achieved. If a 10% reduction in the under 25 year driver crash rate where achieved this would lead to approximately 3% reduction in total fatalities.

As some of these measures have already been implemented in various States and there is some overlap between the measures, it is likely that a further reduction of about 26% in total fatalities could be expected from implementing all these measures.

It is hoped that other programs directed at improved, more responsible behaviour by all road users, including community based programs and those directed at the increasing proportion of elderly road users, will ultimately have an effect on road casualties but it is too early to estimate the extent of such reductions.

### 3.5 Improved Emergency Medical Services

It is likely that more rapid notification of serious crashes through mobile telephones or automatic transmitter devices fitted to vehicles will improve the changes of survival for seriously injured persons. Improvements in emergency services and procedures in hospitals may also reduce deaths among critically injured victims.

Reductions in total fatalities of 10% by 2020 would seem possible by these means.

### 3.6 Exposure Reduction

It is possible that exposure will be reduced through telecommuting, greater use of public transport, or targeted programs which limit the more dangerous forms of exposure, e.g. novice driver night-time curfews or limitations on impaired/elderly drivers. The extent to which such measures are likely to be introduced up to 2020 is unclear and they have therefore been ignored in these calculations.

### 3.7 Total Reductions in Fatalities by 2020

Table 2 below summaries the reductions in fatalities which could be expected if all the measures described in this paper were implemented.

The total reduction was calculated using the multiplicative method and any interactions have been ignored.

$(1 - R) = (1 - r_1)\ (1 - r_2)\ (1-r_3)\ (1 - r_4)$

where R = total proportional reduction
$r_1$ = proportional reduction from vehicle measures
$r_2$ = proportional reduction from road measures
$r_3$ = proportional reduction from road user measures
$r_4$ = proportional reduction from emergency medical service

**Table 2 - Estimated reduction in fatalities by 2020 (assuming all measures implemented)**

| | **Reduction** | **(1 -r)** |
|---|---|---|
| Vehicle safety features | 46% | .54 |
| Road improvements | 39% | .61 |
| Road user behaviour | 26% | .74 |
| Emergency medical services | 10% | .90 |
| **Total reduction (multiplicative method)** | **78%** | **.219** |

The estimated reduction in fatalities of 78% (from 1,970 last year to 431) assumes no increase in the vehicle fleet (or distance travelled) or population. If the rate of increase in the Australian car fleet during the 9 years and 8 months to May 1995 (28.1%) is maintained for the next 24 years, then the car fleet in 2020 would be approximately twice the size of the fleet in 1996.

Similarly if the 14.3% rate of increase in the population for the 10 years to June 1996 is maintained for the next 24 years, the population in 2020 would be approximately 38.4% greater than in 1996.

Assuming the worst case that road fatalities increase at approximately the same rate as registered vehicles (rather than the much lower rate of population increase, or that predicted by Smeed's Law) the expected fatalities in 2020 should be doubled in 86. The fatality rate would then be 3.40 fatalities/100,000 population for an expected population of 25.34 million people or 0.40 fatalities/10,000 vehicles for a fleet of 11.1 million vehicles. In summary in 2020 there would be:

- 862 fatalities (allowing for doubling of vehicle fleet)
- fatalities /100,000 population (assuming 25.34 million people)
- 0.40 fatalities/10,000 vehicles (assuming 11.1 million vehicles)

**4. Fatality Reductions 2001**

Reductions in fatalities by 2001 depend very much on the constraints placed by lead time on improvements to new vehicles and the road system, although major improvements in road user behaviour are possible over the next four years.

Hence it could reasonable be assumed that about 10% reduction (of the ultimate 26%) in fatalities could be derived from the programs directed at drink driving, speeding and seat belt use. On the other hand, improvements in new vehicle safety could not be expected to provide more than a 2% reduction in fatalities by 2001 (of the ultimate 46%) and reductions due to road improvements could be about 6%, if the increased road expenditure program began in 1998.

Using the multiplicative model, this corresponds to a total reduction in fatalities of 17.1% [100 - 100 (.90 x .98 x .94)]. When applied to the 1970 fatalities in 1996 this predicts 1,633 fatalities in 2001, assuming no growth. However, if a 14.2% growth in the vehicle fleet over the period 1996 to 2001, is assumed, the estimate of fatalities in 2001 would need to be increased to 1,864.

Assuming a population increase of 5.95% over the period 1996 to 2001 (the same as in the previous five years), the population in 2001 would be 19,401,000. This means that the 1,864 fatalities would correspond to a fatality rate of 9.60 per 100,000 population.

Hence given the above assumptions about implementation of specific vehicle safety features, road improvements and road user safety programs and their effectiveness, a fatality rate of 9.60 per 100,000 population is possible by 2001.

It is interesting to note that if the 12.4% reduction in fatalities to 30 September 1997 (when compared with the same period in 1996) is maintained for all of 1997, then the fatality rate for 1997 would be approximately 9,46/100,000 population.

## 5. The Distant Future

Ultimately the community can achieve any level of safety it wants (and is prepared to fund). The Swedish Parliament in October 1997 accepted "the Zero Vision" - a concept which had been put forward by the Swedish National Road Administration more than two years ago and has been actively discussed since. In essence, he concept is that it is possible to design a road transport system in which there will be no fatalities and few, if any, serious injuries, given sufficient resources and commitment.

At this stage, it is a vision, rather than target, but it also represents a significant conceptual change. In the past, design for safety in road transport has been based on what can be justified in terms of mobility, cost or individual freedoms. The new concept is based on the fact that it is possible to progressively move towards zero fatalities with existing or developing technology by, for example, setting the speed limit to approximately 30 km/h where there is no separation between opposing streams of traffic nor between vehicles and vulnerable road users. Improved mobility, in terms of higher speeds, can then be achieved by

investment in safer vehicles and better facilities, through divided roads and separation from pedestrians and bicycles.

Ultimately it may be possible to design "freeway type" facilities with automatic guidance, speed and separation control which will allow safe speeds up to 100 km/h or even higher, but these will only be warranted in high volume routes. Similarly divided urban "arterial type" roads with full separation and no roadside hazards, with somewhat improved vehicle occupant protection may be capable of safe operation at 60 or 70 km/h. (The Swedish concept does not specify operation speeds, or specific technologies at this stage).

A consequence of adopting "the Zero Vision" at the Government and Parliamentary level in Sweden is that the rate of progress towards achievement of progress towards achievement of the vision will become a matter for decision by the community and its elected representatives, rather than by administrators and researchers. The role of this latter group is to develop optimum ways of achieving the vision and perhaps promoting a proper understanding of what can be achieved by their adoption.

## 6. Discussion

The accuracy of the effectiveness estimates for each of the measures discussed in Section 3 varies considerable according to what could be found in the literature, in the time available for preparation of this paper. Where no definitive information was available, best estimates based on judgement were used. 0

Similarly, assumptions had to be made about which measures were likely to be implemented and the time frame, as well as the extent of implementation or level of funding. In each case the values used and the assumptions made have been stated and the calculations can be modified, if better information becomes available in the future.

Thus this paper provides a framework for estimating future fatalities based on expected road safety inputs. The accuracy of the final predictions, depends on the accuracy of the various assumptions which have been made.

This paper has been restricted to prediction of future fatalities, but future injuries are also important and similar methods can be used to predict them.

## 7. Conclusions

There is scope for continuing reduction in road trauma through the application of known measures to improve the safety of people, vehicles and the road system. Based on some assumptions on the likely effectiveness and extent of implementation of these measures, it is estimated that Australian road fatalities in 2020 could be reduced by 56% to about 862, which corresponds to a rate of 3.4 fatalities/100,000 population. This compares favourably with last year's fatality rate of 10.8/100,000 population resulting from a total of 1,970 fatalities.

The extent to which road trauma can be reduced by 2001 is limited by the lead time required to make improvements to vehicles and roads, although considerable improvements could be achieved in road user behaviour. It is estimated that by 2001, fatalities could be reduced by about 5.4% to 1,864 which corresponds to a fatality rate of 9.6/100,000 population.

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# WILL A 4WD STRATEGY WORK IN THE SHIFTING SANDS OF POLICY?

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## Introduction

In several countries there is a concern that road safety progress has stalled. The absolute number of deaths has been (more or less) static for several years while death rates have been declining only marginally. At the same time many countries have been developing new, national, road safety strategies with which to enter the 21st Century.

This paper explores the options for a way forward by examining a sample of such strategies. The strategies considered were those of Australia, New Zealand, the United Kingdom and Sweden. (1–4).

The critique which follows is of the collective, not of any particular national strategy. Without exception, the strategies, while they purport to plan for the decade, address only today's problems. Secondly, with rare exceptions, the strategies are not truly strategic.

## The need for a guiding vision

In most motorised nations road safety is managed as part of the overall road transport system. Such systems have multiple objectives, some of which are, at least in part, incompatible. Thus difficult trade-off decisions are required. A guiding vision is essential to provide both leadership and consistency in the decision making process.

Austroads, for example, lists a number of outcome areas in its current strategic plan (5). It wants to integrate road, rail, air and sea transport. It wants to improve road safety. It wants to facilitate economic development, at both national and regional levels. And it wants each of equity, accessibility, mobility and sustainability in the Australian road transport system.

To make matters more complex, the social and policy context in which trade-off decisions are being made, is rapidly changing. Five key areas of change - the "shifting sands" of the title - are briefly discussed:

1. The domestic freight task will grow faster than the economy. Truck traffic will increase by 70% by 2015 while car traffic increases by only 30% (6). This shift in vehicle mix is related to ongoing changes in the production and distribution chain and involves commercial traffic at all levels, from courier vans to road trains. A major safety impact will be the increased frequency of collisions between vehicles of markedly different masses, with

a resultant increase in injury frequency and severity to occupants of the smaller, lighter vehicles. There is no mention in the Australian national road safety strategy of this accelerating trend (there is a section on vehicle compatibility but it does not mention trucks). There is an urgent need to model the expected shift in vehicle mix, to forecast the likely injury impacts and to develop ways of managing these impacts.

2. The BTE also estimates that urban congestion costs will double if not triple by 2015 (6). This must result in both mobility and environmental issues becoming more cogent factors in future trade-off decision making. These matters are not currently factored into road safety strategies. There is a need to examine the interfaces and seek win–win strategic options if safety is not to get swamped in future trade offs.

3. Over the last 50 years Australia's major cities have transformed from the "core and spoke" form that was suitable for public transport, to sprawling low density. The recent appearance of inner city apartments does not (at least not yet) constitute a sea change. What increase in public transport patronage, for what kind of trips, is needed to achieve a meaningful safety benefit? If public transport usage in Melbourne were to double over the next few years, car traffic would still account for almost 90% of urban passenger trips made (6). How much does urban density have to increase by to have a meaningful impact on road travel demand? There are no systematic answers to these questions, yet increased public transport use and urban renewal (via increased density) continue to be put forward as if they were panaceas to the problems of road safety, congestion, pollution, and so on. Unless we start to get answers we cannot make rational decisions about resourcing such strategies or the time frames upon which meaningful effects will be achieved.

4. The median age of the population will increase from its current 34 to 40 by 2020 (6). This forecast has generated substantial research concerning the possible safety impacts and how they might be addressed. There will be key trade off decisions to be taken as the loss of mobility for the elderly can have significant health (and health cost) impacts while the elevated crash risk of the elderly is equally well established (7).

5. Finally, industrial globalisation has two ongoing impacts. Harmonisation in standards will slow down vehicle safety innovations. Such innovations are fundamental not only to improving both primary and secondary vehicle safety - areas of major past advance - but to confronting the rapid worsening of the vehicle mass incompatibility issue. Secondly, because Australia is such a large country with such a small population, transport forms a disproportionate part of production and distribution costs and there will continue to be enormous cost pressures on our transport sector. This will impact on the funds available to address all our problems and make trade-offs even tougher.

These are just a few of the grains in the shifting sands of policy. They are usually mentioned in passing in the introduction to a national strategy and then ignored, or discussed only superficially. For example, the current U.K. strategy states: "As well as reducing car dependency, congestion and local air pollution, walking and cycling can improve people's health and fitness" .(3). Unquestionably true, but how much walking is needed to reduce congestion by a meaningful amount and how much cycling is needed to reduce air pollution

by a meaningful amount? If we don't know we cannot decide whether or not to promote such changes, let alone decide what level of resource might be required and over what time frame?

The factors in the trade-off equations are going to change markedly over the next few years. We need a vision to drive the decision making process. There were many targets and goals in the national road safety strategies reviewed but only one vision of the form sought. The Swedish National Road Administration states that the road system is to be designed so that no one is killed or seriously injured in traffic (4). In effect, this removes death and catastrophic injury from the trade-off decision equation. It does not say that road safety is paramount, it says eliminating death is paramount and this objective overrides other objectives of the road transport system. So trade-offs would then be made between reductions in **non-fatal crashes**, gains in mobility, gains in sustainability, and so on.

In addition to driving the decision process this form of vision also drives accountability, an element strikingly absent from most of the national strategies examined. The Swedish government explicitly declared that it accepts responsibility for designing and operating a zero death road transport system.

The Australian philosophy appears very different, assigning ultimate responsibility to the individual road user. Ten years ago Australia's first national strategy said "Road safety cannot be delivered, it must be practised by the whole community" (8). The current strategy states, when listing the reasons for the gains that have been made over the past decade or so: **"Most importantly**, people have heeded the call to drive more responsibly" (1, emphasis added). It is perhaps not surprising, then, that Australian strategies do not include safety outcome targets at the individual institutional level.

## The need for strategic thinking

The U.K. plan is the least strategic of those examined, at least in its published form (3). The document has ten themes, each with its own chapter. Some themes address a constituency, for example the chapter "Pedestrians, Cyclists and Horseriders"; some address a traditional countermeasure area, for example the training and testing of drivers and riders; some address a traditional problem area as in the chapter "Drink Drugs and Drowsiness". Each chapter is "stand alone", with little discussion of the complex interactions with the issues in other chapters. For example, in the chapter on better enforcement there is no discussion of the need to support enforcement with public education, which Australian research (9) has shown to be fundamental (along with enforcement intensity which is not discussed in depth). Within each theme chapter there is a list of measures that might be considered but with few estimates of potential outcomes or costs.

This is the type of strategy labelled "4WD" in the title of this paper. It has all wheels spinning. Every lobby group can find something that will satisfy them. While it may be politically necessary to package the public document in this way, it provides little leadership or direction and mostly reinforces the status quo.

In addition to a vision to guide the trade off decision making process, the basic strategies need to be made explicit in order to guide countermeasure selection. The Swedish vision is to eliminate death and catastrophic injury. The primary guiding strategy is to minimise energy transfer in crashes. The measures under this strategy include:

- reducing impact speeds by lower speed limits, by engineering measures to constrain travel speeds, by enforcement and by education;
- minimising the opportunities for high energy transfer impacts by road design and access control measures to decrease the probability for head on and high speed side impact crashes;
- using roadside barriers and other energy absorbing devices to substitute impacts with rigid objects with impacts with more forgiving structures;
- improving the secondary safety of vehicles;
- and so on.

This overarching strategy dictates priority setting and resource allocation. Note that it does not lead only to engineering measures, it simply focuses countermeasure selection in a particular way. Plenty of Swedish countermeasures relate to drink driving legislation, to enforcement, to public education, to education in schools, and so on but in a form which fits the overarching strategy of seeking to reduce energy transfer at impact.

Does Australia have an overarching strategy? Yes, an implicit one based on behaviour change through legislation and its enforcement. Australia mandates self protective behaviour as well as "outlawing" high risk behaviour; leading the world, for example, with legislation for seat belt wearing, for motorcyclist and bicyclist helmet wearing, in random breath testing, graduated licensing, and so on. It is less an overarching strategy than a predominant one. Unlike the Swedes, however, this overarching/predominant strategy was adopted (evolved?) by default. Australia actually has a mixed strategic model, the less dominant strategies being based upon improved vehicle design and road and roadside improvements. There is some tension among the proponents of the strategic options and, unlike in Sweden, no consensus on a direction for the integration of countermeasure programs.

The predominant strategy of legislation and enforcement has proved to be an effective strategy in our culture and the Australian evidence base relating to legislation, enforcement practices and their impacts is second to none. Nonetheless, an explicit examination of the future potential of retaining this as the predominant strategy is urgently needed.

The New Zealand draft strategy is openly debating what its overarching strategy should be (2). It contrasts the legislation and enforcement emphasis with a roading emphasis. The former is the least costly in dollar terms while the latter is the most costly. While cost is a key factor in program decisions, the choice of an overarching strategy is an essentially political decision. Both the US and the U.K. are philosophically opposed to behavior change by decree, thereby explaining why the "Better Enforcement" component of the U.K. strategy places traffic enforcement in the wider crime management context and largely ignores the (now compelling) literature on the factors that make enforcement a highly cost-effective road safety measure. Australia is not philosophically opposed, indeed it is highly consistent with the official assignment of ultimate responsibility to the individual road user. What is missing from all but the Swedish strategy is an explicit analysis of strategic options. There is

discussion of countermeasure options but countermeasure choice should follow strategic choice.

## Setting and achieving "road toll" targets

The targets one finds have mostly been set politically. The proposed New Zealand target is to match current world best practice by 2010, about 6 deaths per100,000 population (2). A curious target at first blush. New Zealand is aiming to catch up, in ten years time, with where the best in the world is right now. Setting such a target only makes sense if you assume the best are not going to get much better! Australia has targetted a 40% reduction in deaths per 100,000 population by 2010, implying a target death rate of about 5.7 (1), in effect the same magnitude of target as New Zealand. The U.K. has gone for a 40% reduction in absolute deaths and serious injuries (3), probably choosing an absolute, rather than a rate, reduction because it is already the leader in Europe or perhaps because the U.K. government recognises that the public understands absolute numbers.

How valid is the selection of an international "best practice" target, particularly when it is set in terms of deaths per head of population? The number of deaths per100,000 population in any country is intimately related to the level of motorisation. Using this measure, India is safer than the U.K.! (10). This accurate reflection of the relative risk of dying in a traffic crash ignores the vast difference in access to personal road transport.

Table 1 shows the importance of motorisation differences, even among countries all considered as motorised. The U.S.A. with 78 motor vehicles per 100 population is far and away the most motorised nation and it has the highest death rate per 100,000 population. Sweden and the U.K. are far less motorised and have very comparable death rates (currently considered as the best in the world). Australia and New Zealand are in the middle on both measures; here alone the conclusion of a real difference in safety record is valid. If one examines only those countries with motorisation rates in the same bracket as Australia, then Australia already ranks very highly. One has to ask whether, given Australia's level of motorisation, a rate of less than six deaths per 100,000 population is achievable within the time frame. For New Zealand the target is even more demanding.

**Table 1: Is 'best practice' valid?**

| | 1999 | |
|---|---|---|
| | **Deaths per 100,000 Population** | **Motor vehicles per 100 Population** |
| U.S.A. | 15.3 | 78 |
| N.Z. | 13.3 | 66 |
| Australia | 9.3 | 65 |
| Sweden | 6.6 | 52 |
| U.K. | 6.0 | 47 |

In addition to differences in motorisation level, there are vital differences in the nature of the road safety issues. In India, only around ten per cent of road users killed are (four wheel) vehicle occupants, in the U.K. the figure is less than half while, in Australia, it is closer to 70% (11). Immediately, the potential of the different strategies stand in marked contrast.

The current, common method of choosing national targets, from superficial international comparisons, is therefore flawed. Targets have to be realistic if they are to be assigned to institutions in a performance based process. The preferred approach is to set targets "bottom up", aggregated from specific targets set for specific problems.

The draft New Zealand strategy discusses the need to set targets for each local government region, targets for specific road user groups such as motorcyclists, and targets for specific problems such as drink driving. If the specific targets are chosen on the basis of available evidence of potential effectiveness of the measures that would follow from the adoption of a particular mix of strategies, then a realistic aggregate target can be set with the component parts tied to the accountable institutions. For example a road authority might be set a target to reduce the number of fatalities resulting from collisions with roadside objects by x% ; the Police might be set a target to reduce the number of fatalities in urban speed related crashes by x%; and so on. This kind of institutional accountability for specific safety outcomes does not appear in any of the national road safety strategies examined.

## Selecting countermeasures and countermeasure programs

One of the most promising developments in the recent round of national planning for road safety is the frequent use of the literature on countermeasure evaluations to estimate the likely effectiveness of various measures. For example, the Australian strategy, which is seeking a 40% reduction in deaths per 100,000 population, estimates that 19% of it will come from road improvements, 10% from vehicle improvements, 9% from behaviour change, and 2% from ITS (1). This gives important, albeit macro, guidance as to relative priorities.

Implied in the strategies, however, is a dependence, for the final selection, on the benefit/cost approach. The Australian strategy states: "all safety measures that can be justified in terms of overall community benefits should be implemented" (1). The New Zealand draft strategy points out that the Land Transport Safety Authority is required by law to promote only activities that produce a net benefit to society (2). So the benefit/cost ratio is, in effect, mandated in New Zealand. It is important to understand the ramifications of this dependence. Fortunately, recent work for the Swedish government provides a valuable insight.

The Swedish government asked the Institute for Transport Economics in Norway to evaluate overall benefits and costs of three possible strategic packages that could be implemented over the decade to 2010 (12):

- The first was based strictly upon the benefit/cost ratio. What happens if we put in place all known measures where the evidence in the literature is that the aggregate marginal benefits

(safety, mobility and environment) over the ten year period are predicted to be greater than the aggregate marginal costs?

- Secondly, what happens if you implement the Vision Zero principle of minimising energy transfer at impact, particularly through speed control and road design modifications?

- The third package was the same as the first, but where every measure was to be implemented with the sort of intensity and resource that would be needed to get the maximum potential effect implied in the evaluation literature.

Table 2 contains the results.

**Table 2** (from Ref. 12): **Million SEK: 10 years 2002-2011**

| | **Strict c:b** | **Vision Zero** | **Max. Potentials** |
|---|---|---|---|
| **Benefits** | | | |
| - accident cost savings | 81,890 | 140,542 | 190,011 |
| - travel time savings | (2,925) | (142,284) | (109,237) |
| - veh. op. cost savings | 2,028 | (2,493) | (5,961) |
| - env. cost savings | 4,137 | 4,129 | 1,182 |
| - induc. traffic savings | 366 | (7,854) | (6,025) |
| | **85,496** | **(7,960)** | **69,970** |
| **Costs** | **68,436** | **384,514** | **667,992** |
| **Benefit/cost ratio** | **1.25** | **(0.02)** | **0.10** |

The strict benefit/cost program was estimated to lead to an overall benefit/cost ratio of 1.25, with major benefits in accident cost reductions, some added cost in increased travel time, some savings in vehicle operating costs, some environmental benefits and some reduction in induced traffic. However, the Vision Zero program, on a conventional benefit/cost basis was estimated to be negative. Nearly twice the savings in accident costs compared with the strict benefit/cost process of countermeasure selection, but with 50 times the added travel time costs, resulting from the constraining of traffic speeds There was estimated also to be some increase in vehicle operating costs, positive impacts on the environment and negative impacts on induced traffic, resulting, overall, in a negative cost/benefit ratio. Finally, the "maximum potentials" program was estimated to provide larger accident reduction benefits than even the Vision Zero program but also with large increases in travel time, substantial increases in vehicle operating costs, smaller environmental benefits and quite substantial disbenefits in induced traffic. The benefit/cost ratio was estimated at 0.10.

This is compelling evidence that further major gains in safety are available if nations are prepared to pay the mobility cost. The Swedish vision asserts that the price must be paid, that is the reduction of death/catastrophic injury over-rides other considerations. In the other strategies examined the governments would presumably accept the much lower reductions in

death in order to avoid the "loss" of mobility. However, this conclusion is tentative because the strategies do not explicity address trade-off decision making.

It is important they begin to do so. Moreover, the planners must anticipate the changing salience of the elements in the trade-off decision equations over the next decade. Congestion is going to get worse in Australia. Truck traffic is going to increase dramatically relative to car traffic making vehicle incompatibility more critical in crash outcomes. And so on. We need also to make explicit our decision making rules; if we wish to continue with the default benefit/cost ratio we need explicitly to say so and to enumerate the consequences.

First, however, it is necessary to ask whether we are measuring mobility, accessibility, sustainability, etc., in meaningful, consistent and comparable ways. Mobility, for example, is typically measured in terms of travel time, especially for freight and other commercial operators (sales staff, couriers, etc). With large numbers of vehicles and operators frequently losing very small amounts of time, the aggregate cost quickly mounts and dominates the benefit/cost ratio. However, to what extent are these changes really impacting the achievement of the economic and regional development goals? We need not only to develop comparable measures to aid the decision making process but we need methods to assess the practical impacts on the various objectives.

## Conclusion

Strategic planning for road safety, particularly at national level, is essential to provide governments, industry, institutions and the community with a sense of direction and with the means with which to make resource decisions. The current strategies are moving in the right direction, with a focus on the evidence of effectiveness of known measures and programs. Nonetheless, a guiding vision is generally absent and the strategic preferences are frequently implicit.

The context surrounding the trade-off decision process, through which the balance of efforts to achieve the varying objectives of the road transport system are made, is undergoing rapid change. At no time has the need to understand the shifting sands, and to estimate its impacts, been more important. There is an urgent need to make the process more strategic, without losing its current inclusiveness.

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# STRATEGIC DIRECTIONS FOR THE ROADS AND TRAFFIC AUTHORITY'S ROAD USER SAFETY PROGRAM

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*SOURCE: Cairney, P. (1999). RTA Road User Safety Program - Strategic Directions. Unpublished report. Haymarket, NSW: Roads and Traffic Authority.*

## CONTENTS

## EXECUTIVE SUMMARY

The period covered by Road Safety 2000, the Roads and Traffic Authority's first-generation road safety plan, is drawing to a close. The present document develops possible new strategic directions for Road Safety 2010, the proposed successor to the original plan. It is not intended as a draft plan in itself. The report identifies promising new initiatives and outlines the steps necessary to determine whether the initiatives are worth including in the new plan. A number of sources have been consulted in developing this report. These include: road safety plans of other jurisdictions in Australia; road safety plans from overseas; a workshop attended by Roads and Traffic Authority staff with a major stake in road safety; published literature and unpublished reports; and contact by e-mail and fax with persons with first-hand knowledge of key programs and research. The principal findings are:

- Application of known countermeasures is estimated to reduce fatalities by 46% by 2010.
- Only 20% of these benefits will derive from improvements to vehicles. The balance will come about from improvements to the road system and road user behaviour.
- The local government road safety program offers new opportunities for the delivery of road safety programs and activities.
- Judging by the strategic plans for other countries we have been able to review, they have little to offer New South Wales in terms of major issues which are not being addressed or which could be addressed or which could be addressed differently.
- Features of the United Kingdom's plan which are of interest are the claims it makes for the potential of drink-driving rehabilitation programs and motorcycle helmets. These developments should be monitored carefully. If the benefits can be clearly demonstrated, then they would be worth considering for adoption in New South Wales.
- In the United States of America, the Partnership for a Walkable America and the Safe Cities programs appear to be initiatives which align well with the Roads and Traffic Authority's future pedestrian activities and with the local government road safety program. It would be worth learning more about these initiatives and perhaps establishing on-going contact.
- Although they begin from different starting points, the Netherlands concept of sustainable safety and the Swedish Vision Zero philosophy result in a similar emphasis on differentiating between roads and road user behaviours (particularly speed) according to functional hierarchy. It remains to be seen whether either of the concepts can be regarded as an achievable goal rather than an ideal to strive for.

Major Intelligent Transport Systems (ITS) programs are unlikely to delivers significant benefits in the life of Road Safety 2010. Niche technologies involving seat belt ignition interlocks, limiting access to vehicles to qualified and approved drivers, and emergency alert systems could have a major impact on road safety in Australia. These should be pursued vigorously under Road Safety 2010. Geographic Information Systems (GIS) is a key technology with the power to revolutionise road safety management. So potentially important to road safety is the integration of crash, maintenance and enforcement data that responsibility for ensuring that the data bases are linked should rest with the road safety plan.

There would appear to be scope for revitalising speed enforcement by using more speed cameras and changing the operating procedures. It is suggested that this might follow a four-step process: major publicity to convince the public that small reductions in speeds in urban areas have large safety benefits; an increase in the number of speed cameras available and a commensurate increase in deployments; changes to operating procedures, providing police

agree as a minimum, these would be a cessation in the use of signs at speed camera sites and the imposition of a uniform threshold; and a second wave of publicity aimed focussed on general deterrence for speeding behaviour to coincide with the increase in units and changes in procedure. The trial introduction of 50 km/h precincts has been successful in reducing crashes. More councils are likely to introduce 50 km/h precincts. Speeds and crashes should be closely monitored to determine whether the gains reported from the trial can be sustained. A breakdown of reductions by crash and road user type would be useful.

In the area of drink driving, the main problem is now a group of hardened drink drivers who are not responsive to persuasion and either do not believe their driving is adversely affected by the amount they drink, or are prepared to accept the risk to continue with their life style. There may be scope for improving current enforcement procedures, for example, by mounting covert operations or modifying procedures to conform to best practice when the forthcoming Austroads project reports. Alcohol ignition interlocks may be a viable intervention for repeat and high BAC offenders. Interlocks have proved to be effective in reducing recidivism while the device is fitted to the vehicle. It is possible to run an alcohol interlock program using private contractors on a user pays basis with minimum government staff to administer and oversee the program. The longer interlocks are required to be fitted, the greater their impact in preventing re-offending and alcohol-related crashes is likely to be. The United Kingdom experience with rehabilitation programs looks promising, despite the poor outcomes from such programs in the past. The major experiment currently in progress in the United Kingdom should be monitored carefully and the findings carefully evaluated following it conclusion at the end of 1999.

There appear to be two major aspect to the fatigue issue, a rural problem and a metropolitan problem. Education and publicity should focus on the effects of time of day and the risk associated with inadequate sleep as well as hours of driving. The value of fatigue management programs in the road transport industry has yet to be convincingly demonstrated. These developments should be monitored carefully. New South Wales appears to be undertaking many of the actions recommended by the most recent inquiry into drugs and driving (in Victoria). An exception is in developing criteria to ensure that drug-driving offenders are drug free or that their driving is unlikely to impaired by current medication before their licences are restored.

With regard to pedestrian safety, the Pedestrian Access and Mobility Plans (PAMPS) are similar in many ways to developments in Victoria and the United Kingdom, and may be similar to developments which emerge in the United States. Developments in these other countries should be monitored as PAMPs are instituted across New South Wales. Further investigation of the crash reductions during the 50 km/h precinct trial should be undertaken to determine the effects on pedestrian crashes.

Other opportunities include:

- Improved motorcycle helmet standards may bring about substantial reductions in fatalities. This development should be carefully monitored.
- The evidence for double demerit points having a significant impact on road casualties during holiday periods is not convincing. Further comparisons with earlier years, not just the

year in which high crash rates were experienced during holiday times, are required to determined how effective the measure has been.

# INTRODUCTION

Road Safety 2000 has been the road safety strategy which has integrated and guided road safety in New South Wales throughout the 1990's. This strategy has served New South Wales well, with fatalities running at 576 in 1997 compared to 797 in 1990, and serious injuries running at 6,147 compared to 7,546 in that year. These reductions have taken place against a background of growing population, vehicle numbers, and road travel.

As the period covered by Road Safety 2000 draws to a close, the Roads and Traffic Authority is seeking to develop a new strategy to replace it. Roads Safety 2010 will serve a similar strategic role to that, year, building on the success of Road Safety 2010, remedying its omissions, capitalising on new knowledge and new technical developments and revitalising the program when required.

The present consultancy has been commissioned as first step in developing road user aspects of Road Safety 2010. It draws on developments in road safety and road safety plans elsewhere in Australia and in key jurisdictions overseas, the views of Roads and Traffic Authority road safety managers and other key road safety personnel critical assessment of current literature, and direct contact with key individuals and agencies.

The report summarises the outcomes of some aspects of the consultancy, then develops issues and recommendations in relation to the main road user behaviour issues, and concludes with a summary of the recommendations. The report is not in itself an outline plan, in that many of the established activities which will be continued in the new plan, in that many of the established activities which will be continued in the new plan receive little attention. The intent of the present report is to identify possible new directions for road safety activities and identify what needs to be done to come to a decision as to whether and under what conditions these initiatives are justified.

Key points are summarised at the end of each sections.

The sections which follow are:

- The context of Road Safety 2010;
- Developments in Australia;
- Road safety plans from overseas;
- Potential of new technologies
- Speeding;
- Alcohol;
- Fatigue;
- Pedestrians;
- Other opportunities.

# THE CONTEXT OF ROAD SAFETY 2010

Before considering three specific areas addressed by the plan, it is worth reflecting on the context in which the plan is to be put into effect. To consider the total context involves considering a wide range of factors relating to demographic, economic, social and technical factors and is beyond the scope of the present report which is intended to identify strategic directions for the plan. However, there are two areas which have very direct bearing on the plan which warrant consideration. These are the road safety gains which are likely to come about through the continued application of existing programs and changes in the delivery mechanisms through which road safety is likely to be delivered.

## 2.1 Road safety gains from existing programs and known countermeasures

Vehicle fleets and road infrastructure change relatively slowly over time. It therefore takes several years before some safety initiatives have a detectable impact. For example, in Australia, airbags are a recent innovation and although substantial proportions of new cars are equipped with airbags, it will take several years before this form of protection is generally available. Changes to the Australian Design Rules (ADRs) which specify the safety performance of vehicles are a Federal responsibility and therefore beyond Roads and Traffic Authority's control. However, the cumulative effects of past and future decisions about Australian Design Rules will have a substantial impact on road safety outcomes in New South Wales to the year 2010.

As a background paper for the National Road Safety summit in September 1998, Vulcan and Corben (1998) estimated the following reductions likely to be achieved through the continued application of existing programs by the year 2004:

- Vehicle safety features 8.8%
- Road improvements 12.8%
- Road user behaviour 14.0%
- Emergency medical services 5.0%

Adjusting to avoid double counting provided an overall estimated reductions in fatalities of 35%. These estimates take into account predicted growth in the vehicle fleet and travel.

Extrapolating these estimates to the year 2010 suggests that fatalities on Australian roads could be reduced by 46% to 955 by the 2010, or a fatality rate of 4.5 fatalities/100,000 population compared to the present national rate of 9.5/100,000.

At first sight, this might seem like an unduly optimistic prediction. However, it should be noted that countries such as the United Kingdom, Sweden and the Netherlands currently have fatality rates of approximately 6/100,000 persons. A fatality rate of 4.5/100,000 persons would therefore seem to be potentially achievable by 2010. However, only about 20% of these benefits will come from improvements from vehicles. Action must be taken at the state

level to ensure that the improvements in roads, road user behaviour and emergency services which can make these projections a reality are realised.

## 2.2 Delivery mechanisms

During the course of Road Safety 2000, the Local Government Road Safety program has evolved rapidly and has become established as a major element in the delivery of road safety in New South Wales. As of mid-1996, 50 councils had decided to allocate council funds to continue employing a road safety officer, one third of councils had either developed a road safety strategic plan or were in the process of doing so, 927 separate safety projects had been initiated at the local community level and these had attracted a high level of interest from local media (Roads and Traffic Authority 1998). This represents a considerable resource for implementing wholly local programs, and for reinforcing state-wide or region-wide programs with local activities and media coverage and community involvement. The local government road safety program has the potential to be an effective delivery mechanism for a wide range of programs as either the primary delivery mechanism or as a complement to centrally managed and delivered activities.

### KEY POINTS

- Application of known countermeasures is estimated to reduce fatalities by 46% by 2010.
- Only 20% of these benefits will derive from improvements to vehicles. The balance will come about from improvements to the road system and road user behaviour.
- The Local Government Road Safety Program offers new opportunities for the delivery of road safety programs and activities.

# DEVELOPMENTS IN ROAD SAFETY IN OTHER AUSTRALIAN JURISDICTIONS

## 3.1 Victoria

VicRoads, together with the Transport Accident Commission and Victoria Police, announced their program Road Safety Challenges and Strategies for the Next Decade in 1991. The fundamental aim of the program was to reduce Victoria's road toll by 30% by the year 2000.

The major focus for the road user behaviour initiative was in the following areas:

- Creating a greater sense of individual responsibility and care;
- Better delivery of road safety education at pre-school and school levels;
- Targeted road safety awareness campaigns;

- Review of effectiveness of existing road safety legislation;
- Reduction of high risk behaviours through education, enforcement and appropriate penalties:
- Promotion of higher safety performance standards through the driver licensing system;
- Monitoring of trends in road user behaviour and attitudes;
- Improved awareness of the vulnerability of motorcyclists, bicyclists and pedestrians; and
- Clearer accountability of commercial vehicle operators for the safe operation of their vehicles.

The use of the road behaviour measures were expected to contribute 5-10% toward the ten year goal.

The impetus of the ten year plan is the acknowledgment that road users and key sectors of the community must work together to achieve target reductions in both frequency of crashes and injury severity.

The *Safety First Victorias Road Safety Strategy 1995 - 2000,* was released in September 1995 (VICROADS 1995). It stated that a reduction in vehicle accidents has occurred since 1970 and is due in part to:

- Compulsory seat belt wearing in vehicles
- Compulsory helmet wearing for motorcyclists and bicyclists;
- RBT and the use of booze buses;
- Laws for holders of learner permits, probationary licenses and heavy vehicle operators, prohibiting blood alcohol levels above zero;
- Speed cameras; and
- On-the-spot penalties and automatic license suspension for some traffic offences.

The 1995 strategy focuses on 11 key issues and is said to currently under review in 1998 (Police contact, 1998). The 11 primary issues and principle objectives are shown on the preceding page.

| | | |
|---|---|---|
| **Drink driving** | Maintain this as socially unacceptable behaviour (RU) | |
| **Speeding** | Develop a culture of compliance with speed limits (RU) | Set appropriate speeds for road conditions (RE) |
| **Fatigue** | Develop a better understanding of its role, awareness of its dangers and implement appropriate behavioural (RU) and engineering programs | |
| **Restraint wearing** | Increase the level of seatbelt wearing (RU) | |

| | | |
|---|---|---|
| | and improve the fitting of child restraints | |
| **Road quality** | | Maintain and improve the overall quality and safety standards on roads, particularly in areas of high crash rates (RE) |
| **Drivers in high risk age groups** | Identify those most at risk and develop specific crash reduction programs (RU) | |
| **Motorcycle safety** | Reduce the risks involved in motorcycle travel (RU) | |
| **Bicycle and pedestrian safety** | Develop programs to make the roads safer for these groups (RU) | |
| **Heavy vehicle safety** | Increase the proportion of trucks with safety features that lessen the severity of collisions with lighter vehicles | |
| **Drugs and driving** | Determine the incidence of drug use associated with road crashes and develop appropriate countermeasures (RU) | |
| **Occupant protection** | Make vehicles safer for their occupants through support for better design and manufacture | |

The aim of the Victorian strategy is to reduce the incidence, severity and cost to the community of road crashes.

## 3.2 Northern Territory

The Northern Territory road safety strategy was based on the special needs of the Northern Territory while using the National Road Safety Strategy as its base (Department of Transport and Works, Northern Territory 1992).

The emphasis placed on road user behaviour encourages research into specific behavioural problems associated with driving in the Northern Territory environment. Targeted, will be the "at risk" groups identified within the research. The strategies included;

- Ensure road trauma is recognised by all as an important community health issue:
- Establish, develop, disseminate and evaluate programs of positive road safety education
- with emphasis on key target groups including:
- All school age children throughout the Northern Territory. Incorporating road safety as part of the curricula for both schools and teacher training units.

- Special programs for Aboriginal road users.
- Other target groups
- Encourage road users to accept prime responsibility for their own road behaviour, including the development and application of industry and community codes of practice.
- Encourage greater awareness of the extra hazards of long distance driving, and driving on unsealed
- Develop a rehabilitation framework for the treatment of drink driving offenders;
- Ensure adequate training is available for drivers and riders, wishing to obtain or upgrade a driver's/rider's licence, or other types of specialist training;
- Develop action plans for driving instructor training and assessment to ensure an adequate supply of qualified and competent driving instructors;
- Implement road user legislation which, while being nationally consistent, allows for realistic and credible enforcement throughout the Northern Territory;
- Ensure that responsible authorities use the principles of best practice when implementing measures for improved road user facilities in communities throughout the Northern Territory;
- Initiate programs (e.g., RBT including licence checks) with the aim of deterring the alcohol-affected persons from driving. This should include continuing to aim at an RBT ratio of at least one driver in every four each year, with increased emphasis on rural areas; and
- Maintain appropriate strategic based enforcement including the use of updated technology to ensure a high level of acceptable road user behaviour.

The strategic objective was to reduce accident frequency, severity, suffering and accident costs by improving the road user behaviour of drivers on Northern Territory roads.

## 3.3 South Australia

The strategic objectives of the South Australian '*Road Safety SA*' relate to the National Road Safety Strategy and were planned to be coordinated with it accordingly (Department of Transport, South Australia 1995).

The South Australian approach to **road user behaviour** was aimed fundamentally at developing appropriate road user behaviour and to change existing road user behaviour. The strategies were to:

- Promote effective school-based road safety education programs;
- Promote effective community road safety education programs;
- Foster the use of best practice in driver training;
- Develop effective countermeasures to influence people to cease road use while impaired by alcohol;
- Ensure that countermeasures continue to be developed for targeted unprotected road users: pedestrians, motorcyclists, cyclists and users of small wheeled vehicles;
- Develop effective countermeasures to influence road users to cease driving while impaired by fatigue and/or drugs (not alcohol) or other substances;
- Encourage appropriate speeds for the safe use of the road system;
- Ensure the effectiveness of driver and rider licensing practices;
- Encourage employers to promote safe driving practices by their employees;
- Enhance the safety performance of heavy vehicle drivers;

- Maximise the road safety effectiveness of legislation;
- Maximise the road safety effectiveness of enforcement; and
- Encourage positive incentives to increase safe road use.

## 3.4 Wester

The Western Australian road safety directions brings together five senior State ministers combining their efforts to ensure road safety is given high priority through education, policing, community awareness and a safer driving environment (Western Australian Government 1996).

Safe road user strategies consist of:

- Promoting the severe and potentially fatal consequences of drink driving, speeding, driving when fatigued and not wearing safety restraints;
- Publicising the penalties associated with dangerous driving practices and probability of apprehension;
- Promoting a community culture which makes dangerous driving practices, such as drink driving and speeding, socially unacceptable;
- Tackling persistent offenders with appropriate penalties and special education programs;
- Developing and distributing information on alternatives to dangerous driving practices, e.g., frequent stops and rest areas to reduce fatigue and the use of alternative transport options to remove the need to drink drive;
- Conducting targeted road safety education programs aimed at vulnerable road user groups;
- Making drivers more ware of the road user limitations and behaviour of children, elderly people, people with disabilities, bicycle riders and pedestrians;
- Encouraging the provision of appropriate facilities for vulnerable road users;
- Ensuring speed limits are appropriate in areas used by vulnerable road users;
- Ensuring that enforcement strategies are integrated with road safety publicity campaigns;
- Reviewing and supporting the introduction of appropriate new enforcement technologies;
- Supporting initiatives to increase enforcement levels where appropriate;
- Investigating innovative penalty systems including incentive schemes which reward safe user behaviour;
- Regularly reviewing traffic penalties;
- Improving the effectiveness of driver training and licence testing procedures;
- Promoting improved transport industry practices;
- Examining and implementing programs for driver and rider refresher and advanced training;
- Developing and implementing state-wide curriculum based road safety programs for pre-schools, primary schools and secondary schools; and
- Improving student driver education and training.

## 3.5 Queensland

Strategic directions for road safety in Queensland are contained in ***Key objectives and strategies of the Queensland Transport Strategic Plan 1998 - 2002*** (Queensland Transport 1998).

The strategic plan covers the whole spectrum of Queensland Transport's operations, and embraces a range of strategies aimed at the organisations wide range of functions. The key strategy for the purposes of the present report is Better Transport Safety and Security particularly those sections dealing with road transport safety. Road safety strategies and actions fall under two broad headings, monitoring safety performance, and improving user behaviour.

Actions under the first heading involves evaluation and reporting of road safety programs and reviewing road safety performance via a broadly representative road safety committee.

A wider range of actions follow under the strategy for improving road safety. They are:

- Implementing a speed management strategy which includes speed cameras and public education;
- Conducting media campaigns, with emphasis on alcohol, recreational or prescribed drugs, the introduction of blood tests and the risks of detection and consequences;
- Conducting media campaigns aimed at fatigue, restraint use, and sharing the roads with heavy vehicles;
- Facilitate implementation of fatigue management initiatives, including fatigue management pilot project, roadside rest areas and Driver Reviver programs;
- Implementing policies and programs to reduce drink and drug affected driving;
- Implementing, managing and evaluating the Safe School Travel Program, including reducing speeding close to schools, review of school zone system, and improving safety of major routes to school;
- Monitor the implementation of a new driving tests and engage in development work to complete the staged implementation of the test;
- Implement a pedestrian safety strategy;
- Implement a revised Motorcycling Licensing Policy;
- Implement National road rules in Queensland;
- Provide information and management services for the Queensland Police Random Road Watch program;
- Provide information to the Department of Main Roads and Local Government on road based crash countermeasures.

The performance indicators to evaluate how well these strategies are working are per capita incident rates, including fatalities, injuries and property-damage only incidents, and community perception rating of the level of personal safety and security on the transport system.

The goals set under this section of the plan are to reduce incident rates to achieve Australian best practice by 2002, and to achieve the lowest level of personal safety incidents and the highest sense of personal security on the transport system in Australia by 2002.

## KEY POINTS

- All States now have comprehensive road safety plans, in place, generally similar in scope and content to Road Safety 2000.

# ROAD SAFETY PLANS FROM OVERSEAS JURISDICTIONS

This proved to be a rather disappointing exercise. Very few plans appeared to be available, and there were few new ideas or much that was of direct relevance to New South Wales in any of them. The major plans and the key elements are dealt with in turn.

## 4.1 United Kingdom

In the United Kingdom, the Department of the Environment, Transport and the Regions (DETR) report *Road Safety Strategy: Current problems and future options* is the most useful of the documents studies (Department of the Environment, Transport and the Regions, 1997). Two general features of the report are particularly interesting. The first is the breakdown on expenditure on road safety in the United Kingdom, the second is the discussion regarding the setting of a target for the plan. There are in addition a few ideas for specific actions that are worth noting.

The breakdown of expenditure indicates that just over half the money spent on road safety in the UK is private expenditure in the form of road worthiness inspections and driver training, testing and licensing. Of the public expenditure, one half is spent on ambulance and hospital services, and rather more than a quarter is spent on enforcement. The Department of the Environment, Transport and the Regions has a budget equivalent to approximately A$300 million for road safety, which is distributed in the following manner:

| | |
|---|---|
| Local road safety schemes | $180 million |
| | Paid publicity $21 million |
| | Educational $6 million |
| | Research $27 million |
| | Vehicle inspectorate $45 million |
| | Road safety grants $1.5 million |
| | Highways Agency |
| expenditure on safety | $24 million |
| | research and |
| treatments | |
| | Departmental running |
| costs $12 million | |

By far the greatest item of expenditure is the investment in local road safety schemes (similar in many respects to Local Area Traffic Management), much of which is associated with the introduction of 20 miles per hour speed zones. The small amount for education activities covers development, production and promotion of road safety teaching materials, and does not include the delivery of the lessons which are paid for through the school budget.

The discussion on the role of target setting identifies two main functions for target setting. The target prompted detailed research and analysis which enabled the development of a strategy to meet that target. The target also had a motivating effect and gave road safety a much higher profile than previously. The target set in the previous plan was a one third reduction in all casualties by the year 2000. The target has met with mixed success. The number of killed and injured in 1995 was 39% less than the average for 1981 - 1985, but the number of slightly injured actually increased by 8% over the same period. This total is made up of a 29% drop in slight injuries to non car occupants, and a large increase in reported slight injuries to vehicle occupants (50%) which is proportionate to the rise in vehicle travel.

In determining areas for action, there are four main considerations:

- number and severity of casualties;
- casualty rates per head of population or per kilometre travelled;
- political profile of the area;
- likelihood of effecting improvements.

The potential policy measures need to be assessed in terms of:

- cost-effectiveness;
- affordability;
- practicality and enforceability;
- likely impact on the problem.

Road user types identified for priority in the plan include:

- pedestrians;
- cyclists;
- children;
- car occupants;
- motor cyclists.

Accident types identified for priority in the plan are:

- speed related;
- single carriageway rural roads;
- novice drivers;
- lorries, buses and coaches;
- driver impairment - alcohol, drugs and fatigue;
- vehicle defect related.

A wide range of benefits are discussed in the plan. Only those which are believed to be highly cost-effective are included, unless otherwise indicated.

**(a) Pedestrians**

As mentioned above, there is a major investment in local safety schemes, including traffic calming and 20 mph zones. Both measures appear to be highly effective in reducing pedestrian casualties – area wide schemes by 25%, and 20 mph zone by 43% – and are highly cost-effective.

Pedestrian front impact standards are also seen as another major contributor to pedestrian safety.

Although not judged to be particularly cost effective, review of pedestrian crossing facilities to ensure they are appropriately located and adequate for the demands placed on them is also advocated.

**(b) Cyclists**

Cycling is growing in popularity and being actively encouraged for health reasons. Unless cyclists are better protected, increases in cycling will generate increases in casualties. The provision of advanced stop lines, Toucan crossings (i.e., Crossings which cater for pedestrians and cyclists simultaneously) and traffic signals at roundabouts have all proved to be effective in reducing cycle crashes. There is limited scope for providing segregated cycle facilities. The introduction of compulsory helmet wearing is an element in the plan. Voluntary wearing rates are currently low, at 16%.

**(c) Child pedestrians and cyclists**

Child pedestrian casualties have declined in recent years due to increased car use but the UK still has high child pedestrian casualty rates compared to other countries. Measures put forward in the plan include child pedestrian training, recently shown to be effective, and safe routes to schools programs (note that this is based more on engineering treatments than is the case with the New South Wales program). Road safety education is also thought to be cost effective. Effort is presently going in to develop a revised curriculum, based on studies of the difference between child and adult pedestrian crashes in the United Kingdom and in Europe.

**(d) Vehicle Occupants**

No major increase in primary safety is foreseen in the near future, although improvements in lighting and braking systems may make a minor contribution. Intelligent transport systems are not seen as a major contributor to safety in the immediate future, although their long-term contribution is recognised. Continuing improvements in occupant protection are expected to be delivered through the New Car Assessment Program. Front and side under run guards for heavy goods vehicles are regarded as a cost-effective treatment that will benefit car occupants and cyclists. It is estimated that 20% of motorcycle fatalities (2.5%) of all fatalities could be prevented by better helmets. Research into an improved design is under way. European Community arrangements for standardisation may be an impediment to early adoption.

**(e) Excess speed**

The United Kingdom lags behind Australia in the use of speed cameras and has up till now been largely dependent on fixed installations, but is moving to introduce more mobile cameras. As described above, 20 mph zones in urban areas have been highly effective. They involve large outlays for engineering works to create an environment where 20 mph is

perceived as an appropriate speed, but are highly costs effective. There is a proposal to reduce speed limits on single carriageway rural roads (i.e., two lane two way rural roads) from the current 60 mph (96 km/h) to 50 mph (80 km/h). This is estimated to save 12% on fatalities and serious injuries on these roads.

**(f) Novice and other high-risk drivers**

It is proposed to raise the minimum age at which the driving test can be taken from 17 to 18, reducing casualties amongst novice drivers by 15%. It is also planned to improve the driving test by including a hazard perception component and improving the theory test by developing a computerised skills test to replace the present knowledge-based test. It is also proposed to raise the standard of driver training, in part by raising standards in the driver training industry and in part by providing guidance to parents in giving learner drivers greater opportunities to practice driving under supervision in a range of circumstances.

**(g) Driver impairment**

The United Kingdom would appear now to have a drink-driving problem comparable to that of New South Wales: 7% of drivers killed having illegally high BACs (20% in New South Wales). It is proposed to reduce the legal maximum BAC from 80 mg/100 ml to 50 mg/100 ml. Some faith was also expressed in improving the High Risk Offenders (HRO) scheme. Results of a review should be available by now and are being sought. More needs to be learned about the likely effects of self-test breathalysers before they can be recommended. Alcohol interlocks do not feature in the document. It was recognised that it was difficult to find a way forward with drugs. Possible options for future developments include developing roadside screening, better training of police, publicity and better labelling of pharmaceuticals, but no clear direction is developed.

**(h) Other measures**

Other measures put forward in the plan and which are regarded as likely to yield benefits are:

- Education and publicity regarding vulnerable road users and driver fatigue;
- Better organisation of traffic policing across the jurisdictions of individual forces;
- Funding traffic enforcement from the DETR budget rather than the Home Office general policy budget.

More detail on countermeasures proposed to reduce drink driving are contained in a consultation paper, Combatting drink driving: the next steps (Department of the Environment, Transport and the Regions, 1998). The issues for discussion fall under three broad headings:

- Improving enforcement;
- Improving the system of offences and penalties;
- Education, publicity and information.

While many of the discussion points relate to measures which are already implemented in New South Wales and most other Australian Jurisdictions, such as widening police powers to require a breath test, lowering the permitted maximum blood alcohol concentration, and labelling alcohol content in terms of standard drinks and publicising guidelines for safe alcohol consumption when driving, two points are of particular interest.

Reviewing the available evidence, the consultation paper suggests that it too early to decide whether alcohol ignition interlocks have a place in the United Kingdom's enforcement program, and that overseas experience should continue to be monitored.

The consultation paper also outlines the trial rehabilitation programs described briefly above. Following the recommendations of a review of traffic law, legislation was passed enabling a large-scale experiment to determine whether offenders who attended rehabilitation courses were less likely to re-offend than a control group of similar drivers. Successful completion of the course resulted in a 25% reduction in the period of disqualification (normally 3 months off a 12 month disqualification).

Commencing in 1993, the experiment has been successful in improving knowledge about the effects of alcohol on driving, and in reducing repeat offences. The experimental period has been extended from the original termination date at the end of 1997 to the end of 1999, and the geographical coverage of the treatment areas greatly extended.

While rehabilitation of drink drivers has traditionally, achieved low success rates, the UK experiment would seem to be worth watching carefully, particularly as the consultation paper claims that high risk offenders and middle aged drivers are among those who are re-offending less as a result of the program. Other approaches have had little success with these groups. More information about the success rate for the course, the crash reductions which can be attributed to it and the cost of the crashes saved in relation to the costs of providing the courses are required, as well as further detail about the aims, structure and content of the courses themselves, before it can be decided whether the courses are likely to be appropriate for new South Wales.

## 4.2 National Highway Traffic Safety Administration (USA)

The National Highway Traffic Safety Administration (NHTSA) Strategic Plan is interesting in that it is presented in the form of the Haddon Matrix, a 9-cell matrix defined in terms of Human, Vehicle and Environment factors which affect events in the Pre-crash, Crash or Post-Crash Phases. The plan would seem to have little to offer New South Wales as it is a plan to coordinate efforts in the various States within the United States of America, many of which lack basic road safety laws which have become widely accepted in the rest of the developed world, such as compulsory seat-belt wearing and motorcycle helmet wearing laws. The strategies to deal with individual problems are generally expressed in terms of goals for casualty reductions, actions to coordinate or encourage State activities or to engage new players in road safety, and research into new countermeasures. The principal features of the plan which are of interest to New South Wales are:

**(a) Pre-Crash - Human**

- *Alcohol and drugs* - implement programs with states, communities and national organisations, strengthen partnerships, promote legislation and support action.

- *Aggressive driving and speeding* - encourage integration of speed enforcement with other enforcement activity, promote use of automated equipment, technical assistance and demonstration projects targeting aggressive drive, and research into role of speeding and aggressive driving in crashes, and new countermeasures.

- *Pedestrians* - Combination of public information, enforcement, engineering and outreach strategies. Research into effective countermeasures, focussing on young, elderly, ethnic minorities and alcohol-impaired pedestrians. A notable initiative is the emergence of *Partnership for a Walkable America*, a national effort embracing the public and private sectors committed to promoting the changes needed to make more placed readily accessible by foot in an attractive and safe manner.

- *Fatigue and inattention* - priority is better understanding of the problem, especially the identification of high-risk groups, legal drugs which cause drowsiness, and fatigue detection devices. Public education to target high risk groups.

- *Driver Licensing* - Technical assistance in standardising and linking state licensing data bases, detecting fraudulent licensing and establishment of a national data base of driver who lose their licences.

- *Older driver safety* - focus is on enhancing older drivers' ability to drive safety, and initiatives include technical assistance to States in screening, testing and evaluation, developing model procedures for making licensing decisions, and research into operational procedures and increasing crash survivability among older drivers.

- *Young drivers* - support State initiatives for better education and licensing procedures, support legislation for graduated licensing and BAC of 0.02 for under 21 year olds.

**(b) Crash – Human**

- *Seat Belts* - action to encourage seat belt wearing through public-private partnerships, legislation, enforcement and education. Similar action on child safety seat use.

- *Advance restraint systems* - continued research to improve protection offered by air bag/seat belt/child safety seat systems and to reduce injuries caused by air bad deployment.

**(c) Crash - Vehicle**

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## 4.3 Towards a sustainable safe traffic system in the Netherlands

This is not so much a road safety strategy in the forms of spelling out specific problems and proposed countermeasures as the expression of a philosophy as to how road safety issues should be dealt with. The document notes that although the Netherlands ranks as a very safe

country in terms of road use, the expectations of the government's road safety plan had not been met. The document considers road safety from the point of sustainable development, and is particularly focussed on inter-generational aspects of sustain ability. In essence, sustain ability means meeting today's needs without burdening future generations with the unwanted consequences of our present consumption and production methods. Applied to the road system the concept of sustain ability means that we should not pass on to the next generation a road transport system which inflicts high numbers of deaths and injuries, and continue to tolerate a situation in which we respond to previous thoughtlessness, lack of expertise and unwillingness to make appropriate investments in safety.

There is therefore a need to upgrade the road system and to eliminate the design faults of the past if a sustainable safe road system. Three safety principles are the key to achieving this:

- prevent unintended use (i.e. use which is inappropriate to the function of that road);
- prevent large discrepancies in speed, direction and mass at moderate and high speeds (i.e. reduce the possibility of serious conflict);
- prevent uncertainty amongst road users (i.e. enhance the predictability of the road layout and traffic movements).

These principles are most successfully applied on motorways and 'woonerven' (i.e., special low speed zones for mixed use in residential areas).

These principles must be applied to cater for a flow function, an access function and a residential function. The requirements for these functions are very different, and so the physical form of the areas given over to these functions should ideally be very different as well.

The document suggests that considerable progress could be made towards achieving a sustainable safe road transport system over a thirty year period, and that this would be affordable. A problem with implementing the approach is that the savings do not necessarily come back to the bodies making the original investments.

## 4.4 The Swedish Vision Zero approach

A different approach has recently been articulated in Sweden. Like the Netherlands view of sustainable safety, the idea has been developed to the stage of a guiding philosophy rather than a definite action plan.

The essence of the concept is that, in the long run, it should be unacceptable for anyone to be killed or seriously injured while using the road transport system (Belin, Hohansson, Lindberg and Tingvall 1997). The basic parameter in designing the road transport system ought therefore to be the mechanical impact (or more emotively level of violence) that the human body can stand. It is envisaged that this can be achieved through a clear allocation of responsibility along the following lines:

1. The designers of the system are ultimately responsible for its use, operation and safety.

2. Individual road users are responsible for following the rules set by the system designers.

3. If road users fail to follow rules due to a lack of knowledge, acceptance or ability, or if serious injuries do occur, it is the responsibility of the designers to change the system to accommodate the road user behaviours or eliminate the injuries.

   It is reasonable to question whether Vision Zero is an unrealisable ideal or an achievable long-term goal, and whether the philosophy ought to explicitly recognise the possibility of modifying some road user behaviours rather than re-configuring the system to accommodate minorities who engage in behaviours the community generally finds unacceptable, eg drink driving. However, it is likely that Vision Zero, if generally adopted could have an inspirational role in encouraging high level of safety in road transport.

   The authors spell out the roles for the players in road safety - citizens, decision-makers, public authorities and mass media. In fact, the roles required of them under Vision Zero look rather similar to the roles we would like them to play under existing philosophies, except there would perhaps appear to be less emphasis on authorities controlling aberrant or illegal behaviours then might be expected under existing plans, and more emphasis on the individual being motivated to be informed about traffic safety and obey traffic laws.

   Adopting the bio-mechanical limits of the human body as the basic design parameter inevitably implicates speed as a major factor in the management of the road system. Operating speeds should be set by the technical standards of vehicles and their protective systems, and the standards of roads, roadside and roadside furniture. The safer roads and vehicles become, the higher the operating speeds which can be effectively. Although the authors do not make this point explicitly, this philosophy does very strongly imply different speed regimes for different road functions along the lines proposed in the plan for the Netherlands. Speeds must be slower where there is exposure to unprotected road users, and can be highest in circumstances where there are only vehicle occupants and no conflicting traffic movements.

## KEY POINTS

- Judging by the strategic plans for other countries we have been able to review, they have little to offer New South Wales in terms of major issues which are not being addressed or which could be addressed differently.

- Features of the United Kingdom's road safety plan which are of interest are the claims it makes for the potential of drink-driving rehabilitation programs and motorcycle helmets. These developments should be monitored carefully. If the benefits can be clearly demonstrated, then they would be worth considering for adoption in New South Wales.

- In the United States of America, the Partnership for a Walkable America and the Safe Cities programs appear to be initiatives which align well with Roads and Traffic Authority's future pedestrian activities and with the Local Government Road Safety Program. It would be worth learning more about these initiatives and perhaps establishing on-going contact.

- Although they begin from different starting points, the Netherlands' concept of sustainable safety and the Swedish Vision Zero philosophy result in a similar emphasis on differentiating between roads and road user behaviours (particularly speed) according to functional hierarchy. It remains to be seen whether either of the concepts can be regarded as an achievable goal rather than an ideal to strive for.

# POTENTIAL OF NEW TECHNOLOGIES DURING THE LIFE OF ROAD SAFETY 2010

There are at least two forms of technological advance which are likely to have a major impact on road safety and how it is managed during the life of Road Safety 2010. If this new road safety plan is reach its full potential, then these new technologies need to be explicitly recognised in the plan, courses of action established and, to the extent that this is possible, goals for the incorporation of these new technologies established.

## 5.1 Intelligent Transport Systems

Intelligent Transport Systems (ITS) is the name collectively given to the application of information and communications technology to the management of transport systems with the objectives of making them more efficient and safer. In the longer term, ITS is likely to have a major impact in reducing congestion and improving traffic flow, in reducing emissions and other environmental impacts, and in reducing collisions.

At time of writing, ITS is making the transition from something that is being planned for and talked about to something that is actually happening on the ground. In Australia, Advanced Traveller Information systems are in development in many cities. The Melbourne DRIVE TIME system has been in service for more than two years, providing drivers with real-time estimates of travelling to different points on the freeway system derived from measurements of traffic speed at critical points on the system. Electronic toll collection is well advanced for the Sydney Harbour Crossings and for the Melbourne City Link project. Many commercial vehicle operators and taxi fleets are taking advantage of Commercial Vehicle Operation technologies through GPS based dispatch and tracking system. An Advanced Public Transport System which will allows accurate tracking of buses and which generates up to the minute advice to travellers waiting at the bus stop has been implemented for the Perth Central Area Transport (CAT) system. A similar system covering a wider geographic area is being considered for Melbourne.

None of these systems are likely to have major direct impacts on safety but they are tangible evidence of the progress made in ITS, and a reminder that many more sophisticated ITS products are likely to become available during the life of Road Safety 2010. Many of these are likely to have considerable safety benefits, such as variable speed controls, adaptive cruise control, and collision avoidance technology.

It must be recognised that most of this advanced technology will be developed by global consortia of major companies, regulated through international standards, and driven by the demand of the global marketplace. Road Safety 2010 is therefore unlikely to have a role in determine the nature or pace of these developments. However, it is worth ensuring that New South Wales road users are early beneficiaries of these developments. It would therefore be appropriate to ensure regular monitoring of ITS programs is a feature of Road Safety 2010, and that action plans be developed to encourage early adoption of promising developments as they become available. Regular reviews of safety-related developments in ITS (say perhaps at two-year intervals) would be one way of achieving this. These reviews could be achieved in a number of ways, such as commissioning a review from ITS Australia or independent consultants, a survey of relevant persons or organisations, or an open forum with invited experts.

There are however areas where relatively modest ITS developments could have a major impact on the road toll in New South Wales and the rest of Australia. These do not seem to feature to any large extent in the ITS programs overseas. It is suggested that a more pro-active approach to these issues would be appropriate for Road Safety 2010, ideally as part of a nationally coordinated strategy.

The three issues concerned are non-use of restraints, unlicensed driving, and better emergency response systems.

### 5.1.1. Non-use of restraints

Despite high restraint wearing rates, approximately 19% of vehicle occupants killed in new South Wales were not wearing restraints (RTA 1993). To a large extend, this problem could be overcome by the introduction of seat belt interlocks, systems which prevent the vehicle from being started unless every occupied seat has a fastened seat belt. While this will not eliminate non-wearing, due to factors such as deliberate strategies to achieve non-wearing, and excess occupants for the seating positions with restraints, it is likely to make a major impact. While the most appropriate route for developing these devices is via the ITS Australia in the ADR process, Road Safety 2010 could have a useful facilitating role, eg by supporting studies of the circumstances applying in crashes where non-wearing is a factor and the likely benefits of restraint interlocks, studies of the likely penetration rate of interlocks fitted to new vehicle, and extensive field trials and demonstration projects involving prototypes and early production versions.

### 5.1.2. Unlicensed driving and riding

Four percent of fatal crashes in New South Wales involve unlicensed drivers of motorcycle riders. Of the unlicensed drivers, 54% had never held a licence for the type of vehicle they wer driving, 34% were driving while disqualified, usually for alcohol or speed offences, and 11% had licences which had expired. Ninetteen percent of the motorcyclists involved in fatal accidents were unlicensed. Of these, 72% had never held a license for a motorcycle, 9% were riding outside their license restrictions, and 16% were riding whilst disqualified.

These problems could be overcome to a large degree by better control of access to the vehicle, either by means of a smart license or the use of a biological identifier to restrict access to

authorised individuals. Either of these developments would make unauthorised use of the vehicle extremely difficult.

As with the restraint interlock, such devices would most effectively be developed through a national program via ITS Australia in the Australian Design Rule process. Road Safety 2010 could again have an important role in promoting studies which would help better understand the issue and likely benefits, and promote trials and demonstrations of the technologies.

### 5.1.3 Emergency response system

On rural roads, a major factor determining the outcome of the crash is the length of time it takes for emergency services to arrive on the scene. A long interval before the crash is reported may contribute to long delays. One way of overcoming this would be to equip vehicles with an emergency response system combining cellular phone and global positioning system technology backed by a control centre. Capable of automatic operation in the case of a severe impact, the system would automatically put through a message, complete with the vehicle's global positioning system coordinates, to a control centre which can then dispatch help to the correct location, with or without speaking to the vehicle's occupants. At time of writing, at least 22 companies were offering this type of service in North America.

At time of writing, NRMA and RACV are about to jointly launch such service with some elements of an emergency response system. Full details are still to be formally announced, but it is clear that the system will have a global positioning system/mobile telephone basis that will be geared primarily towards the roadside assistance services offered by the motoring organisations, and that it will initially cover only the Sydney and Melbourne metropolitan regions. The appropriate course of action in relation to this development would be to keep a close watching brief, to monitor and evaluate results and , assuming a positive outcome, encouraging the spread of this technology beyond the capital cities where it is likely to delivery the greatest safety benefits. Community road safety programs could perhaps be an effective way of promoting the technology in non-metropolitan areas.

## 5.2 Geographic information systems

Geographic Information Systems (GIS) are a form of data base which allows the easy storage, manipulation and retrieval of spatial information, and ready linkages to other data bases, including geographic information system data bases. It may conveniently be thought of as a sort of electronic map, which allows other maps to be overlaid, thus allowing different types of information to be directly related, for example, road width to roadside condition may be collected separately, then displayed on the same geographic information system, on which individual crashes may be located, or crash rates for different stretches of road displayed. Increasingly, road authorities and organisations with a stake in road safety are conducting core business via geographic information systems. For example, asset registers, road condition surveys and maintenance activity are increasingly being stored and retrieved by geographic information systems.

Global Positioning system (GPS) technology also plays a role in location-based records. Global positioing systems technology enables a receiver (usually on a vehicle) to be

accurately located anywhere on the planet's surface, and an accurate record of a vehicle) to be accurately located anywhere on the planet's surface, and an accurate record of a vehicle's movements to be created. This information can itself be used to generate maps, or to relate movement or activity patterns to existing maps. Global positioing systems technology is a key element in the automatic dispatch systems currently used by taxi and commercial fleets. In the near future, it seems likely that most Police forces will be similarly equipped. This then provides an opportunity for comparing spatial patterns of crashes with patterns of enforcement in a way which will allow much better matching of resources to problems. For example, alcohol-related crashes can be related to patrol activity at high alcohol times, RBT activity, and intercepts of alcohol-affected drivers. At least two police forces are already carrying out speed camera enforcement programs which involve global positioning systems registering of crashes, approved camera sites, and enforcement activity at these sites. The same principles apply to the management of aspects of road maintenance such as skid resistance and line marking.

The key to this potential revolution in the management of safety resources is integration - geographic information systems and global position9ing systems technologies are not being adopted because they allow better management of road safety, but because they are more efficient. If safety management is to benefit from these developments, it is essential that they are monitored and that a strategy is in place to ensure integration. As a minimum, this should ensure that all stakeholders are committed to the same software platform. While it is to be hoped that integration would be a primary focus of any corporate or government strategy to promote these technologies, unless there is clear acknowledgment of safety as a key stakeholder there is a risk that safety's needs will not be adequately addressed by the process.

Road safety will be unable to benefit from these advances in management unless crashes are geocoded to enable them to be located on GIS. Geocoding of crashes would also do much to establish road safety as a *bona-fide* stakeholder in GIS. It would therefore seem to be advisable to establish goals for the progress of geocoding during the early life of the plan, and to ensure the necessary resources are committed for this purpose. It is beyond the scope of this consultancy to suggest what the actual goals should be, but it is suggested that the actual form of the goals may be along the lines of all current fatal and serious injury crashes back to 1997 by end of year three (assuming it is considered worthwhile to code retrospectively).

Making crash data available through geographic information systems is likely to have an effect in motivating road safety at the local level and in ensuring better-targeted activity in Local Government Road Safety programs.

Since there is no guarantee that the linkages between different geographic information system databases will happen otherwise, it is suggested that consideration be given to making this type of integration a key goal for Road Safety 2010. In view of the potential for this data base integration to revolutionise the management of road safety, and that road safety is likely to be one of the greatest beneficiaries, allocation of this responsibility to the road safety plan is justified.

## KEY ISSUES

- Major ITS programs are unlikely to deliver significant benefits in the life of Road Safety 2010.

- Niche technologies involving seat belt interlocks, limited access to vehicles to qualified and approved drivers, and emergency alert systems could have a major impact on road safety in Australia. These should be pursued vigorously under Road Safety 2010.

- Geographic information system applications is a key technology with the power to revolutionise road safety management. So potentially important to road safety is the integration of crash, maintenance and enforcement data that responsibility for ensuring that the databases are linked should rest with the road safety plan.

# SPEEDING

## 6.1 Current status

More crashes are associated with speeding than with any other behaviour. The percentages are 36% for fatal crashes and 19% for serious injury crashes. There has been no progress in reducing speed-related crashes in recent years, with both fatal and serious injury crashes marginally higher in 1996 and 1997 than 1993, although they did fall slightly in 1994 and 1995.

Speeding behaviour therefore represents a major challenge for road safety over the next few years. It currently represents the single greatest road safety problem and there has been no reduction in speed related fatal and serious injury crashes in recent years. In many ways, the situation is similar to the situation with alcohol around 1980 - there is ample evidence of the role of excessive speed in crash causation and outcome, there is some public support for the nation of lower speeds in many circumstances, and technology which is available for speed management has not been used particularly effectively to date. There is also widespread public scepticism or even disbelief that lower speeds would reduce crash involvement and some suspicion that any attempt at more vigorous enforcement is imply government revenue raising. The workshop made the case very clearly that the credibility of speed limits and the link between speed and crashes was an essential issue to be dealt with, without which any attempt to enforce speed limits more rigorously was likely to run into resistance from the community.

### 6.2 Revitalised speed enforcement

There is a marked contrast in speed enforcement practices in New South Wales and Victoria. Although the overall level of resource commitment is roughly the same, the level of camera enforcement is much higher in Victoria (54 cameras vs 18 for New South Wales), the tolerance permitted in Victoria is 10 km/h while the tolerance in New South Wales is decided by the officer responsible for operating the camera according to his perception of circumstances at that time and place, and signing of all enforcement sites, warning of the possible presence of speed cameras.

Speed cameras differ from other forms of speed enforcement in that they are able to process much greater numbers of speed offenders than methods which require vehicles to be intercepted and are able to work on parts of the road network where intercepting offenders would be dangerous. In Victoria, the number of speed offences detected by camera is.....xxxx

Both States are similar in that sophisticated GIS mapping of crashes and speed enforcement activity is being used to assist decisions regarding deployment of speed cameras. At this stage, the Victorian system would seem to have been formalised to a great extent on a computerised information system which combines information about crashes, the location of camera sites and camera activity at these sites, and trends din accident patterns at each site.

Research by Monash University (e.g., Rogerson, Newstead & Mullan 1994) has demonstrated that crash reductions do occur in the vicinity of camera enforcement site. Data from the Victoria Police show that there has been a reduction in the percentage of motorist driving past the cameras who are driving fast enough above the limit to be prosecuted. It is not known whether these latter figures represent a genuine reduction in speeds across the network, or whether they reflect drivers becoming accustomed to camera deployments at particular sites, or the ability of drivers to better detect the presence of cameras. It is believed VicRoads has recently commissioned an extensive study of vehicle speeds as an independent check on speed trends, but this work has not yet been released.

Delivery of speed enforcement is the responsibility of the New South Wales Police Service, and therefore not under the direct control of Roads and Traffic Authority. However, since road safety in New South Wales is acknowledged as a partnership between Roads and Traffic Authority, the New South Wales Police Service, and other major shareholders, there is some prospect that Roads and Traffic Authority may be able to persuade Police to change operating procedures as part of a major reconsideration of speed enforcement procedures. This would seem to be an essential element in Road Safety 2010 in view of the lack of progress in consistently reducing the number of speed related crashes in recent years. The elements in such a re-vamped program would probably include:

- Major publicity to convince the public that small reductions in speeds in urban areas have large safety benefits. Convincing Australian research is now available to make this point clear, and advertising in Victoria has been developed to graphically illustrate this point.
- An increase in the number of speed cameras available and a commensurate increase in deployments.
- Changes to operating procedures, providing Police agree. As a minimum, these would be a cessation in the use of signs at speed camera sites and the imposition of a uniform threshold.
- A second wave of publicity aimed focussed on general deterrence for speeding behaviour to coincide with the increase in units and changes in procedure.

### 6.3 50 km/h on local streets

New South Wales has recently concluded a trial of 50 km/h speed limits on local streets (Roads and Traffic Authority, 1998). Twenty-six metropolitan and rural councils participated. The results were generally encouraging, with a reduction in speed of between 1 and 2 km/h being achieved in most areas. Casualty crashes and casualties fell by 7% more in the trial areas than they did outside the trial areas in New South Wales. Unfortunately, no

breakdown by crash type is presented in the report. The report points out that is uncertain whether this reduction would be sustainable in the long term.

Community support for a 50 km/h speed limit on local streets is widely supported, but local councils hold diverging views, with councils in Sydney and on the coast being most in favour of a 50 km/h local street speed limit, and rural councils elsewhere in the State being most opposed.

The report recommends that all councils be invited to establish 50 km/h precincts on local roads, with Roads and Traffic Authority help to be made available to assist in the choice of areas. Roads and Traffic Authority will bear the cost of signing the 50 km/h precincts. Forty-five percent of councils support a 50 km/h speed limit on local streets, so it is possible that 50 km/h precincts may quickly become very widespread. If a 7% reduction in crashes can be achieved, then the safety benefits will be substantial.

It is recommended that further work be undertaken to provide a breakdown of crash reductions following the introduction of 50 km/h precincts.

### 6.4 Truck speeds

Truck speeds are of special concern, due to the mass of the vehicle and the consequent energy exchange in the event of the collision, the higher centre of gravity and lesser stability especially when cornering, and the intimidating impact of large vehicles travelling at high speed. Urban truck speeds can be handled by normal enforcement procedures. In view of the more serious consequences of truck crashes (as manifested in their higher costs) it may be worth considering giving additional weighting to truck crashes in the selection of speed camera and other enforcement sites.

In the workshop, it was suggested that the Safe-T-Cam system was being used only for the enforcement of driving hours. Although the system had the potential to be used to check the average speeds implied by the travel times between Safe-T-Cam installations, this was not being done at present. It should be recognised that, except over relatively short distances across flat terrain, the Safe-T-Committee system would appear to be unlikely to produce evidence of excessive speed, based on journey times. On most journeys, there are sufficient gradients and sections requiring lower speeds that the average speed for the journey would be unlikely to exceed the limit. However, it would be worth investigating average journey speeds using Safe-T-Cam to give a different perspective on possible enforcement priorities. Routes which produce average speeds close to 100 km/h imply that legal maximum speeds may be exceeded on parts of the journey. Whether or not this is an enforcement priority will depend on the nature of the terrain, the actual excess speeds on parts of the journey, the number of trucks using the route, and the safety performance of the route. Individual vehicles or firms which consistently have short journey times could also be targeted for on-road enforcement.

Australian Design Rules ADRs) require that all trucks produced since 1988 over 12 tonnes gross vehicle mass be fitted with speed limiting devices which limit the speed to 105 km/h. There is at present no formal requirement for checking that the maximum speed that speed limiting devices will permit.

Recent nation-wide regulations promulgated through the National Road Transport Commission requires that a speed limiter be fitted or an existing one calibrated only after a second offence in which the truck is detected travelling over 115 km/h. Driver fines apply to both the first and second offences. This lenient approach combined with the lack of regular checks means that it is

likely a large proportion of the truck fleet is limited to travel at speeds considerably greater than the 105 km/h specified in the Australian Design Rules. Although it is not clear at this point how it could be achieved, the development of procedures to ensure compliance with the Australian Design Rules for speed limiting as part of the road worthiness inspection might be worth considering.

## KEY POINTS

- There would appear to be scope for revitalising speed enforcement by using more speed cameras and changing the operating procedures. It is suggested that this might follow a four-step process:

- Major publicity to convince the public that small reductions in speeds in urban areas have large safety benefits.

- An increase in the number of speed cameras available and a commensurate increase in deployments.

- Changes to operating procedures, providing Police agree. As a minimum, these would be a cessation in the use of signs at speed camera sites and the imposition of a uniform threshold.

- A second wave of publicity aimed focussed on general deterrence for speeding behaviour to coincide with the increase in units and changes in procedure.

- The trial introduction of 50 km/h precincts has been successful in reducing crashes. More councils are likely to introduce 50 km/h precincts. Speeds and crashes should be closely monitored to determine whether the gains reported from the trial can be sustained. A breakdown of reductions by crash and road user type would be useful.

# DRINK DRIVING

### 7.1 Current status

The introduction of Random Breath Testing and associated publicity and other countermeasures in New South Wales in late 1982 had a dramatic impact on alcohol-related deaths and injuries. Alcohol countermeasures have continued to have an impact since that

time, with the number of drivers and riders killed with illegally high BACs approximately 40% of the pre-1982 total. There are signs that the reduction in the number of fatalities may have levelled off in the last five years, but the number of serious injuries continues to show a steady decrease, falling 11% between 1993 and 1997. This is equivalent to a reduction of approximately 15 per year.

Illegally high BACs are involved in 20% of fatal crashes and 13% of serious injury crashes.

At the workshop, concern was expressed about a large group of drivers which research had identified as being resistant to the message that the amount they drank affected their crash risk and believed they could evade police alcohol enforcement activity. This group is identified in the Roads and Traffic Authority Brief to Marketing Branch, Drink-Driving Campaigns - 1997/98. The primary driver target group for drink-driving material continues to be male drivers aged 17-40. The high risk group is identified as:

- having a poorer response to countermeasures
- much less motivated by the consequences
- most likely to drink-drive
- judge themselves less affected by alcohol
- respond to some degree to the treat of enforcement.

Recidivism is another aspect of the hard core drink driving problem. The Victoria Parliament Social Development Committee estimated in a 1988 report that one fatal crash in twelve (ie 8.5%) involved a drink-driver with at least one previous conviction for a drink-driving offence (Cited in Smythe and Morns 1996). The same paper cities a number of sources which suggest the probability of drink drivers re-offending approximately 20% over a four year period.

If further gains are to be made in reducing drink driving and alcohol-related crashes then it would seem that this is a key group to target. Possible strategies for addressing this issue include:

**(a) Covert enforcement operations**

The Victoria Police have been using such operations, particularly in country towns, resulting in approximately 3,000 arrests per annum for drink-driving offences in Victoria is approximately 18,000 per annum). A program such s this may be effective in persuading core drink-drivers that the chances of being caught had changed, particularly if combined with appropriate publicity. Before such a program could be included as part of the strategy, it would need to be demonstrated that it constituted effective use of Police time, and that it was an acceptable mode of operation by both the Police and the public.

**(b) Optimisation of RBT and other alcohol countermeasures**

An AUSTROADS brief is about to be released calling for proposals to carry out research to determine best practice in alcohol enforcement, similar to a current project to determine best practice in alcohol enforcement. It is anticipated that a report would be available in time to be considered for Road Safety 2010. Since the report is likely to identify ways in which RBT and other forms of alcohol enforcement. It is anticipated that a report would be available in time to be considered in developing Road Safety 2010.

**(c) Better targeting of drink-driving messages at the high risk group of drivers**

In the workshop, it was suggested that there was insufficient understanding of how the high risk group of drink drivers viewed issues. It was felt that research to profile the current attitudes and beliefs of the high risk group would be of value in determining strategy and designing advertising and publicity.

**(d) Longer disqualification for high BAC or repeat offenders**

Longer times spent disqualified for high BAC or repeat offenders would, to the extent that disqualification prevents driving, reduce the exposure of this high risk group. Disquiet was expressed at the workshop regarding inconsistencies between magistrates in applying disqualification periods. Strengthening the sentencing guidelines and increased efforts in informing magistrates about the risks associated with drink driving may result in more consistent and generally longer disqualification periods.

**(e) Alcohol interlocks**

Although effective alcohol interlock technology has been a available for some time now, published accounts of experience with accounts of experience with alcohol interlocks have only recently began to appears to be only one d fully adequate study to date. Because of the expense of the device and in the literature, and there appears to be only one fully adequate study to date. Because of the expense of the device and its maintenance, and the administrative procedures required to implement an effective program, it has generally been regarded as a treatment which is justified only for serious repeat offenders.

Experience in Australia is confirmed to a trial carried out recently in South Australia which involved fitting interlocks to volunteers' vehicles for a six-month period (Coxon 1998). The aims of the trail were to demonstrate the viability of the technology, to investigate the administrative arrangements which might be required for a formal program, and to investigate drivers' reactions and problems experienced. The volunteers who participated in the trial were not selected on the basis of offence record, and the interlock would not prevent them from driving with an illegally high BAC if they choose to use a by-pass facility which provided. The trial can therefore shed no light on the likely effectiveness of alcohol interlock programs in Australia. However, the trial did indicate that interlocks performed reliably over the course of the trial and that they did not appear to impose undue inconvenience on participants, despite the need for extensive training in the use of the device. In discussion following the presentation, indicate costs were put forward by a representation of the Guardian company. Installation cost approximately $125, with a monthly charge for this and calibration of around $85. The purchase cost of units is approximately $600, for Guardian units, and approximately $1300 for the competing Drager brand.

Alcohol interlock programs have expanded rapidly in the last 10 years, and 30 of the US States have programs of some description. It is beyond the scope of the present consultancy to review these comprehensively. Many of the evaluations published to date would appear to have methodologically limitations due to an inability to allocate drivers randomly to interlock or control groups, due to the judicial or administrative programs function. An exception to this is a recent trial of program in Maryland (Beck, Rauch and Baker 1997). Repeat drink-driving offenders were randomly allocated to an interlock program group or a control group

which allowed participants to drive subject to the conditions which normally applied to repeat alcohol offenders, which usually include supervision and treatment programs. After one year, 2.4% of the interlock group and 6.7% of the control group had committed an alcohol-related traffic offence, a difference which was statistically significant and indicated that the probability of being caught re-offending was approximately 65% less for the interlock group. The authors are careful to explain that this suggests the administratively operated interlock program which is effective, and not the interlocks per se.

Although the reduced probability of re-offending with the alcohol interlock is impressive, it must be borne in mind that the rate of reoffending in the control group in that first year was only 6.7%. This raises two interesting questions.

First, how much undetected drink-driving is going on in the two groups? There is no reason to suspect that the interlock in any way results in a lower probability of arrest for drink driving, so that we may be reasonably confident that the rate of drink driving in the control group is approximately 65% higher. What the available data does not tell us is the actual level of drink-driving in the two groups, hence it is not possible to say what the effect of the alcohol interlock program is on the probability of drink-driving in the two groups, hence it is not possible to say what the effect of the alcohol interlock program is on the probability of drink-driving, or crashing while drink-driving.

Second, what is the probability of reoffending in the second and subsequent years. If it remans approximately the same as in the first year, then the interlock program could make a very big difference to the probability of reoffending if installation was required for a period of three or five years.

Several other papers on alcohol interlocks were presented at the same conference. The general picture which emerges is that alcohol ignition interlock programs appear to be effective in reducing rates of reoffending, but there appears to be no difference between the interlock groups and the comparison groups once the period of compulsory fitting ends. There does not yet appear to be data on the effectiveness of interlock programs in reducing alcohol-related crashes.

Correspondence with authorities in Alberta, Canada and Maryland, United States of America, has revealed some further useful points. Alberta has run an apparently successful alcohol interlock program since 1990, with fitting and servicing undertaken by a private contractor. Offenders register with the interlock program for a fee of $50, and the program has required only two staff. There has been a significant drop in recidivism following the introduction of the program (Balan, personal communication).

The Maryland view is that the alcohol interlock program has been used with some success and is a viable alternative to standard programs in terms of reducing repeat offences (Pinciaro, person communication). However, the decision to require an interlock rests with the courts and Motor Vehicles Administration, and has not been widely used. The introduction of the interlock program has not had much impact on drink-driving attitudes generally.
Thus the following points can be made in relation to alcohol interlocks:

- Recidivism is a major factor amongst the hard core of recalcitrant drink drivers, and may contribute up to 8% of fatal crashes;
- Alcohol interlocks are a viable and reasonably effective technology;
- The administrative requirements for setting up and running programs are well-defined;
- Alcohol interlocks appear to be effective in reducing rates of reoffending for drink-drive offences while the device is fitted to the offender's vehicle, but there is no evidence to suggest the experience of using the interlock is effective in reducing drink-driving in the period after the interlock has been removed;
- Their effect on alcohol-related crashes is not known at present.

Interlocks would appear to hold out some hope as a viable countermeasure for a difficult problem for which there appears to be few other viable solutions. It is possible that an interlock program may have benefits beyond the preventing drink driving in persons enrolled in the program, as it may act as a signal that authorities are becoming more serious about drink driving, and may lend added weight to general deterrence. However, a number of issues need to be settle before a decision can be made to introduce them into New South Wales. The principal of these are:

- In how many crashes is recidivist drink-driving a contributing factor?
- What are the consequences of including high-range first offenders as well as recidivists in the program?
- What are the likely benefits in terms of crash reduction?
- What are the likely costs of an alcohol interlock program to the individual and to the Roads and Traffic Authority, and how do they compare to the benefits?
- Under what conditions would installing, maintaining and monitoring alcohol interlocks be a viable business proposition for a service provider?

It is worth noting that the Department of the Environment, Transport and the Regions (1998) consultation paper on drink driving suggests that overseas experience should be monitored over a longer period before considering their introduction in the United Kingdom.

**(f) Rehabilitation programs**

Although efforts to rehabilitate drink drivers have generally been unsuccessful in the past, the reported success of to date of an experimental program in the United Kingdom offers some hope that rehabilitation may be on option in the future. It may be recalled from Section 4.1 that the United Kingdom has instituted a large scale experiment, offering convicted drink drivers a reduction in the period of disqualification if they successfully complete the rehabilitation course (typically a 3 month reduction from a 12 month disqualification). Initial results appear to be encouraging, with a reduction in recidivism amongst high risk and middle aged offenders, groups who have proved resistant to other countermeasures. The experimental program is due to be completed at the end of 1999. Results of this program should be monitored carefully. In particular, to decide whether the program may be applicable in New South Wales, it will be necessary to establish the reduction in alcohol-related crashes which can be attributed to the program, the benefits associated with these crash reductions, and the costs of running the program. It will also be necessary to consider the aims of the course, its structure and content, and mode of delivery. The viability of the course outside metropolitan and major regional centres will also have to be considered carefully.

## KEY POINTS

- The main problem is now a group of hardened drink drivers who are not responsive to persuasion and either do not believe their driving is adversely affected by the amount they drink, or are prepared to accept the risk to continue with their life style.

- There may be scope for improving current enforcement procedures, for example, by mounting covert operations or modifying procedures to conform to best practice when the forthcoming Austroad project reports.

- Alcohol ignition interlocks may be a viable intervention for repeat and high BAC offenders. Interlocks have proved to be effective in reducing recidivism while the device is fitted to the vehicle. It is possible to run an alcohol interlock program using private contractors on a user pays basis with minimum government staff to administer and oversee the program. The longer interlocks are required to be fitted, the greater their impact in preventing re-offending and alcohol-related crashes is likely to be.

- The United Kingdom experience with rehabilitation programs looks promising, despite the poor outcomes from such programs in the past. The major experiment currently in progress in the United Kingdom should be monitored carefully and the findings carefully evaluated following its conclusion at the end of 1999.

# FATIGUE AND DRUGS

## 8.1 Fatigue

### 8.1.1 Current status

The recognition of fatigue as a major contributor to traffic crashes is relatively recent. Unlike other types of crash, the absolute number of fatal and serious injury crashes designated fatigue related has increased considerable over recent years, from 681 in 1993 to 739 in 1997, an increase of 8.5%. It seems probable that his increase is attributable, at least in part, to increased awareness of the issue and increased classification of crashes as fatigue related. However, it may be that some of this increase is attributable to actual changes in behaviour as economic pressures force longer times in the transport industry and encourage many people in the general workforce to work in the evening or at night, and to share their time between two or more jobs.

In 1997, fatigue-related crashes were 18% of fatal crashes and 13% of serious injury crashes.

Fatigue appears to be a fairly diffuse problem, illustrated by the following points:

- Only 59% of crashes occur between midnight and 8 am;
- 41% of crashes occur in rural areas away from towns and 44% in the metropolitan areas;
- 46% involve drivers 25 years of age or younger;

- Over half of fatigue related crashes and near crashes appear to occur on short trips or within 2 hours of starting the trip;
- Over a third occur during work trips or during the trip to or from work;
- Over half the drivers had not had a proper night's sleep the night before.

The vast majority of fatigue-related crashes involve cars. At present, there is no effective means of preventing persons from driving when they are tired, or of prosecuting them if detected driving when fatigued other than for careless driving unless a specific offence has been committed, such as crossing double lines.

### 8.1.2 Recent Developments in Research and Fatigue Management.

Consensus seems to emerging about the main features of fatigue as a road safety problem. At the recent 3rd International Conference on Fatigue and Transport, Smiley (1998) summarised the consensus emerging from research on fatigue. While hours spent driving is clearly an important factor, it is not the most important determinant of fatigue. Time of day is particularly important, diurnal rhythms exerting a powerful influence over the individual's state of alertness which is not easily modified. Lack of sleep is also an important factor, and insufficient rest time is associated with risk of build-up of cumulative lack of sleep. This basic understanding of the importance of time of day and previous sleep experience suggests that a more flexible approach to fatigue management than simply restricting the number of hours spent driving would be worth considering. It may be noted that this account of the fatigue problem closely matches the statistical picture of fatigue related crashes in New South Wales described in the previous section.

Such a system is currently being trialed in Queensland (Mahon 1998). The scheme involves operators who enter into an accreditation agreement which allows them to operate outside the normal maximum operating hours. It allows for more flexible approach by requiring additional recovery time to compensate for time spent working beyond the normal maximum hours, subject to maximum limits. The variations from normal maximum working hours and the rest time allocated are subject to audit. It is not possible to say at this stage how successful the scheme has been.

A similar scheme is currently under consideration by the NRTC (Moore 1998). This has an added level of sophistication in that it involves a weighting of the risk associated with driving, both in terms of the time of day at which driving occurs and the hours driven in one shift, and allowing the weighted driving hours to be traded off against longer recovery periods.

An alternative approach to flexible management of driving hours is to rely on technology to detect fatigue-affected driving. According to Dinges and Mallis (1998), it is likely that reliable, affordable and non-intrusive systems to detect drowsiness can be developed to the point of practical implementation in the near future. A number of technologies may be viable, including analysis of driver control movements, eyelid movement analysis, and response times to standardised test items. Although there are a number of significant technical challenges to overcome, such as demonstrating the validity and reliability of the technology and making it capable of handling a wide range of individual difference, the most significant problems to be overcome are legal and social rather than technical. Amongst

theses are whether the systems should be solely advisory, or whether they should progressively slow the vehicle down if the driver appears to be fatigued. It may be concluded that drowsiness detection devices should not be seen as a substitute for operator fitness standards and fatigue management, but a potentially useful tool in this process.

### 8.1.3 Implications for Road Safety 2010

In view of the even split between metropolitan and rural crashes, it would appear that is may be worth considering them as two distinct problems to be addressed by the strategy:

- A city problem, where the emphasis is on advice and publicity.

- A rural problem where the advice and publicity is backed up by provision of information regarding options for taking breaks and distance to next stopping opportunity, and rest facilities are provided as appropriate.

It would be appropriate for both programs to draw attention to the effects of time of day on crash risk and to seek to minimise travel at high risk times, and to draw attention to the risks associated with lack of sleep. A watching brief should be maintained on fatigue management programs, which should be subject to adequate evaluation before being adopted.

## 8.2 Drugs

### 8.2.1 Current status

Recent studies (Drummer 1994) indicate that drug use amongst Australian drivers may be greater than hitherto believed. Of drivers killed on roads in New South Wales, Victoria and Western Australia, drugs alone were present in 13.7% of cases, alcohol alone in 25% of cases, and alcohol and drugs in combination in 9.2% of cases. Thus 23% of cases, and alcohol and drugs other than alcohol present, alone or in combination with alcohol. These figures are broadly consistent with a number of other sources of data regarding the prevalence of drugs amongst Australian drivers (Road Safety Committee 1996). Benzodizepine (minor tranquilliser), amphetamines and other stimulants, and cannabis were the drugs most frequently present. Responsibility analysis indicated that drivers affected by alcohol were six times more likely to be killed, and that drivers affected by a combination of alcohol and drugs were nine times more likely to be killed. Interestingly, drugs on their own do not appear to result in great increases in risk, with driver with benzodiazepines present have 1.8 times the risk of being killed, those with amphetamines or other stimulants having 1.9 times the risk, and those with opiates present having 2.4 time the risk. Drivers with cannabis present had a lower risk of being killed (0.7 times the risk).

The most recent attempt to systematically work through the issues relating to drugs and road safety and to develop countermeasures based on current knowledge and technology has been the inquiry instituted by the Road Safety Committee of the Parliament of Victoria (Road Safety Committee 1996). A response from the Victoria Government indicated a willingness to take on all forty one recommendations of the Inquiry, with only minor qualification regarding the need for the further development of some issues. In essence, the principal recommendations of the Committee were:

- To support the development of international guidelines for experiments of drug impairment. Further studies of impaired drivers, the establishment of national research strategy, and the development of a common data base for drug driving issues.
- A change in the legal definition of a drug to make it more inclusive, and a change in the offence from driving under the influence of a drug to driving whilst impaired, with the consequent development of suitable tests of impairment and training police in recognising impairment and the administration of test procedures.
- Publicity to support the changes in legislation.
- Development of standardised analytical methods, quality management procedures, and performance standards for screening blood and urine samples.
- Development of procedures for recovery of license to ensure drug-related impairment is removed or under control before re-licensing.
- Better information from the pharmaceutical industry regarding the effect of drugs, better labelling, better training and Code of practice for industry and professionals involved in manufacturing, prescribing and administering drugs.
- Integrated information campaign to emphasise risks associated with combinations of drugs and alcohol, more attention to drugs issues in driver training.
- Commercial vehicle drivers to be drug free, fines to apply to operators as well as drivers, development of fatigue management programs in industry.

Many of these recommendations are already being acted upon by Roads and Traffic Authority (Road Safety 2000 Drug-Driving Prevention 1996-97). The one issue which stands out as being worthy of consideration is the development of procedures for the recovery of licence. At present, there are no formal requirement which apply in New South Wales. The adoption of criteria to ensure a person applying for restoration of their licence, following its loss for driving whilst affected by drugs, are drug free or have prescription drugs under control, would seem like a wise precaution. A Victorian working group, set up following the Parliamentary inquiry, is due to report in the near future.

## KEY POINTS

- There appear to be two major aspect to the fatigue issue, a rural problem and a metropolitan problem.

- Education and publicity should focus on the effects of time of day and the risk associated with inadequate sleep as well as hours of driving.

- The value of fatigue management programs in the road transport industry has yet to be convincingly demonstrated. These developments should be monitored carefully.

- New South Wales appears to be undertaking many of the actions recommended by the most recent inquiry into drugs and driving (in Victoria).

- An exception is in developing criteria to ensure that drug-driving offenders are drug free or that their driving is unlikely to be impaired by current medication before their licences are restored.

# PEDESTRIANS

## 9.1 Current status

Pedestrian crashes account for approximately 20% of fatalities and 15% of serious injuries. Between 1993 and 1997, pedestrian crashes fluctuated considerably, with a peak in 1994. In 1997, fatalities and serious injuries were 3.8% lower than in 1993, and accounted for exactly the same proportion of all casualties (15.7%) in both years. Thus is would seem that pedestrian crases have reduced over the period in proportion to reductions in all crashes, although there have been two years in which there were notable deviations from this trend.

Pedestrian crashes have high average costs (Andreassen 1992) due to the pedestrian's lack of protection in a collision and consequent high injury severity. Pedestrian crashes are almost all within built-up areas, and the majority are within the New South Wales metropolitan areas (Cairney and Cusack 1996).

There are a number of developments which have the potential to considerably improve pedestrian safety. These are Pedestrian Access and Mobility Plans the introduction of 50 km/h zones on local streets, and Local Government Road Safety Plans. Another possible development which justifies some consideration is the issue of traffic calming, particularly in association with lower speeds.

## 9.2 Pedestrian Access and Mobility Plans (PAMPs)

Pedestrian Access and Mobility Plans (PAMPs) are intended to ensure that pedestrians are adequately catered for in areas of high pedestrian activity. In time, all major pedestrian activity centres will be covered by a Pedestrian Access and Mobility Plan. Although the details of the process have yet to be worked through the overall philosophy is clear at this state. The process of developing a Pedestrian Access and Mobility Plan will start with an analysis of present and future pedestrian mobility needs in the area, assets existing facilities and develop a comprehensive plan to ensure pedestrians are adequately catered for in terms of on-street and off-street routes, road crossing facilities, dispersed pedestrian activities which do not justify special pedestrian facilities and integration of pedestrian routes with current and future land-use planning. Community consultation is seen as a major feature of this process. It is envisaged that the focus of the Pedestrian Access and Mobility Plans will be on engineering works which can be achieved in the short to medium term.

The basic concept of the Pedestrian Access and Mobility Plan has broad similarities with developments elsewhere. VicRoads has developed a rather similar process for dealing with pedestrian safety issues in areas of intense pedestrian activity. The process is currently being

implemented as Walksafe in the City of Stonnington, an inner Melbourne municipality. It differs from the Pedestrian Access and Mobility Plan process in that the starting point is an analysis of pedestrian crashes and safety needs rather than mobility needs, and in that education, encouragement and enforcement are major features of the programs designed to complement engineering works. The process is similar to Pedestrian Access and Mobility Plans in that a key feature is an integrated program of fairly low-cost engineering works, and in that the program has been developed after extensive community consultation.

In the United Kingdom, area wide traffic safety schemes have been an accepted part of practice for a number of years, following the success of the initial schemes (Ward and Mackay). They differ from Pedestrian Access and Mobility Plans in that they are not exclusively concerned with pedestrian safety but, given the nature of the area where they have been applied, pedestrian issues are inevitably a major consideration. The DETR plan described in Section ... Attributes a 25% reduction in pedestrian crashes to such schemes, identifies them as high cost effective. Together with 20 mph speed limit zones, area wide schemes make up the largest expenditure item under the UK scheme.

A related development is the Partnership for a Walkable America which has recently emerged in the US under the auspices of the National Safety Council. (Partnerships for a Walkable America home page 1997). It is an alliance of public and private organisations and individuals who are committed to making America more walkable. The objectives of the organisation embrace safety, access and health outcomes. The organisation intends to do this by identifying the changes needed to make America more walkable, promoting walking as an important transport option, highlighting situations which are particularly good or bad for walking, and educating the public and policy makers about the importance of a walkable community and how to achieve it. It is envisaged that the partnership will function as an independent alliance. Working closely with the DOT Secretarial Initiative for Pedestrian and Cyclist Safety.

It would seem therefore that the approach adopted in PAMPs in broadly consistent with developments in order jurisdictions, and that the UK precedent with area wide safety schemes, though not identical to the PAMP process, is sufficiently similar to indicate that some reductions in pedestrian crashes are possible.

## 9.3 50 km/h speed limit on local roads

As describe in the section on speeding, it is recommended that local councils be invited to establish 50 km/h zones. Experience of these zones in the trial indicated that speeds were reduced by 1-2 km/h and casualty crashes and casualties were reduced by 7%. It is not known what the impact on pedestrian crashes was. Lower speeds are very effective ways of reducing pedestrian crashes and ameliorating their severity. However, few pedestrian crashes occur on local streets so that the impact of the limit on pedestrian crashes may not be great. A more detailed investigation of crash reductions during the 50 km/h precinct trial, broken down by crash type, would enable an estimate of the likely effects on pedestrian crashes.

## KEY POINTS

- Pedestrian Access and Mobility Plans (PAMPS) are similar in many ways to developments in Victoria and the United Kingdom, and may be similar to developments which emerge in the US. Developments in these other countries should be monitored as PAMPs are instituted across New South Wales.

- Further investigation of the crash reductions during the 50 km/h precinct trial should be undertaken to determine the effects on pedestrian crashes.

# OTHER ISSUES

## 10.1 Motorcycle helmets

According to the road safety plan of the Department of the Environment, Transport and The Regions in the United Kingdom, improved designs and standards for motor cycle helmets have the potential to reduce motorcycle fatalities by 20%. Research is still in progress to determine whether this can be realised, and details are being sought. If these gains can be realised, Roads and Traffic Authority should take a lead role in championing a revision of the current Australian Standard to incorporate these new findings.

## 10.2 Demerit points

Most driver licensing authorities in advanced economies have a scheme whereby driving offences attract not only a monetary fine but penalty or demerit points of some form, the number of points being proportional to the seriousness of the offence. The essence of such schemes is that once an individual accumulates points beyond a set threshold, his or her licence is revoked for a set period. Under some schemes, it may be possible to avoid loss of licence by reverting to a provisional licence or risking loss of license for a greater period if a subsequent is committed within a set time.

A good discussion of the issues associated with demerit points is available in the report of the Victorian Parliament's Road Safety Committee's inquiry into the demerit points scheme (Road Safety committee 1994). Although it is widely believed that demerit points are an effective way of encouraging drivers with a poor driving offence history to improve their driving (and hence lower their crash risk) in order to avoid loss of licence, there appears to be only one study with directly addresses this proposition. Haque (1987) showed that, for Victoria drivers with demerit points, the interval between a second and third offence was longer than the interval of the first and second offence. There are a number of studies which show that drivers who have accumulated large number of demerit points are at greater risk of crashing than drivers in general, suggesting that the process is targeting the appropriate group of drivers.

In response to large number of fatalities in holiday periods on 1996-7 (particularly Easter 1996 and January 1997), increases in demerit points applying from speeding offences, and one extra point above the normal allocation for all other driving offences. A report is currently at the draft stage. This report compares road fatalities and serious injuries in the holiday periods in 1996-7 (particularly Easter 1996 and January 1997), increases in demerit points were introduced during holiday periods, with double the usual demerit points applying for speeding offences, and one extra point above the normal allocation for all other driving offences. A report is currently at the draft stage. This report compares road fatalities and serious injuries in the holiday periods in 1996/7 prior to the introduction of double demerit points with those in the equivalent holiday periods in 1997/8. A net reduction of 22% in fatalities and 8% in serious injuries was identified. However, it is questionable how much of this effect is due to double demerit points and how much to a regression to the mean effect, the tendency of for crash numbers to revert to a value closer to the long-term mean in the next period, following a period in which crash numbers have been exceptionally high. The reductions claimed in the report are not credible estimates of the likely effects of double demerit points. This could readily be achieved by comparing the 1997/1998 results with results from a number of previous years. Such direct comparisons are possible from the Roads and Traffic Authority's Road Traffic Accidents in NSW suggest that fatalities in 1997/98 are indeed lower that in 1992 and 1993, but by a lesser margin than was the case for 1996/97.

**KEY POINTS**

Improved motorcycle helmet standards may bring about substantial reductions in fatalities. This development should be carefully monitored.

The evidence for double demerit points having a significant impact on road casualties during holiday periods is not convincing. Further comparisons with earlier years, not just the year in which high crash rates were experienced during holiday times, are required to determine how effective the measure has been.

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# REVIEW AND DEVELOPMENT OF STRATEGIC DIRECTION FOR THE ROAD ENVIRONMENT PROGRAM

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*SOURCE: Tziotis, M. (1999). Review and development of strategic direction for the road environment program. Unpublished report, May 1999. Haymarket, NSW: Roads and Traffic Authority.*

**Executive Summary**

Developed by the Roads and Traffic Authority, the New South Wales Road Safety 2000 strategy is drawing to its conclusion. While the strategy has led to substantial reductions in the road toll since the early 1990's the number of people killed on New South Wales roads over more recent years has remained relatively unchanged. The purpose of this report is to identify future strategic direction options that focus on Road Environment Safety, that will assist the Roads and Traffic Authority, as part of its future Road Safety 2010 strategy, deliver significant additional road safety benefits to those already attained. The key steps used to develop strategic direction options comprised identification:

- of the elements of the current Road Environment component of Road Safety 2000 that proved to be successful;
- of the gaps in the current Road Environment Program;
- of □best practices□ Road Environment safety;
- and examination of Road Environment programs in other Australian jurisdictions and in other countries.

**Major Findings**

- Road fatalities are expected to fall across Australia by about 26.5% by 2004, and 46% by 2010, when compared to 1998. These benefits will be derived from the combined effects of environmental, behavioural, vehicle and medical safety initiatives.
- it is estimated that continuation of road and road environment improvements in NSW will result in a saving of 143 fatalities during 2010, based on the 1998 NSW road toll.
- To achieve the reduction in road fatalities in New South Wales attributable to road environment improvements, the Road Safety 2010 Strategy must continue to implement a targeted Accident Black Spot program, and maintain its general road expenditure program.

**Road environment programs from other Australian jurisdictions – key program elements for consideration in New South Wales**

- identification and application of engineering and road safety "best practices";
- Increased focus on pedestrians and cyclists, heavy vehicle safety, mass action initiatives (e.g., Delineation, shoulder sealing and tactile edge lines), intersection management for safety and land use planning;
- ongoing review of Road Design Standards;
- commitment to accident investigation and road safety audit training;
- undertake Road Safety Audits that ensure that behavioural factors are considered, and check that road design practices account for vulnerable road users;
- ongoing monitoring of the effects of Black Spot treatments;
- unsure that roads are maintained to a minimum level of safety;
- provide safer routes for, and conduct Road Safety Audits for vulnerable road user (e.g., young and older pedestrians, cyclists, motorcyclists);
- implementation of multi-action pedestrian and bicyclist safety programs;
- undertake safety audits of land use and transport plans;
- review speed limits to correct anomalies and to ensure that signing standards are met.

**Road environment programs from other countries - key program elements for consideration in New South Wales**

- Increased use of pedestrian facilities in pedestrian activity areas;
- application of variable speed limits as part of incident detection systems;
- improved layouts for bus stops to prevent pedestrian accidents;
- lower speed limits in residential areas, and the lowering of the existing 60 mph (96 km/h) speed limit on rural single carriage way roads to 50 mph (80 km/h);
- continued construction of by-pass routes;
- promoting Safety Management processes amongst Federal, State and Local Governments, and the commercial transport industry;
- implement a Program to widen travel lanes and shoulders, and improve pavement skid resistance / provide safe road pavements.

**Potential for New Technologies**

- ITS technologies are still evolving and are a potentially high cost investment;
- opportunities exists to use relatively low cost technologies and products at specific locations;
- the development and use of perceptual countermeasures may potentially deliver road safety benefits at relatively low costs.

# Introduction

## 1.1 Background

As New South Wales current road safety strategy, Road Safety 2000 is drawing to its end, the Roads and Traffic Authority is seeking to develop a future road safety strategy that will take the State into the next century.

While the Road Safety 2000 strategy has led to substantial reductions in the road toll since the early 1990's, the number of people killed on New South Wales roads over more recent years has remained relatively unchanged. The key aim therefore of the new strategy will be to identify new strategic directions that will provide significant additional road safety benefits to those already achieved.

In developing the future road safety strategy, Road Safety 2010, the Roads and Traffic Authority is reviewing its current Road Safety 2000 strategy while also seeking to identify new strategic direction options that will bring about a significant reduction in the road toll. The review of the current strategy and development of strategic direction options for the new Road Safety 2010 will focus on Road Environment Safety, Road User Behaviours, and Vehicles and Equipment Safety.

While this report focuses on the Road Environment Safety component of the review, and its future strategic options, it recognises the overlap and inter-relationship it has with road user behaviour and vehicle engineering safety strategies.

## 1.2 Objectives of Strategic Options Study

The objectives of the project are to:

- review the current Road Environment Safety program and develop strategic options as part of the future Road Safety 2010 strategy;
- identify best practice in road environment safety;
- recommend actions to be taken by the Roads and Traffic Authority in support of the Road Safety 2000 strategy.

## 1.3 Study Method

The project method comprise the following:

(a) Identification of current road environment safety directions, which form part of Road Safety 2000 that have been successful, unsuccessful, or which could be improved upon. This in part was achieved through consultative forums with key Roads and Traffic Authority stakeholders. The forums sought to identify what the stakeholders believed were the:

- elements of the current Road Safety Program which were successful;
- aspects of the current Road Safety Program failed, or which did not fully deliver the expected road safety benefits;
- road safety issues of problems which are not being addressed by the current Road Environment Safety Program;
- year 2010 Road Environment Safety objectives;
- current best practices in road and environment safety;
- future new technologies and innovations which could be applied in New South Wales;
- the future role of the Roads and Traffic Authority, and other agencies, in program development and delivery.

(b) Identify and review the Road Safety Strategies that are in place within each of the Australian jurisdictions and selected overseas countries.

(c) Identify road safety best practices with Australia and overseas.

(d) Conduct a literature review to identify new technologies and innovations that may be used to improve road safety in future road safety strategies in New South Wales.

## 1.4 Road Safety to the Year 2010

When examining gains to be made in road safety to the year 2010, account needs to be taken of reductions in road trauma that are expected to come about as a result of the renewal of the vehicle fleets, which will incorporate improvements in vehicle design standards, improvements in the road infrastructure (e.g., new road constructions incorporating improved road design practices and the progressive upgrading of road cross sections), and through the continued application of best practices in proven road environment (e.g., road crash black spot program), and road user behaviour road safety practices (e.g., road crash black spot program and random breath testing programs). The benefits of previously made long term decisions are also expected to culminate in significant safety benefits in New South Wales to the year 2010. For example, improved Australian Design Rules (ADRs) over recent years provide for, and which will ultimately require, all new cars to be fitted with safety features such as airbags, side impact protection and anti-lock braking systems.

Using eh -xxxx multiplicative method (which ignores interaction), reported by Vulcan and Corben (1998), it is estimated that road fatalities will fall by about 35% by the year 2004, and by 57.4% by the year 2010 (with no growth in vehicle registrations). Assuming an annual 2% cumulative increase in vehicle registration, the estimated number of fatalities is expected to fall by 46% and 26.7% respectively. Using these expected reductions in the road toll the number of road fatalities for Australia and New South Wales for the years 2004 and 2010 is provided in Table 1 below.

**Table 1 - Number of Fatalities in Australia and New South Wales, estimated for 2004 and 2010**

| Year | Australia | New South Wales |
|---|---|---|
| 1998 | 1762 | 560 |
| 2004 | 1292 | 410 |
| 2010 | 952 | 201 |

## 1.5 Road and Environment Improvement to the Year 2010

Future road safety benefits are expected to be achieved through an improvement in the road environment though:

- the continued implementation of Federal and State Accident Black Spot Programs (intersections, mid-block locations, routes and areas);
- the application of mass action treatments (e.g., Shoulder sealing, tactile edge lining, and pavement skid resistance improvement treatments);
- the increased application of road safety auditing procedures;
- ongoing improvements in road design standards and practices;
- major road construction and reconstruction projects (e.g., road duplications, by-pass routes);
- increased development and implementation of community road safety plans, (i.e., Local area traffic management / speed management plans);
- application of roadside hazards management strategies (i.e., Frangible and slip based poles installations);
- application of new or innovative technologies (e.g., The use of hazard perception treatments designed to influence driver speeds at hazardous road locations - described in more detail in Section 5);
- Travel Demand Management (e.g., Design and location of modal interchanges, operation of intersections and traffic signals systems).

Described below are those areas where an estimated measure of their road safety benefits has been made;

***Black Spot Programs***

The targeted treatment of accident Black Spot locations has been shown to be highly effective in reducing road trauma in our community. A study conducted by the Bureau of Transport and Communications Economics (BTCE), Report 90 Evaluation of the Black Spot Program 1995, reported that the community benefited by $4 for every dollar spent on each treated black spot under the Feral 1990 to 1993 Black Spot program. In Victoria similar benefits were found from the States Black Spot program. Studies by Tziotis, M. 1993, and Corben, B.F. and Foong, C. 1989, found that high safety benefits are achieved through the implementation of Black Spot Programs. The reports found that at treated sites casualty accidents reduced by about a third while providing an economic benefit to the community of over $7 for every $1 spend (i.e., Benefit cost ration of 7.3:1).

***Road construction and reconstruction projects***

Following a computer-based search of the AROAD database by ARRB, TR, Vulcan and Corben (1998) reported the following:

- *Accident Black Spot Program.* Based on the effectiveness of the Federal and Victorian Accident Black Pot Programs referenced above, and assuming the continued maintenance of funding levels of $60m (State and Federal) to the year 2010, reductions in fatality level may be expected to progressively reach to 144 annually by the year 2010.
- Road construction expenditure. Reductions in road fatalities may be expected result from the expenditure of funds for roads and their environments. The expenditure may be directed to:

a) specific road safety measures (i.e., road resurfacing, intersection treatments, bridge widening, provision of access control, delineation measures);

b) specific road projects (i.e., road duplications, road widening, freeways constructions / extensions);

c) general road improvements (i.e., general road construction, general road upgrading and maintenance programs).

Based on expected future general road expenditures for each state it is estimated that the number of lives saved nationally annually would be about 26 and that by the year 2010 it will progressively building 309 fatalities annually. This equates to reduction in fatalities in NSW for the 2010 year that is attributable to general road construction improvement of 100.

Combining the effects of the continued operation of Accident Black Spot programs and General Road Construction Expenditure it is estimated that the number of fatalities will fall by the years 2004 and 2010 by about 12.8% and 25.6% respectively. It should be noted however that this estimate does not take into consideration the safety impact of road environment improvements that may be result from the application of Road Safety Auditing practices, speed and local area traffic management strategies, ITS, travel demand management, and new and innovative road safety measures expected to be developed and implemented.

Using the information provided in Table 1, Table 2 estimates the number of fatalities that will be saved across Australia and in NSW for the years 2004 and 2010 that will result from the continued and combined impact of Accident Black Spot and General Road Construction programs.

ble 2 - **Estimate of Lives Save During 2004 and 2010 as a Result of the Continued Implementation of Road and Road Environment Safety Programs**

| Year | Fatalities -Australia | Fatalities - New South Wales |
|---|---|---|
| 2004 | 226 | 72 |
| 2010 | 451 | 143 |

***Key points:***

Road fatalities are expected t all across Australia by about 26.5% by 2004, and 46% by 2010, when compared to 1998. These benefits will be derived from the combined effects of environmental, behavioural, vehicle and medical safety initiatives.

It is estimated that continuation of road and road environment improvements in NSW will result in a saving of 143 fatalities during 2010, based on the 1998

NSW road toll.

To achieve the reduction road fatalities in New South Wales attributable to road environment improvements, the Road Safety 2010 Strategy must continue to implement a targeted Accident Black Spot program, and maintain its general road expenditure program.

# 2. Road Environment Safety - 2000 Road Safety Strategy NSW

## 2.1 Road Environment Safety program

**Goal:**
To have the safest roads anywhere in the world by the year 2000, and to reduce the number of fatalities by 23% and serious injuries by 13% (revised targets).

**Strategy:** ***Road Safety 2000 Strategy***
The NSW Road Safety Strategy, Road Safety 2000" was released in 1991.

**Road Environment Safety program;**
The current Road Environment Safety program which form part of the NSW Road Safety program comprise the following elements.

- identification and treatment of Accident Black Sport sites, which includes the treatment of target locations, routes and local areas, and the application of mass action safety treatments (State and Federal programs);
- undertake Road Safety Audit practices for new constructions, for the existing road network and for traffic management activities;
- implement a Speed Management Strategy across the road network that is sensitive to community travel and safety need;
- incorporate roadsafety objectives as part of route management systems;
- apply Local Area Traffic Management (LATM) treatments in residential precincts to encourage motorist drive at appropriate speeds;
- implement road design features that account for the operational and behavioural requirements of all road users;
- implement a roadside management program (includes the provision of rest areas);
- develop more effective facilitates for pedestrian;

- provide bicycle facilities to ensure their safe integration with other traffic;
- develop policies and guidance for use by road safety practitioners;
- assist Local Governments in the development and implementation of local and safety plans.

The Program is developed and administered by the Road Safety and Traffic Management Directorate. RTA Regional offices are required to identify candidate projects that may be funded from within each of the program elements.

The Program Guidelines provide for program element eligibility criteria and output requirements. For the Accident Blackspot Treatments component of the program regular progress reporting and monitoring are also required to be provided by the Region.

### 2.2 Feedback from Key RTA Stakeholders

Workshops were held involving key road safety stakeholders within the RTA's Regional officers and head Office Departments. A major objective of the workshop was to provide key stakeholders within the RTA with the opportunity to provide input into the development the future Road Environment Strategy component of Road Safety 2000.

The forums sought to identify:

- best practices in Road Environment Safety considered appropriate by key RTA Rod Safety stakeholders;
- elements of the current Road Environment Safety program considered to be successful, or which could have been undertaken more effectively, or which are not effective in improving road safety;
- gaps in the current Road Environment Safety program;
- new or innovative Road Environment Safety measures.

The questions put to the discussion groups were:

a) which elements of the current road Environment Safety program that you have been involved with do you believe have succeeded, failed or could have been improved upon?

b) what are the key reasons for the failure or for program elements not achieving their full potential? Are they under resourced? Or are they inadequately or poorly implemented?

c) what gaps if any, do you believe there are in our Road and Environment Safety Program? If there are gaps, what are they?

d) what do you think are the key performance measures of a successful Road Environment Safety Strategy?

e) what should the objectives be of the year 2010 Road Environment safety issues that should be addressed as part of a future Strategy?

f) what do you believe are the current and future Road Environment Safety issues that should be addressed as part of a future Strategy?

g) how would you prioritise and tackle these issues?

h) what role do you see new technologies and innovations having a future Road and Environment Safety Strategies? Can you identify any of them?

h) what role do you see new technologies and innovations having in future Road and Environment Safety Strategies? Can you identify any of them?

i) what Road Environment Safety opportunities to you see in intelligent Transport Systems (ITS)?

j) what role do you see the RTA, and other agencies having in the development and delivery of future Road Environment Safety Strategies?

Table 3 following summarises the responses provided to each key issues.

**Table 3 - Summary Issues and Suggested Actions Emanating from Stakeholder Forums**

| Program Element | Issue | Action |
|---|---|---|
| Accident Black Spot (ABS) Treatments | ABS need more comprehensive actual benefits are not known / need to conduct post treatment evaluation to ensure that the remedial treatments are working;<br>need to ensure that ABS site identification and remedial treatments delivery optimal safety benefits;<br>need to undertake high cost treatments as part of the Road Network Infrastructure (RNI) Program;<br>no specific criteria is provided / need better identification processes; need to improve the identification of BS in rural areas; | update current knowledge on remedial treatments;<br>develop better tools to identify and solve safety problems;<br>develop better project selection and prioritisation guidelines;<br>evaluate / monitor ABS site and re-investigate where remedial works have not been successful. Use GIS to monitor the ABS Program;<br>need to update data base quickly;<br>use GIS and ARC View to better identify the location, nature and magnitude of the safety problem at ABS site;<br>program should be continued. |

| Program Element | Issue | Action |
|---|---|---|
| | accident reduction factors need to be current and consistently applied;<br>program needs to be credible;<br>require more experienced staff to develop optimal remedial treatments. | |
| Accident Investigate and prevention | valuable tool required as part of future Road Environment Safety program;<br>provides a good approach to getting a priorities program;<br>identifies emerging issues;<br>viewed by some as having limited success. | should be continued. |
| Road Safety Audits (RSA) | stage 5 audits are generating measures that are unlikely to be treated in the foreseeable future;<br>stage 1 to 4 audits require clarification and need to be incorporated into standard design and construct contracts;<br>benefits of RSA are unclear or not clearly understood;<br>RSA not consistently applied;<br>maintenance issues are major component of Audit findings;<br>hard to build a program of works (ie, difficult to prioritise the outcomes of RSA);<br>financially under resourced | need to evaluate the benefits of RSA:<br>need to use the outcome of RSA to identify inherent Road Design problems that should be addressed;<br>should promote the use of EASY Audit (expert computer based system developed for the RTA by ARRB for conducting RSA);<br>need to ensure that Auditors are appropriately accredited;<br>improve maintenance practices;<br>RSA should be continued |
| Speed Management (now the primary responsibility of the Road User Safety Section) | too many speed limits;<br>speed limits inconsistently applied;<br>should have a 50 km/h residential street speed limit;<br>shortage of staff. | undertake a review of speed limits taking into account new technologies;<br>promote the use of NLIMITS (expert computer based system developed for the RTA by ARRB for determine speed |

| Program Element | Issue | Action |
|---|---|---|
| | | limits);<br>should use new technologies to advise motorists of prevailing speed zones;<br>should use dynamic speed limit / warning systems. |
| Road Design and Management | some road design areas require revision;<br>need to have a closer relationship between Road Safety and RNI | road design standards should be revised under a sunset clause, or elements reviewed if found deficient as a result of RSA or ABS investigations. |
| Location Area Safety | need to better identify and treat local area precincts to maximise available road safety dollars;<br>lack of development controls | need to ensure a stronger safety emphasis as part of the Quality Management process. |
| Roadside Facilities (including rest areas) | not enough general use of frangible and slip based poles;<br>no clear focus/conflicting organisational objectives;<br>in some cases have gone backwards where poles are placed in hazardous locations;<br>should be addressed as part of the ABS Program and RSA process | undertake a mass action shoulder sealing program;<br>involve other stakeholders (i.e., Utility companies) in the management of roadside hazards. |
| Federal Black Spot Program | operates more effectively that State ABS Program | State ABS Program should be run like the Federal ABS Program |

Gaps in the current Road Environment Safety Program identified by forum participants included the following;

***Pedestrian and Cyclists***

No clear program focus, rather improvements for these road user groups emanate from other Road Environment Program elements (i.e., ABS Program, RSA, Speed Management , Road Design and Management, and Local Area Safety).

***Route and Area Management***
Similarly there is no clear Program focus. Views were expressed that Route Management was not efficient with respect to signals along a traffic route, and linking strategies may contribute to safety problems.

Other issues (which form part of Road Safety 2000) not specifically targeted include:

- Heavy Vehicle routes
- Delineation (using new methods and practices, such as profile edge lining);
- Intersection Management;
- Land use Planning;
- Lack of Coordination between sections across the organisation, and with Local Governments

New or innovative measure identified within the forum by the participants included:

- the operation of Road Safety features within ITS;

- the use of variable speed limits to advise motorists of changes in speed limits which may be associated with changes in driving conditions. The new technology is also seen to have the capacity to detect deteriorating driving conditions (e.g., Wet, foggy, etc)

- the use of variable advisory speed limit signs (as distinct from regulatory speed limits). Such limits would be operated at site specific location (e.g., On bends or along steep grades);

- a road environment that communicates with the motorists to advise of prevailing driving conditions;

- identification of new safety products. The view was held that there was considerable scope for the identification of new safety devices/products (e.g., Internally illuminated delineators for use in fog prone areas).

**Key features of current Program:**
no clear program focus on pedestrian and cyclists, heavy vehicle safety, delineation as a mass action safety measure, intersection management for safety and land use planning;
***Accident Black Spot Program*** -
is important and should be continued;
treatments need to be better developed, and their effectiveness monitored to ensure optimisation of safety benefits;
State program should be run like the Federal Black Spot Program;
***Accident Investigation*** program is seen as a valuable tool that needs to be continued;
***Road Safety Audits (RSA)***

is important and should be continued, however there is the need to catch up with treating the outcomes of audits;
should use the findings of RSA to review road design standards;
promote the use of EASy Audit and ensure the auditors are accredited;
road maintenance practices should be improved;

***Speed Management*** -
need to review speed limits taking into account the availability of new variable technologies (i.e., Dynamic and variable speed limits);
need to promote the use of the NLIMITS expert system as means of achieving consistent and creditable speed limits across the State's road network;

***Road Design Standards*** need to be periodically reviewed, or as deemed necessary as a result of deficiencies identified by the RSA process;

***Roadside Facilities*** -
program to replace poles (with frangible / slip based), should involve other key interest groups (i.e., Utility companies and councils);
hould undertaken a mass action shoulder sealing program.

# 3. Road Environment Safety Strategies for other Australian Jurisdictions

## 3.1 Introduction

***Strategies and programs***
Road Safety Strategy documents were also requested and obtained from each of Australia□s States and Territories. The information provided includes:

- the goal/s of each Strategy. This is provided in terms of reductions in road fatalities, serious injuries and total injuries;
- detail of when each Strategy was released, and the period the Strategy covers;
- actions emanating from each Strategy as it relates to Road Environment Safety.
-

***Discussions with key personnel from jurisdictions***
Information officer level discussions with key personnel from each of the States and Territories revealed that their respective Road and Environment Programs were based on the economic worth of candidate road safety projects. While this was the general case there were a number of Road Safety projects based on a pro-active approach to road safety and equity (i.e., Conducting Road Safety Audits, standards development, training programs for road safety practitioners, railway level crossing safety, etc). Although economic benefit criteria are not set for these elements criteria have been established based on relative risk and exposure.

None of feedback provided indicated a formal process for undertaking other remedial or pro-active safety works associated with a selected treatment site (i.e., continuing the extent of remedial works beyond the limits of a Black Spot site for the purpose of removing or addressing nearby safety problems). Potential additional work such as this may be considered as part of the overall cost of a project provided the additional works did not interfere (because of the higher project cost and consequential lowering of the Benefit Cost Ratio), with the treatment of the selected black spot site.

Equally there was no formal process for undertaking one of projects based on road safety grounds. However, within each jurisdiction there were discretionary Ministerial powers that enabled such projects to be undertaken within each of the jurisdictions Road Safety program.

## 3.2 Victoria

**Goal:**
The reduce the incidence, severity and cost to the community of road crashes

**Strategy:** ***Safety First", Victoria□s Road Safety Strategy 1995 - 2000***
Victorias Safety First 1995 - 2000 Road Safety Strategy was released in September 1995.

**Road Environment Safety Program:**

The objectives of the safer roads sub-program of the strategy was to reduce fatalities and serious injuries at intersections, road lengths and road-rail level crossings that have high crash rates by implementing improvements at these locations. The components of the Safer Roads sub-program comprised:

Route and Black length Treatments (State and Federally funded);

2. Black Spot and other treatments;

3. Route Audits

A Safety First Strategy sub-program, program Support Services also provided expenditure directed to improving the State's road network and its environment. Elements of this sub program included:

1. Skid resistance testing;

2. Project Safety Audits;

3. Accident Investigation and Audit Training;

4. Road design standards development

5. Research and evaluation.

The Safer Roads which comprised the above components focused on primary safety issues and objectives. Outlined below are the Strategy's key safety issues and the road environment safety initiatives directed to each.

***Speeding***

□ Development of specific road features to ensure compliance with speed limits in sensitive area (e.g., Near schools, shops, and local streets).

***Fatigue***

□ Apply protective devices (e.g., Tactile edgelining) and wider bitumen surfacing on roads with high run-off-road and single vehicle crashes.

***Road quality***

□ conduct Road Safety Audits to improve maintenance practices, identify hazardous features, identify deficient road design elements for review;
□ continue the Accident Black Spot Program;
□ continue removing roadside hazards and installing safety barriers in rural areas;

□ conduct Road Safety Audits of planned developments to ensure best safety outcomes;
□ (more recently) conduct Road Safety Audits for target groups (e.g., Motorcyclists).

***bicycle safety***

□ together will local government identify high-risk locations;

□ introduce design features and engineering treatments to improve safety for pedestrians.

**Key Initiatives for consideration in NSW**
review of Road Design Standards;
skid resistance testing;
conducting Road Safety Audits for target groups (e.g., motorcyclists);
accident investigation and road safety audit training
implementation of multi-action pedestrian and bicyclist safety programs;
driver fatigue program involving the installation of tactile edgelining and provision of greater vehicle recovery areas.

## 3.3 Queensland

**Goal:**
Achieve in relative terms a 30% reduction in the annual road toll.

**Strategy:** ***1993 - 2003 Road Safety Strategy***
The 1993 - 2003 Road Safety Strategy was released early 1993.

**Road Environment Safety program:**

The objectives of the Strategy's Safer Roads program were to improve the safety of roads, the road environment and the management of traffic. The Road Safety Strategy also sought to achieve a safe road environment through achieving greater effectiveness in road safety planning and actions by means of improved coordination and application of enhanced traffic/road use management systems.

Described below are the actions of the Road Safety Strategy that focus on the road and its environment

***Improved Road Safety planning***

- participate and contribute to national road safety forums as a means of identifying best practices and new or innovative measures;
- improved data collection, analysis and dissemination of information for project prioritisation, monitoring and evaluation.

***Speeding***

- review speed limits and introduce LATMs and lower speed limits in residential precincts;
- adopt lower speed limits outside schools, nursing homes, retirement villages and other appropriate community facilities.

***Safety for vulnerable road users groups***

- improve pedestrian facilities for elderly pedestrian;
- for pedestrian safety generally , install appropriate pedestrian facilities (ie medians/barriers);
- establish rest areas in fatigue zones and develop innovative road based warning measures (i.e., tactile edgeless).

***Safer roads, road environments and traffic management***

- develop and implement a Road Safety Audit (RSA) program on all major routes which include commercial and tourist routes, and routes with hazardous steep grades;
- ensure that the outcome of FRSA are implemented;
- use engineering best practices;
- continue the School Safe program;
- ensure safety factors are given a high priority in the development and maintenance of signals systems, signs and road makings;
- (continue to) implement the ABS Program and widely apply known safety measures (e.g., shoulder sealing, road surface improvements, edgelines, etc);
- systematically remove roadside hazards;
- new and public facilities will be designed and built to incorporate safe road features for all road user groups;
- ensure that the roads and traffic systems account for vulnerable road users and cyclists

***give road safety high priority in land use and transport planning***

- include road safety objectives in planning processes;
- undertaken safety audits of land use and transport plans.

**Key Initiatives for consideration in NSW:**
pedestrian facilities program for vulnerable road users;
undertake safety audits of land use and transport plans;
new road facilities will be built to incorporate safer road features for all road user groups;
use engineering best practice. It should be noted that as part of the Queensland Road Safety program a commitment is made to participate in National Road Safety Forums as means of identifying best practices and innovative or new safety measure;
adopt lower speed limits outside of schools, retirement villages, nursing homes and other similar community locations;
undertake a review of speed limits.

## 3.4 South Australia

**Goal:**

Achieve a 20% reduction in projected fatality and casualty levels by the year 2000. This represents a reduction from the 1991 to 1993 average in fatalities of 34%, and 22% for all casualties.

**Strategy:** ***Road Safety SA, A Strategic Plan for Road Safety in South Australia till the Year 2000***

The Road Safety SA Strategy (to the year 2000) was released in December 1994.

**Road Environment Safety Program;**
The Road safety vision in SA is for road users to have a level of safety which is significantly better than projected current trends. The goal of the Road Environment Safety component of the program, Safer roads and roadsides is described in terms of the implementation of effective strategies for the management and control of road use to reduce hazards and provide safer roads and roadsides.

Actions emanating from the program include:

- promotion of best practices in the planning design, construction and maintenance of roads and associated facilities;
- promotion of best practice in traffic management;
- implementation of an Accident Black Spot Program;
- implementation a roadside hazard management program;
- application of road safety principles in land use zoning, planning and development processes;
- promotion of effective Local Area Traffic Management (LATM) strategies:
- promotion of road environment safety improvements for unprotected road users;
- implementation of a Speed Management Program
- increase public awareness of hazardous road conditions.

***Following the release of the SA Road Safety Strategy the following additional road safety measures have been initiated:***

- major sealing of unsealed rural arterial roads program (expected to be completed by 2004);
- funding of additional pedestrian facilities;
- commencement of Safe Routes to Schools and Walk With Care Programs;
- release of a Cycling Strategy for SA, which include the provision of cycle paths / facilities;
- introduction of RSA practices;
- funding to develop and introduce a Road Safety Audit training program for Transport SA, local governments and consultants;
- development of standards for rest area;
- implementation of an annual shoulder sealing program;
- review of Speed Zoning guidelines;
- review of the road crash database.

**Key Initiatives for consideration in NSW:**
promote best practice in road safety for all aspects of road construction and traffic management. This may be achieved through the implementation of a research program, regular or ongoing interaction with peak research organisations and peers both nationally and internationally, study tours, conference attendance, literature reviews and searches of the Internet;
promote improvements for unprotected road users and funding specifically for pedestrian facilities;
major sealing of unsealed roads program;
develop and facilitate a Road Safety Audit training course,
undertake a review of speed limits.

## 3.5 Western Australia

**Goal:**
To reduce the number of fatalities per 1000 people to a level which regards WA's road safety record as the best in Australia. This represents a reduction in number for both fatalities and serious injuries of 10% from the averaged 1993 to 1995 serious casualties road toll.

**Strategy:** ***The Way Ahead, Road Safety Directions for Western Australia***
The road safety strategy k(to the year 2001) was developed by Main Roads Western Australia and released in 1996, as an issues and Directions paper

**Road Environment Safety program:**
The road environment safety component of the road safety strategy comprised:

- application of best practices in road design standards and traffic management practices;
- promotion of Road Safety Audits as part of planning construction, maintenance and road treatments;
- undertake an Accident Black Spot Program, and evaluate remedial treatments;
- encourage innovative approaches to road safety;
- encourage more use of appropriate advisory and traffic control devices;

- provide safe routes and conduct Road Safety Audits for vulnerable road users (pedestrians, old and young, cyclists, disabled);
- review speed limits across the State;
- reduce speeds in residential precincts using Local Area Traffic Management schemes;
- to counter fatigue establish rest areas, install tactile edgelining and design a forgiving roadside environment.

**Key Initiatives for consideration in NSW:**
promote best practice in road safety in road design standards and traffic management practices. This will require a commitment to a research program, interaction with peak research organisations and peers both nationally and internationally, periodic study tours, conference attendance, literature reviews and searches of the Internet;
undertake Road Safety Audits at all stages for new work;
evaluate remedial works;
provide safer route and Road Safety Audits for vulnerable road user (e.g., young and older pedestrians, cyclists, motorcyclists);
undertake a review of speed limits.
mass application of tactile edgelining.

## 3.6 Tasmania

**Goal:**
To achieve the maximum reduction in road deaths, serious injuries and crash severity within the resources available.

**Strategy:** ***Road Safety, it's Everyone's Job***
The road safety strategy, Road Safety, It's Everyone's was developed in 1994, and is about to be revised for the years ahead. No time frame has been made available for any existing or future strategies.

**Road Environment Safety Program**

The road environment safety component of the road safety strategy entailed the following actions;

- the conducting of Road Safety Audits ensuring that behavioural factors are considered, and check that road design practices account for vulnerable road users;
- ensuring that the existing road network is maintained with a high level of priority;
- safe management of roadside hazards;
- development of route management system that takes into account safety consideration;
- undertake an Accident Black Spot program and monitor its effectiveness. The program should also ensure that there is not the potential to shift the problems;
- adopt a speed zoning strategy.

**Key Initiatives for consideration in NSW:**
conduct Road Safety Audits ensuring that behavioural factors are considered, and check that road design practices account for vulnerable road users:
ongoing monitoring of the effectives of Black Spot treatments.

## 3.7 Northern Territory

**Goal:**
To reduce the level of fatalities and serious injuries by 30% by the year 2001 (from the 1991 level of 628)

**Strategy:** ***Road Safety, Our Responsibility***
The strategy was launched in 1992. The key strategy issues comprise the management of the road environment for road safety, and the development of wide ownership and participation in the use of the road environment.

**Road Environment Safety Program**

The road environment safety component of the road safety strategy entailed the following actions:

- undertaking of an Accident Black Spot Program;
- recognition and promotion of the implications of road safety in all aspects of the development and management of the road network;
- improve safety in residential precincts;
- design a forgiving roadside environment;
- development of a route safety management plan to an acceptable level across the entire road network taking into account the safety performance of differing types of vehicle (e.g., trucks);
- development of a speed management strategy;
- provision of special consideration to problems associated with remote areas.

**Key Initiatives for consideration in NSW:**

give special consideration to problems associated with remote areas.

## 3.8 Australian Capital Territory

**Goal:**
By the year 2001, the 10 year moving average of fatalities is never to exceed 30, and hospitalisations not to exceed 180, despite increases in population.

**Strategy:** ***ACT Road Safety Strategy (draft)***

A Draft ACT Road Safety Strategy was released in 1993.

**Road Environment Safety Program**

The road environment safety component of the road safety strategy entailed the following actions:

- promote transport and land use strategies that achieve road safety objectives;
- make road safety a fundamental consideration in the development and management of the road network;
- provide high levels of safety near schools;
- manage the roadside environment to minimise the incidence and severity of accidents;
- identify and implement cost effective road safety improvements;
- implement a speed management strategy;
- undertake at all stages RSA:
- promote the use of new traffic management devices through trialing;
- ensure the safe integration of cyclists with other traffic;
- ensure road designs take account of the operational and behavioural needs of all road users;
- ensure that roads are maintained to an acceptable level of safety.

**Key Initiatives for consideration in NSW:**
ensure that roads are maintained to an acceptable level of safety.

## 4. Overseas Road Environment Safety Strategies

**Goal:**
To reduce all casualty accident by a third by the year 2000 relative to the 1981 / 85 average.

**Strategy:** ***Towards Safer Roads***

The road safety strategy was released in 1997, and is intended to take the UK to the year 2010.

**Road Environment Safety Program**

Outlined below are the Strategy's key safety issues and the road environment safety initiatives directed to each.

***pedestrians***

- implementation of Local Area Traffic Management and Area Wide Schemes;
- increased use of pedestrian facilities in pedestrian activity areas;
- implementation of engineering works associated with a Safe Routes to School Program.

***cyclists***

- application of traffic calming measures;

! segregated bicycle routes (based on BCR values);
- provision of both pedestrian and cyclist facilities at signalised junctions.

*speed*
- increased use of speed cameras
- lower speed limits in residential areas;
- variable speed limits as part of incident detection systems;
- increased use of speed limit repeater signs.

*rural single carriageway roads*
- lowering of the existing 60 mph (i.e., 96 km/h) speed limit to 50 mph (i.e., 80 km/h);
- implementation of Black Spot and Route Treatments;
- use of low cost measures, particularly on curves and at intersections include the use of yellow bar markings on the approaches to intersections, coloured road surfaces on the approaches to intersections, advisory speed warming signs on dangerous bends and vehicle actuated speed warning signs at bends with weather sensitive threshold setting.

*bus and coach safety*
- improved layouts for bus stops to prevent pedestrian accidents. The improvements relate to the provision of more conspicuous and better layed out pick-up and set-down zones, and to the minimisation of roadside furniture and vegetation that may obscure the visibility of pedestrians and motorists.

*driver fatigue*
- application of tactile edgelining.

*road construction improvements (subject to economic appraisal)*
- ensure through traffic by-passes town centres and minor roads;
- undertake remedial treatments outside urban areas that are known to provide safety benefits.

**Key Initiatives for consideration in NSW:**
increased use of pedestrian facilities in pedestrian activity areas;.
provision of both pedestrian and cyclist facilities at signalised junctions;
lower speed limits in residential areas;
application of variable speed limits as part of incident detection systems;
increased use of speed limit repeater signs;
lowering of the existing 60 mph (96 km/h) speed limit on rural single carriageway roads to 50 mph (80 km/h);
improved layouts for bus stops to prevent pedestrian accidents;
application of tactile edgelining on high risk/crash routes.

## 4.2 Sweden

## 4.3 Goal:

In the long run, no one will be killed or seriously injured within the road transport system. The current goals are to:

**Strategy:** ***Towards Safer Roads***

The road safety strategy was released in 1997, and is intended to take the UK to the year 2010.

**Road Environment Safety Program**

Outlined below are the Strategy's key safety issues and the road environment safety initiatives directed to each.

- continuously reduce the total number of fatalities and serious injury road crashes;
- continuously reduce the risk of being killed or seriously injured for all road users;
- achieve a high risk reduction for pedestrians and cyclists, than for motorists, and that special attention be paid for children.

**Strategy:** ***Vision Zero***

The road safety policy in Sweden was first developed in 1982 by the Swedish Parliament and since ratified in 1988 and 1993.

**Road Environment Safety Program:**

To achieve vision zero it will be necessary that responsibility for road safety be shared. When considering the road and its environment, this principal is based on the designers of the system being ultimately responsible for the design, operations and use of the road transport system and are thereby responsible for the level of safety within the entire system.

The current road safety program covering the period 1995 to 2000, focuses on ten (program) areas, one of which require the development of a safer traffic environment.

The road environment safety component of the road safety strategy is comprised of:

- the need to design both urban and rural road and streets where the fundamental design parameter be the road traffic safety need of the most vulnerable groups of road users,
- as a prerequisite to road safety, effective road and street maintenance practices need to be in place.

**Key Initiatives for consideration in NSW:**
design both urban and rural roads and streets where road traffic safety need of the most vulnerable groups of road users has prime consideration..

## 4.3 Netherlands

**Goal:**
To reduce the number of fatalities by 50% and the number of hospital admissions by 40% by 2010.

**Strategy:** ***Road Safety Plan (SVV-II, 1990) - Draft***

**Road Environment Safety Program**
The main aspect of the traffic safety policy related to the road environment involves the application of safe traffic regulations and requires the provision of a road that is designed according to its classification or function as part of the road network.

**Key Initiatives for consideration in NSW:**
elopment of a road environment according to its classification or function, as part of the road network.

## 4.4 Finland

**Goal:**
To reduce fatalities to 370 by the year 2000, and less than 250 fatalities by the year 2005. The road toll for 1989 was 734.

**Strategy:** Road Safety Plans have been developed for the periods 1993 - 1996 and 1997 - 2000

**Road Environment Safety Program**

The road environment safety component of the road safety strategy entailed the following actions;

- improving road safety in built-up areas (i.e., application of Local Area Traffic Management Schemes permitting speeds of no greater than 40 km/h speed limits and the provision of road user facilities);
- reducing the number of run-off road and head-on crashes (by improved signing, applying roadside hazard management strategies, improving road maintenance practices and by reducing speeds in deteriorating weather conditions.

**Key Initiatives for consideration in NSW:**
implementation of lower speed limit in built up areas.

## 4.5 Germany

**Goal:**

The road toll in East Germany, although falling since unification with West Germany in 1991, is about twice that of the former West Germany. The road toll for the Republic of Germany during 1996 was 8,827, 8% less than the previous year. The aim into the 21st century of the Federal Ministry of Transport is to achieve a levelling out of road safety across the entire road network of Germany.

**Strategy:**
The road safety strategy comprises of four parts, traffic education and information, traffic law, road construction and road traffic engineering, and transportation of hazardous goods.

**Road Environment Safety Program:**
The component of the road safety program related to road construction and road traffic engineering include the following measures:

- the application of safe pavements;
- the continued construction of by-pass routes;
- development of traffic dependant traffic management systems;
- application of improved crash barriers on federal interstate highways.

**Key Initiatives for consideration in NSW:**
the application of safe pavements;
□the continued construction of by-pass routes.

## 4.6 European Union

**Goal:**
To reduce fatalities by 7,000 by the year 2000, progressing to a reduction in fatalities of 18,000 by the year 2010.

**Strategy:**
The 1993 Commission launched its first Road Safety Program in 1993. During 1993, the European Union which represent 320 million people, experienced 48,993 road accident fatalities. While the European union is more about trade and commerce, it has recognised the costs associated with road trauma.

**Road Environment Safety Program:**
Road environment safety actions they are seeking to develop or implement in their strategy include:
□ the development of an Interactive high way Safety Design Model;
□ enhancements to road delineation.

**Key Initiatives for consideration in NSW:**

development of an Interactive Highway Safety Design Model;
program to improve delineation

## 4.7 United States of America

**Goal:**

*Federal Hwy Admin (FHWA)* - To continually improve highway safety and to reduce the number of highway related fatalities and injuries by 20%.

*The National Hwy Traffic Safety Administration (NHTSA)* - To reduce total number of highway fatalities and injuries by 20% by the year 2008.

**Strategy:**

*Federal Hwy Admin (FHWA)* - Federal Highway Administration Performance Plan for the President's Fiscal year 1999 Budget.

*The National Hwy Traffic Safety Administration (NHTSA)* - Strategic Plan (Draft), March 1998.

**Road Environment Safety Program:**

Road environment safety initiatives stemming from each of these agencies are as follows:

- promoting Safety Management Processes amongst Federal, State and Local governments, and the commercial transport industry.
- expand technology transfer activities focusing on preventing run-off-road, pedestrian and cyclists crashes;
- maintain programs dealing with roadway design, maintenance and operations;
- conduct research into improving traffic control devices;
- pilot the undertaking of Road Safety Audits in 14 states:
- promote the application of remedial treatments at targeted safety areas.

*The National Highway Traffic Safety Administration (NHTSA)-*

- speed management program, apply road design solutions to moderate vehicle speeds;
- provide work zone safety;
- undertake measures to reduce run-off-road crashes;
- undertake rail crossing safety improvements;
- install and upgrade rumble strips, breakaway poles and roadside barriers:
- widen travel lanes and shoulders;
- improve pavement skid resistance.

**Key Initiatives for consideration in NSW:**
**promoting Safety management Processes amongst Federal, State and Local Government, and**

**the commercial transport industry;**
**implement a Program to widen travel lanes and shoulders, and improve pavement skid resistance.**

## New Zealand

**Goal**
Reduce the number of road fatalities from 514 during 1996 to 470 by 1998/99, and to 420 by 2001.

**Strategy:** Road safety vision was set out in the "National Road Safety Plan 1995".

**Road Environment Safety Program**

The road environment safety component of the road safety strategy entailed the following action:

- crash investigation and monitoring;
- undertaking of Road Safety Audits;
- revision of speed limit setting.
- undertaking of Road Safety Audits
- revision of speed limit setting

**Key Initiatives for consideration in NSW:**
**review of speed limits**

# 5. Potential for new Technologies

## 5.1 Intelligent Transport Systems (ITS)

With the development of new and sophisticated technologies in recent years, particularly in the area of Intelligent transport Systems (ITS), opportunities may be provided which will assist in improving road safety. Major conclusions from a study undertaken by ARRB Transport Research (TR) for Austroads (Cairney, P. and Green, F. May 1998) were that the current major ITS projects were unlikely to provide significant safety benefits until well into the future, and that priority should be given to "niche" technologies that target specific problems.

ITS technologies are applied in three differing interactive ways, namely, the vehicle interacting with the environment, the driver with the environment, and the driver with the vehicle. Such technologies may play a key role in minimising the crash risk associated with hazardous road situations.

ITS technologies have categorised as follows:

- Advanced Traffic Management Systems (ATMS);
- Advanced Traveller Information systems (ATIS);
- Advanced Vehicle Control Systems (AVCS)
- Commercial Vehicle Operations (CVO)
- Advanced Public Transport Systems (APTS)

### 5.1.1 Advanced Traffic management Systems (ATMS)

ATMS are used as a means of improving traffic flow through the road network by managing or coordinating traffic signs operations across the network. During the mid 1970's the Department of Main Roads of NSW developed the Sydney Coordinated Adaptive Traffic Control System (SCATS). It has since been used in 36 cities around the world, including almost all of Australia's major cities. (e.g., Brisbane - BLISS, Brisbane's Linked Intersection Signalling System and Melbourne - SCRA, Signal Coordination in Regional Areas of Melbourne. Because the Melbourne. Because the Melbourne system is the same as that used in Sydney it is also referred to as SCATS). A study conducted by Hodge, Daley and Nguyen (1986) found a reduction in all crash types of 6% following the introduction to the system in Melbourne. The study also revealed, however, that here was a 28% increase in the relatively lower severity rear end types of crashes, and reduction 34% in the more severe right turn against types of crashes.

Similar systems are in operation overseas (eg in the UK. SCOOT, Split, Cycle and Offset Optimisation Technique) is used. The system is similar to the SCAT system, but instead of using data from induction loops located at the signalised intersections the linking strategy uses information obtained from loops located at the signalised intersections the linking strategy uses information obtained from loops located mid-block.

With the rapid increase in technological development the use of ATMS has been extended to now include application in the areas of Automated Highways, Dynamic Management Systems, Incident Section Systems and automatic toll collection. The function of each of these systems involves interaction between the driver and the environment and the vehicle and the environment.

Dynamic Traffic Management (DTM) is another technology used as means of improving road safety. The systems are used to display changeable speed limits on variable message signs. The sped limits are set to vary as driving condition change (i.e., wet, dry, clear, foggy, peak and off-peak traffic flow conditions, etc). Overseas experience in German, Portugal, the Netherlands and, more recently Finland, have found (DTMs of varying technical complexity to be extremely valuable in reducing the number of accidents. More recent developments are seeking to provide a DTM system, which responds to incident detection information. This technology would provide motorist with information related to the appropriate speed that may be required in response to unexpected incidents (e.g., warning of road work, or dangerous driving conditions).

Incident Detection referred to above provide another technology, or processing system, that better and more safely manages vehicles travel through the road network system. When an incident is detected using either motion cameras or detector loops, emergency vehicles respond immediately thereby minimising delays and possible crash risk to other motorists.

The ATMS technologies may also be used as means of enhancing pedestrian safety. currently used in Australia and England PUFFIN crossings are used to safely allow slow moving pedestrians, to cross at signalised pedestrian crossing. With the use of infra red detection units mounted on the traffic signal pedestals, the pace at which pedestrians are moving is detected, and if necessary the pedestrian green time is extended beyond the normal maximum to enable slow walkers to cross safely.

### 5.1.2 Advanced Traveller Information Systems (ATIS)

The use of ATIS provides motorist with the opportunity to gain real time driving information. Victoria currently operates a DRIVE program, which provides motorists with travel times along key routes to major roads, which they are approaching. This information is provided with the use of variable message signs strategically located.

Located on some of Victoria's major arterials that lead onto freeways is information, which is displayed, on variable message signs, advising motorists of Light, medium or heavy traffic flow conditions. Motorists then have the opportunity of taking an alternative travel route. This technology may provide possible safety benefit, as reductions in travel time will result in a lessening in exposure to traffic, which will lead to a reduction in crash risk.

Dynamic Traffic management 9DTM) Systems, which may also be considered to be an ATMS technology, provides information to drivers warning of roadwork, dangerous driving conditions and traffic incidents. Regulatory speed limits may also be varied in response to peak period traffic congestion, with the intention of allowing continuous through movement of vehicles, instead of "stop-start" behaviour (Steele, et al, 1995) this will allow drivers to manoeuvre through a system with reduced conflict and increased safety.

Road Weather Monitoring Systems (RWIS), which are another for of ATIS, allow motorists to adjust their driving speed and behaviour according to the prevailing driving conditions. such systems, which are being used in Portugal, Finland, Germany, Netherlands and the US, have demonstrated positive safety benefits. (ITS International, 1997; TRANSEARCH, 1997; van der Hoogen et al. 1993; Steele et al. 1995; Opitz et al. 1995) Fog detection systems have also been developed and are currently in use in the United Kingdom and Australia (Steele et al 1995.)

### 5.1.3. Advanced Vehicle Control systems (AVCS)

AVCS offer potentially the greatest road safety benefits. The system seeks to remove the driver entirely from the vehicle control operations. The essentially removes from the travelling system errors that may result from poor driver judgement, inadequate driver peripheral vision to road or roadside hazards, and inexperienced or unsafe driver behaviour.

The Nissan Motor Company during 1996, together with Japan's Minister of Transport, developed an Advanced Vehicle control system (ASVC) that had integrated twelve safety features (Sugasawa et al. 1996) Each of the safety features was designed to minimise driver error through intervention. The safety features included:

a) *Obstacle Warning System* - Using a combination of cameras, to detect objects, and radar units, to detect changes in velocity and distance of any objects, in both forward and rearward directions, the driver can be warned of the danger of collision.
b) *Adaptive Cruise Control system* - this system automatically detects changes in headway between the vehicle and other vehicles, performing braking and accelerating when necessary to maintain a particular headway, or speed.
c) *Automatic Braking system for Reduction of Collision Speed* - the speed is automatically adjusted by the vehicle when sensors register the danger of collision with another vehicle, or obstacle on the road ahead.
d) *Night Time Pedestrian Monitoring System* using an infra red sensor, the vehicle will warn the driver of the presence of a pedestrian on the road ahead, the direction of the pedestrian will also be indicated to the driver.
e) *Automatic Emergency Reporting* - the vehicle sensors register an accident upon impact and will automatically send the vehicle's information to emergency services. A manual switch is available to alert authorities of vehicle breakdown or poor health of the driver.

### 5.1.4 Commercial Vehicle Operations (CVO)

Because of the size, manoeuvrability and their dynamics commercial vehicles (buses, rigid and articulated trucks) have a relatively high risk for road crashes. To assist the safe management of these types of vehicles within the road network commercial Vehicle Operations (CVO) systems have been developing. The developments have been mainly in the area of emergency of distress items, vehicle location, safety enforcement and vehicle navigation.

The Roads and Traffic Authority of NSW has operated a system (Safe-T-Cam) that uses video imaging to detect drivers not taking mandatary rest periods or for speeding infringements. the system, which is installed along the major truck routes in NSW, identifies and classifies each truck from the video recorded registration numbers. As the vehicle is detected along the route, the travel patterns can be monitored and checked against a law enforcement database. Similar systems are proposed in other Australian states.

### 5.1.5 Advanced Public Transport Systems (APTS)

The development and use of Advanced Public Transport systems (APTS) technologies have undertaken with the objective of increasing the attractiveness of using public transport for commuters and assist in minimising the level of traffic congestion of the road network. As a consequence of reducing the level of vehicular activity, the reduction in exposure may be expected to provide road safety benefits.

The system outputs provide commuters with waiting and travelling times information, and also allow public transport priority through road network. The system is operated with

transponders that are attached to vehicles, which interact with traffic signals along the route ahead.

### 5.2 Roadside Hazards / Delineation

In an effort in the USA to address the roadside safety problem, the National cooperative Highway Research Program (NCHRP) drew together a key group of "experts" with the aim of identifying the best ways in which to improve the safety of the roadside environment. the group developed the following vision:

"A highway system where drivers rarely leave the road, but when they do the vehicle and the roadside come together to protect vehicle occupants and pedestrians from harm" (Opiela and McGinnis 1997).

To realise this goal the group developed 5 basic aims for transport agencies, namely:

1. "increase the awareness of roadside safety and support for it" - this goal seeks to educate people about the problems associated with roadside safety, and to achieve a coordinated approach to dealing with the problem with key stakeholder groups (i.e., transport groups, manufacturers, motoring associations and advocacy groups, etc).

2. "build and maintain information resources and analysis procedures to support continued improvements in roadside safety" - this involves the gaining of greater understanding between the interaction between the driver and their environment in order that cost effective remedial treatments may be developed. This goal also proposes that an improved roadside inventory system supported by state-of-the-art computer analysis techniques to monitor changing roadside conditions and their resultant influences on roadside safety should be established. it is further considered that safety auditing and safety managements systems can also be used in an effective manner to improve roadside safety.

3. "keep vehicles from leaving the roadway" - this initiative seeks to prevent motorists from leaving the carriageway by improving highway design, and by using innovative vehicle based systems which are presently being developed. The use or audible or tactile edgelining is suggested as a relatively low cost treatment that may be applied on roads experiencing particular types of roadside safety problems. it is further suggested that maintenance practices need to be diligently applied to ensure that the skid resistance properties of roads are retained, edge of shoulder seal drop-offs do not prevail and that potholes are avoided.

4. "keep vehicle from overturning or striking objects on the roadside when they leave the roadway" - This aim seeks to ensuring the roadside environment is design and maintained to reduce the potential for vehicles rolling over or striking roadside objects. Actions that would stem from this goal are to ensure batter and embankments slopes provides a smooth surface that will prevent errant vehicle from snagging and turning over, and the angel of slope is "non-critical" (recoverable slopes are 1:4 or flatter, non-recoverable slopes are between 1:3 and 1:4, critical slopes are steeper than 1:3). The initiative also seeks to minimise the presence of poles and trees along the roadside, and suggest strategies for removing trees in particularly hazardous locations, such as on the outside of tight curves.

5. "minimise injuries and fatalities when overturns occur or objects are struck on the roadside" - this goal requires that better guidance is provided to road design and safety practitioners in the selection, design installation of roadside barriers.

   Developments in recent years have now made available impact attenuating materials that minimise damage or injury to motorists and their vehicles when leaving the carriageway. the material (carney J 1997), sometimes referred to as "smart" material (high molecular weight / high density polyethylene) is designed to be used as an end treatment crash cushion. the advantage of this type of material is that following a collision it regains its shape (to 90%), is reusable and has no after crash down time. the 3 models available using this material (REACT 350.9 tested at 100 km/h, REACT 350:6 tested at 88:5 km/h and REACT 350:4 tested at 70 km/h) have now been accepted by the Federal Highway Administration for use on the National highway System under NCHRP Report 350 guidelines.

   To improve delineation around curves a study undertaking in Japan trialed the use of Flashing Delineators (FD) on the centre line around curves of two-lane rural roads. The findings of the trial (Mitsui 1998), showed that the use of FDs improved safety of both inside and outside of lanes on horizontal curves. It was suggested that the optimal spacing of the FDs is 5 m. The study deduces that FDs may also provided benefits if also used on both edges of the road.

   The availability from (SJC - Sekisui Jushi Corporation, Japan) of solar powered raised markers now also offers the opportunity to better delineate either carriageways straight or curved, particularly at night.

   The cost for the supply, installation and maintenance of FDs and solar powered raised pavement markers is unavailable.

### 5.3 Perceptual Countermeasures

Speed or speeding has been identified as a major factor in the occurrence and severity of road crashes. Studies conducted overseas have identified speed as a factor in about 37% of fatal road crashes, while in Australia investigations have estimated that speed was a contributing factor in about 30% of all fatal crashes. while the personal cost to the community is high, it has been estimated that the monetary cost Nationally is up to $1 billion annually, and for Victoria about $260 million and NSW $470 million annually.

While the application of enforcement, education / publicity and engineering programs have assisted in reducing speed as factor in road crashes, supplementary measurers are need to achieve further control of unsafe driver speed behaviours, particularly at hazardous locations.

To assist in the identification of future directions in this area Fildes and Lee (1993) undertook a major investigation involving leading experts from across Australia. A key direction provided by this assessment was the need to develop low cost perceptual countermeasures designed to reduce driver speed on roads. Theses are generally low cost road and environment measures that are designed through their psychological effect on motorists to

influence lower driver speed behaviours. Most often they use varying road paint markings as the visual queues to lower driver speeds.

In response to this investigation the Federal Office of Road Safety (FORS) and the Road Traffic Authority (RTA) of NSW commissioned Monash University Accident Research Centre (MUARC) and ARRB Transport Research (TR) to conduct a major study into this area. The study comprise four phases running over several years. The topic of each of the phase and its status is as follows:

1. Perceptual Countermeasures: Literature Review. CR4/94 (FORS and RTA NSW), B.N. Fildes and J.R. Jarvis, November 1994.

II. Perceptual Countermeasures: Simulator Validation Study CR 169 (FORS) and RR 1/97 (RTA NSW), B.N. Fildes, S. Godley, T. Triggs and J.R. Jarvis, April 1997.

III. Perceptual Countermeasures: Modelling of Perceptual Treatments (expected to completed December 1998).

IV. Perceptual Countermeasures: Trialing of Perceptual Safety Treatments (expected to commence March 1999).

The Phase I literature review conducted identified a range of road measures that were effective in influencing driver speed behaviour. The types of treated identified included transverse lines checked and herringbone edgelines and widened centrelines (painted and hatched).

Phase 2 of the study sough to compare driver responses to a particular type of perceptual countermeasures (transverse lines) on suburban road with those obtained in a driver simulator (located at Monash University, Victoria). The major conclusions of the study were that:

- the simulator was suitable for testing different types of perceptual countermeasures;
- transverse lines on urban roads affect lower speeds;
- if transverse lines had an audio impact they would be more effective in driver speed behaviour.

Figures 1 and 2 provide examples of perceptual countermeasures to be considered for implementation as part of final phase of final phase of the study.

The final phase of the study proposes to trial the perceptual treatments that have demonstrated the greatest safety benefits (in terms of improved speed behaviour), based on outcomes of the early phases of the project. It is proposed that the trial uses only one type of treatment at each of the mid-block and intersection locations. It is proposed initially that the trial uses only one type of treatment at each of the mid-block and intersection locations, and that the site trialed be located in rural areas within NSW and Victoria. It is intended that a total of 6 locations within each State are trialed, and that the sites selected for trialing will have had a demonstrated speed related safety problem.

The evaluation will entail making and measuring a range of observations at treated and untreated locations to measure the possible impact of the perceptual countermeasure treatments.

Since the commencement of this study a further type of perceptual countermeasure has been developed (by SJC - Sekisui Jushi Corporation, Japan). A stick down 2 dimensional (tape) product is now available which gives a 3 dimensional colour illusion. Incorporated into the tape down sheets are reflective beads designed to provide increased reflectively during night time and wet weather driving conditions.

**Key Initiatives for consideration in NSW:**
**ITS technologies are still evolving and are a potentially high cost investment;**
**opportunities exists to use relatively low cost technologies and products at specific locations;**
**the development of perpetual countermeasures, as means of affecting safer driver speed behaviours may develop as a low cot safety measure.**

# 6. Strategic Direction

## 6.1 Discussion

A major requirement of any future Road Environment Safety strategy is that it carry forward those programs that have proven their worth, and which are expected to delivery further road safety benefits. Combined with the Behavioural Safety, Vehicle engineering and emergency Medical programs and services, the road toll is expected to fall buy about 45% by the year 2010. To ensure that the anticipated or optimal benefits are achieved from the Road Environment Safety program, it is essential that actions emanating from the program are effectively administered and implemented.

While substantial reductions in the road toll are expected to be achieved through current and expected programs and initiatives, (i.e., Accident Black Spot program, and road construction programs, major and minor), the estimates have not recognised the current and potential benefits, which may be derived from other areas, (i.e., Road Safety Audits, particularly as they relate to stages 1 to stage 5; the impact of speed management and local area traffic management strategies; ITS technologies; travel demand management; and the ongoing development and use of new safety products). It may therefore be expected that additional benefits to that predicted (Vulcan and Corben 1998), will be attained with the inclusion of these initiatives.

A major conclusion that may be drawn from the examination of ITS technologies is that they are still evolving, and very costly. While this is generally the case, some opportunity exists for the application relatively low cost technologies at specific locations (e.g., Internally

illuminated advisory speed limit signs, which may be activated during foggy conditions on roads in fog prone areas).

The application of perceptual countermeasures has also been identified as a low cost initiative that may potentially provide significant road safety benefits at some hazardous road locations. The Roads and Traffic Authority of NSW and the Federal Office of Road Safety (FORS). In recognition of this potential initiated a major study is about to enter its final phase.

Investigation of Road Safety Strategies both in Australia and overseas, with specific focus on road environment safety program, has id4ntified a number of opportunities for the enhancement of future programs in NSW. Each of these opportunities has been identified through the body of this report and summarised in Section 6.2 below.

## 6.2 Strategy Options

Following the investigation of current practices in Road Environment Safety in NSW, across Australia, and in a number of overseas countries the following future strategic direction options are put forward for consideration.

***Accident Blackspot Treatments / Roadside Hazards***

Review the operation of the program to ensure the remedial works provide maximum road safety benefits. This revision should involve the following:

- ensure Regional personnel investigating and developing remedial treatments are skilled in the collection and analysis of crash data, and the identification of the most appropriate accident countermeasures. This may require the training and/accreditation of accident investigators much in the same way as Road Safety Auditor;

- institute of Quality Management process whereby line managers are required to sign off each investigating, ensuring that the investigatory processes are applied and the quality of the remedial works meets the desired standard;

- monitor and evaluate the effectiveness of implemented works;

- expand the opportunity to implement Mass Action safety measures (e.g., Broad use of tactile edgelining, shoulder sealing, use of frangible or slip-based poles, etc);

- the development of up to date and quick response GIS crash data bases. This development will assist in the development of mass action programs, the prioritisation of Road Safety Auditing outcomes and the monitoring and evaluation of remedial works;

- implement as a treatment option dynamic warning systems at hazardous road locations (e.g., Wet, foggy, etc);

- continue the current Program focus on Local Area Safety, and Roadside Hazards. The expenditure of road safety funds on rest areas are not considered an effective expenditure of

road safety funds, to date there is insufficient evidence to show that the provision of these facilities

- provide a greater program focus on Pedestrians and Cyclists, Route and Area management, Heavy Vehicle routes, Delineation (using new methods and practices, such as profile edge lining), Intersection Management and Land Use Planning. These are key issues specified as part of Road Safety 2000.

***Road Safety Audits / road Quality***

- develop and use GIS as a basis for prioritising the works emanating from Audits;

- provide minimal funding levels for the funding of works emanating from Road Safety audits. While Audits provide a pro-active approach to road safety, limited available road safety funds will provide measurable reductions in road crashes, as distinct from possible reductions in crash occurrence. Maintaining minimal levels of Auditing will provide the opportunity to identify and correct possible inherent deficiencies in Road Design Standards;

- promote the use of EASy Audit (i.e., Expert computer system developed by the RTA to assist in the conducting of Road Safety Audits);

- ensure all Road Safety Auditors are accredited;

- ensure all Road Safety Auditors are accredited;

- ensure all design and construct contracts specify the requirements to conduct formal Road Safety audit for stages 1 to 4;

- undertake a sign of process for line managers to confirm the undertaking of the specified audits, together with the formal response to report by the responsible Project Manager to issues raised in the Audit report;

- undertake a sign off process for line managers to confirm the undertaking of the specified audits, together with the formal response to report by the responsible Project Manager to issues raised in the Audit report;

- undertake a monitor of the projects undertaken at the Regional and major project level to identify the number of projects in hand, the Audits conducted and responses provided;

- undertake compliance audits to ensure the quality of the Audits conducted;

- road design standards should be revised under a sunset clause, or elements reviewed if found deficient as a result of RSA or ABS investigations;

- review road maintenance practices to ensure those segments of the road networks subject to higher crashes risk are more regularly maintained.

- a part of the road maintenance quality check undertake and report at the Regional level periodic compliance inspections of the road networks

***Speed***

- undertake a review of speed limits in NSW:
- promote the use of NLIMITS amongst Regions and Local Governments;
- establish a lower 50 km/h residential street speed limits;
- implement dynamic speed limit and advisory speed and warning systems.

***Land use Planning / Travel Demand management / Traffic Signal Linking Plans***

- conduct a Road Safety audit of systems and plans associated with each of these key areas.

***New Technologies***

- maintain a watching brief on ITS technologies. The technologies are generally high cost and still evolving;

identify opportunities to use relatively low cost technologies and products at specific locations (e.g., Flashing or internally illuminated pavement markers, PUFFIN crossing);

- continue the investigation and development of perceptual countermeasures, as means of affecting safety driver speed behaviours may develop as a low cost safety measure.

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# DIRECTIONS IN ROAD USER PROTECTION

Michael Paine
Vehicle Equipment and Design

## Introduction

*Project background and report structure*
A project to determine strategic directions in road user protection was commissioned by the Roads and Traffic Authority to provided into the new road safety strategy for the next decade for New South Wales – Road Safety 2010. The project was also commissioned to provide a revision of road user protection developments worldwide, with a view to developing better practice.

This report provides an examination of:

- why vehicle safety in general and road user protection issues specifically is of crucial importance in efforts to reduce the road toll.
- What the recommended strategic priorities for road user priorities are from Australian international literature and practice.
- how current Roads and Traffic Authority road user protection programs align with the recommended strategic priorities
- and what is recommended for the future.

These areas are developed in sequence through the body of this report, as indicated in the table of contents

*Addressing the vehicle component of the road safety has potential to influence a large proportion of crashes and road trauma*
It is estimated that around 13% of crashes occur where vehicle factors (mainly defects) were causal or contributing factors. It was estimated in a 1977 study in Indiana that a further 20% of crashes could have been avoided at the time through improved design. Hence, nearly 33%, or one third of crashes could have been influenced by enhanced vehicle crash avoidance countermeasures. For the remaining "unavoidable" crashes, Swedish researchers have identified that a 40% reduction in fatal and serious injuries could occur if all cars were designed to equal the crash worthiness of the best current car in each class. Hence, up to a further 27% of crashes could be made less severe by improved occupant protection using current technology. Hence, up to 60% of all crashes can be influenced by addressing vehicle factors.

*A variety of literature sources and websites were used to identify innovations in road user protection*

Road user protection measures can be described as those designed to enhance the safety of vehicle occupants and of their users of the road.

The literature search relating to road user protection included the following sources:
- Road Safety and Technology library
- ROAD database
- VicRoads library and staff
- Monash University literature sources were also used to the study
- ESV conference proceedings
- and a variety of international and Australia websites

An annoted bibliography was constructed to provide details of the literature reviewed (not included). A workshop was also planned to obtain and develop input from experts working in the vehicle and road user protection area. This workshop was subsequently cancelled.

*The benefits of road user protection could provide the key to a large reduction in serious and fatal crashes*

Road user protection is primarily about preventing or mitigating injuries *in the event of a crash.* Swedish estimates of crash savings are based on current best practice – that is, vehicles currently in production. Further benefits are expected to arise from the application of advanced technology to road user protection, particularly, through the rapid developments in electronics and communications.

Three mechanisms of road user protection are revealed by the literature:
- decreasing the risk of injury to vehicle occupants
- decreasing injury risk to vulnerable road users (pedestrians, cyclist, motorcyclists and occupants of smaller vehicles)
- providing prompt rescue and medical assistance to crash victims

Each of these mechanisms is described in more detail.

*Minimisation of hazards to vehicle occupants and vulnerable road users, in combination with enhanced post crash responsiveness will provide improved road user protection*

Occupant protection can be improved by minimising:
- secondary collisions between occupants and unyielding vehicle parts
- crushing or entrapment by intruding or deformed vehicle components
- poor occupants kinematics or inappropriate loading of the body by restraint systems (e.g. seat belts, seats, head restraints and airbags)
- fire or chemical burns
- lacerations from sharp objects
- ejection, partial ejection or direct exposure to external hazards

Vulnerable road user road trauma can be mitigated by minimising:

- unyielding, sharp or projecting structures on the exterior vehicle, mainly frontal design)
- hazardous kinematics of the vulnerable road user (such as being trapped under the vehicle)
- the impact speed

Prompt rescue and medical treatment of crash victims

- reducing the risk of entrapment
- improved notification of rescue services following serious crashes
- faster response times through navigation aids
- in-situ and in-transit diagnosis and medical advice to rescue personnel

*Marketing an public education will play an important role in facilitating the implementation of road user protection strategies*

Aggressive promotion of promising innovations, such as smart airbags, is required to assist their market penetration. Improved presentation and accessibility of vehicle safety information is required. Specific program aims should include:

- encouraging the purchase and proper use of safety use of safety equipment
- encouraging the purchase of newer, safer vehicles
- discouraging the purchase of aggressive vehicles/accessories
- encouraging driver to travel at speeds appropriate to the conditions

Education, taxation incentives/exemptions, and influencing government, community and media are other appropriate strategies to be developed.

Consumer demand initiatives such as the New Car Assessment Program (NCAP), Used Car Safety Ratings and Buyers Guide to Child Restraints have provided a good start in this area and we are worth considering for other areas of vehicle safety.

## Road user protection priorities

Priorities for road user protection were determined using some decision making criteria to assist ranking. The factors used to determine relative rankings were:

- Estimates of crash and injury savings
- The economic feasibility of implantation
- The practicality of implementation
- Community and political acceptance of the initiatives (it was recognised that some initiatives would be highly effective but impossible to implement at present).
- Lag time for implementation and effectiveness in the short and long term
- The readiness of technologies in relation to the stage of deployment (whether at start-up, take-off, harvest, saturation or exhaust phase), as depicted in the diagram opposite and explained overleaf

*Assessing the phases of implementation assisted in determining the utility of countermeasures to assist with short and long term reductions in road trauma*

Each issue has an estimated assessment of implementation phase indicated in the 'stage' column. Definitions of each phase are provided in the table below

| Phase | Description | Characteristics |
|---|---|---|
| Start-up | Initial research, prior to production. Prototypes. | High effort for little or not tangible road safety results (Prospects of moving to start-up stage fuel the research. |
| Take-off | Introduced to market on a limited basis. Typically safety features on up-market vehicles. | Accelerating returns. Beginning of good returns on efforts. |
| Harvest | Increasing market penetration. Eventually expected by consumers as optional equipment. | Steady returns on efforts. |
| Saturation | Most new models have the safety feature. Expected by consumers as standard equipment. Regulation may be acceptable to industry at this phase. | Diminishing returns on efforts. |
| Exhaustion | Only models near the end of their production life do not have the feature. | High effort for little or no results plus no prospect of further gains. |

Four broad categories of road user protection issues were determined:

- Protection of car occupants (issue codes begin with A)
- Vulnerable road user safety issues (issue codes begin with B)
- Bus and truck occupant safety (issue codes begin with C)
- Other strategic and management issues (issue codes begin with D)

Road user protection issues were divided into priority areas relating to the short and long term goals and the achievement of Road Safety 2010.

Short term priorities, or those that would reap a reward in the near future, and longer term priorities where these priorities will take longer to implement and come on line but will usually have a greater lasting effect

*Priorities for road Safety 2010*

A series of priorities were developed to achieve the ambitious targets set out in 2010, these were aimed at halving the road toll in the next ten years. Overall priorities were determined by aggregating the contribution to road safety that road user protection measures can yield in the:

- short term
- long term
- context of Road Safety 2010 objectives

Occupant protection subissues presented in the following pages provide scores for the contribution the initiatives make to short. long and 2010 priorities. The subissues are scored from 0 (low) through to 5 (high) and are presented in an unranked fashion.

SUB ISSUES RELATING TO CAR OCCUPANT PROTECTION

| Issue # | Issue | Short | Long | 2010 |
|---|---|---|---|---|
| AOI | Systems approach to occupant restraint systems | 5 | 4 | 4 |
| A02 | Advanced occupant restraint systems | 5 | 2 | 4 |
| A03 | Structural integrity of passenger compartment | 4 | 3 | 4 |
| A04 | Improved frontal crash protection | 4 | 3 | 3 |
| A05 | Improved side impact protection | 4 | 2 | 3 |
| A06 | Improved rear impact protection | 2 | 2 | 2 |
| A07 | Improved roll-over protection | 2 | 2 | 2 |
| A08 | improved glazing | 3 | 3 | 1 |
| A09 | Improved fuel system integrity | 2 | 1 | 2 |
| A10 | Improved seat and head restraint design | 4 | 3 | 1 |
| A11 | Improved leg protection for car occupants | 3 | 2 | 1 |
| A12 | Reduced likelihood of entrapment (see also "extrication") | 2 | 2 | 1 |
| A13 | Restraint of large and small adults | 3 | 3 | 3 |
| A14 | Airbags and child occupants | 1 | 1 | 0 |
| A15 | Improved child restraints designs | 3 | 3 | 2 |
| A16 | Improved restraint system usage | 4 | 4 | 4 |
| A17 | Improved head protection for vehicle occupants | 4 | 3 | 3 |
| A18 | Improved extrication of occupants from crashed vehicles | 3 | 2 | 3 |
| A19 | Improved notification of rescue services about serious crashes ("Mayday") | 2 | 1 | 2 |
| A20 | Improved rear seat design | 3 | 2 | 2 |

SUB ISSUES RELATING TO CAR OCCUPANT PROTECTION

| Issue # | Issue | Short | Long | 2010 |
|---|---|---|---|---|
| A21 | Ageing vehicle fleet | 4 | 2 | 4 |
| A22 | Reduce vehicle to vehicle incompatibility | 4 | 3 | 4 |
| A23 | Improve roadworthiness | 1 | 1 | 1 |
| A24 | Effects of ageing on safety equipment | 2 | 1 | 0 |
| A25 | Safety of electric vehicles and non-petroleum fuelled vehicles | 1 | 0 | 0 |
| A26 | Vehicles and equipment for persons with disabilities | 1 | 0 | 0 |
| A27 | Reduce hazard from towing a caravan or trailer | 1 | 1 | 1 |
| A28 | Taxi Safety | 3 | 3 | 1 |
| A29 | Cargo barriers | 2 | 2 | 0 |
| A30 | Protection for older drivers | 3 | 2 | 2 |

SUB ISSUES RELATING TO ENHANCED PROTECTION OF VULNERABLE ROAD USERS.

| Issue # | Issue | Short | Long | 2010 |
|---|---|---|---|---|
| B01 | Improved vehicle frontal design for pedestrians | 2 | 2 | 2 |
| B02 | Reduced aggressivity of impacting vehicle (less risk to other occupants) | 4 | 3 | 4 |
| B03 | Motorcycle airbags and crash protection devices | 1 | 1 | 0 |
| B04 | Improved head protection for motorcyclists and cyclists | 3 | 3 | 2 |
| B05 | Improved helmet wearing rates for motorcyclists and pedal cyclists | 4 | 4 | 2 |
| B06 | Improved leg protection for motorcyclist | 0 | 0 | 0 |
| B07 | Alternative transport for pedal cyclists when conditions are hazardous | 1 | 1 | 0 |
| B08 | Improved conspicuity of pedestrians cyclists and motorcyclists | 2 | 2 | 1 |
| B09 | Fire risk in motorcycle crashes | 2 | 2 | 0 |
| B10 | Protective Clothing | 2 | 2 | 0 |

SUB ISSUES RELATING TO BUS AND TRUCK SAFETY

| Issue # | Issue | Short | Long | 2010 |
|---|---|---|---|---|
| C07 | Improve pedestrian safety around school buses | 2 | 2 | 0 |
| C02 | Improve door systems on buses (to reduce risk of entrapment) | 1 | 1 | 0 |
| C03 | Improve occupant protection in route-service and school buses | 2 | 2 | 0 |
| C04 | Fire risk in heavy vehicles | 1 | 1 | 0 |
| C05 | Improve seat belt wearing rates in buses and trucks | 4 | 4 | 4 |
| C06 | Improve rollover strength (buses) | 2 | 1 | 1 |
| C07 | Improve security of loads on trucks | 2 | 2 | 0 |
| C08 | Effectiveness of buss emergency exists | 1 | 1 | 0 |
| C09 | Special purpose vehicles | 0 | 0 | 0 |
| C10 | Truck cabin strength | 2 | 2 | 2 |

SUB ISSUES FOR STRATEGIC AND MANAGEMENT INITIATIVES

| Issue # | Issue | Short | Long | 2010 |
|---|---|---|---|---|
| D01 | Influence coverage of vehicle safety in car marketing | 4 | 4 | 4 |
| D02 | Influence coverage of vehicle safety by the media | 3 | 3 | 2 |
| D03 | Monitor vehicle factors in accidents | 3 | 3 | 2 |
| D04 | Influence vehicle safety content of tertiary education | 2 | 2 | 0 |
| D5 | Monitor developments in ITS, transport and environmental policies | 1 | 0 | 0 |
| D6 | Monitor developments in RUP technology | 4 | 3 | 3 |
| D7 | Availability of optional safety equipment | 4 | 4 | 2 |
| D8 | Insurance incentives for safety equipment | 3 | 3 | 2 |
| D9 | Feedback on traffic injuries | 2 | 1 | 2 |
| D10 | Improve response of emergency services | 4 | 3 | 4 |
| | Establish a statement of principles on road user protection | 4 | 4 | 4 |
| D12 | Exchange research information with Australian and overseas organisations | 4 | 3 | 4 |
| D13 | Influence safety decisions of fleet purchasers | 4 | 5 | 4 |

For short term gains in road user protection, priorities which take advantage of current research and production technology were identified:

- Improved understanding of injury mechanisms and trends
- Encourage best practice in vehicle design for occupant protection. In particular, encourage the purchase of new vehicles with airbags
- Raise road user awareness of vehicle safety issues
- Discourage aggressive vehicle designs
- Improve the quality of child restraint installations and use:

In addition to the short term priorities, longer term priorities for road safety were directed towards...

- Reducing the number of older vehicles in the fleet
- Improved designs and technology to reduce the risk of entrapment and to improve rescue efforts.
- A range of improvements to bus safety
- Establish principles of assessment for road user protection initiatives

Upon analysing priorities that would achieve road safety 2010 goals, the following initiatives were suggested as being high priority:

- Encouraging best practice in vehicle design for occupant protection
- Discourage aggressive vehicle designs
- Improved understanding of injury mechanisms and trends
- Improved designs and technology to reduce the risk of entrapment and to improve rescue efforts
- Raise road user awareness of vehicle safety issues, particularly in relation to seat belts, airbags, child restraints and helmets.

## Overall Priorities

Overall priorities were derived that would yield a high road safety return in the immediate and longer term future; these are listed below from highest to lowest priority:

1. Improving the understanding of injury mechanisms and analysis of trends

2. Encouraging best practice in vehicle design

3. Discouraging aggressive vehicle designs

4. Raise road user awareness of the importance and effectiveness of safety equipment.

5. Improving the survivability of crashes

6. Encouraging better design and use of child restraints

7. Reducing the proportion of older vehicles in the fleet

8. Improving bus safety

9. Establish principles for the assessment of road user protection initiatives

Each of these nine priority areas is outlined in further detail in the following pages

1. IMPROVING THE UNDERSTANDING OF INJURY MECHANISMS AND ANALYSIS OF TRENDS

- Monitoring/fostering of research relating to impact biomechanics
- Improved crash investigation and training, and improved reliability of reporting from crash investigators and the police.
- Further research into the effects of recent occupant protection developments such as airbags
- Investigation of the benefits of emerging technology, such as ITS applications to injury minimisation.

2. ENCOURAGING BEST PRACTICE IN VEHICLE DESIGN

- Promote/encourage occupant protection systems which have shown to be highly effective.
- Monitor international developments, including ITS developments that afford improved safety for vehicle occupants and other road users
- Monitor the 'real world' crash performance of vehicles (use Car Safety Rating) and identify the best performers
- continue consumer testing programs such NCAP
- Enhance media advertising and media coverage of road safety topics to expand coverage of safer vehicle aspects.
- Promote appropriate national regulations that lead to safer vehicles
- Encourage increased availability of optional safety equipment

3. DISCOURAGING AGGRESSIVE VEHICLE DESIGNS

- Identify and address aggressive designs that pose a threat to other road users
- Conduct and monitor research into pedestrian, bicycle and motorcycle impacts as well as impacts between small and large vehicles
- Promote less hazardous alternatives to traditional equipment such as rigid bullbars
- Encourage fleet compatibility in size and mass
- Ensure vehicle-to-vehicle compatibility that allows safety systems to be engaged and crash energy to be absorbed by components designed for this purpose.

4. RAISE ROAD USER AWARENESS OF THE IMPORTANCE AND EFFECTIVENESS OF SAFETY EQUIPMENT

- Communicate road safety messages in terms that are easily understood by the public
- Improve the use of seat belts, child restraints and cycle helmets
- Put the role of airbags in perspective – i.e. as a supplementary restraint in a severe crash rather than as a primary protective mechanism
- Increase consumer awareness of safety in vehicle (and equipment) selection and so influence manufacturers, politicians and the media.
- Increase fleet purchaser awareness of safety issues when purchasing vehicles.

5. IMPROVING THE SURVIVABILITY OF CRASHES

- Reducing the risk of entrapment
- Promote designs that offer improved lower limb protection
- Further research into automated crash and emergency services notification upon severe impact
- Enhance rescue services response times through ITS prioritisation for emergency vehicles
- Monitor the potential for in-situ and in-transit medical diagnosis via video links to hospitals

6. ENCOURAGING BETTER DESIGN AND USE OF CHILD RESTRAINTS

- Encourage better designs of child restraints
- Contribute to international standardisation of child restraint anchorages
- Promote the correct use of child restraints
- Encourage increased use of child restraints

7. REDUCING THE PROPORTION OF OLDER VEHICLES IN THE FLEET

- Increase the proportion of new safer cars (occupants in older cars have twice the risk of fatal/serious injuries compared with newer vehicles)
- Provide incentives for the public to buy new vehicles and scrap older vehicles
- Monitor the involvement of older vehicles in crashes and factors which may have contributed to injures
- Monitor the effectiveness of safety equipment as vehicles age.

8. IMPROVING BUS SAFETY

- Trial padded hand rails in route service and school buses
- Increase the conspicuity of school bus warning lights
- Promote door designs that decrease the risk of entrapment for disembarking passengers
- Enhance the seat belt wearing rates in coaches
- Promote the voluntary upgrading of the safety of existing buses in accordance with the National Code of Practice.

9. ESTABLISH PRINCIPLES FOR THE ASSESSMENT OF ROAD USER PROTECTION INITIATIVES

- Provide guidance to Roads and Traffic Authority staff and researchers assessing the feasibility of new technology and other promising developments in the Road user protection field
- Improved crash investigation and training, and reliability of reporting from crash investigators.
- Include information on:
    - road user protection objectives
    - the status of road user protection technology and lead time to production
    - methods of assessing benefits and costs of road user protection safety mechanisms
    - ways of addressing barriers to implementation (regulations, consumer demand, promotion, financial support, fleet specifications etc.)

## Strategic alignment with current programs

There are eight current Roads and Traffic Authority programs in the road environment and vehicle safety section relating to vehicle factors and road user protection

- Crash protection
- Crash avoidance
- Road worthiness
- Consumer safety information
- Occupant restraint use
- Crash investigation
- Heavy vehicle safety
- Bus and coach safety

Some of these programs are more active than others

Analysis of the present programs against strategic priorities revealed shortfalls in the following areas:

- There should be better exchange of information with other state authorities, insurance companies and medical researchers about road trauma.
- Develop a dynamic, updatable system to monitor developments in road user protection research (possibly by enhancement of the annotated bibliography)
- Ensure ongoing monitoring of safety developments in new production vehicles
- Give consideration to alternatives to regulations, such as incentives to encourage the availability of optional safety equipment
- Increase the awareness by vehicle purchasers of agressivity issues and the risks posed to other road users.
- Increase promotion and observational surveys that enhance the ability of parent/carers to correctly fit child restraints
- Increase the focus on post crashes issues, which tend to have been neglected in the past.
- Establish principles for assessment of road user protection

## Recommendations

Recommendations for the future were developed in five key areas after analysing overall road user protection priorities against current programs:

1. Standards and regulations
2. Research and monitoring
3. Education and consumer information
4. Advocacy and promotion
5. Strategic alignment of programs

Recommendations within each category have been ranked in priority order to be addressed, and suggested activities for each of these areas in future are detailed as follows:

STANDARDS AND REGULATION PRIORITIES

1. Systems approach to occupant restraint systems in the ADR's
2. Seat belt wearing in taxis, buses and trucks
3. Vehicle to vehicle incompatibility and aggressivity
4. Structural integrity of the passenger compartment
5. Availability of optional safety equipment (key safety items must be available, at least as an option).
6. Improved front crash protection
7. Improved seat and head restraint design
8. Improved protection for older drivers
9. Improved rear seat design
10. Improved child restraint and anchorage designs
11. Improved roll-over protection
12. Improved vehicle frontal design for pedestrians
13. Review the effectiveness of cargo barriers

RESEARCH AND MONITORING PRIORITIES

1. Establish a statement of principles on road user protection
2. Exchange research information with Australian and overseas organisations.
3. Monitor developments in RUP technology
4. Investigate a systems approach to occupant restraint systems
5. Reduce vehicle to vehicle incompatibility
6. Structural integrity of passenger compartment
7. Reduce aggressivity of impacting vehicle (less risk to other occupants)
8. Monitor availability of optional safety to equipment.
9 Investigate improved frontal crash protection
10 Investigate improved seat and head restraint design
11 Improve protection for older drivers
12. Improve rear seat design
13. Improve roll-over protection
14. Improve vehicle frontal design for pedestrians
15. Improve seat belt wearing rates in buses and trucks
16. Review taxi safety

EDUCATION AND CONSUMER INFORMATION PRIORITIES

1. Improve restraint system usage
2. Improve seat belt wearing rates in buses and trucks
3. Influence emphasis on safety in car marketing
4. Influence safety decisions by fleet purchasers
5. Encourage reduced vehicle to vehicle incompatibility
6. Encourage reduced aggressivity of impacting vehicle (less risk to other occupants)
7. Encourage the purchase of newer, safety vehicles and the scrapping of older vehicles
8. Improve head restraint positioning
9. Improve child restraint designs to reduce misuse
10. Improve helmet wearing rates for motorcyclists and cyclists
11. Influence coverage of vehicle safety by the media
12. Improve conspicuity of pedestrians, cyclists and motorcyclists

13. Improve pedestrian safety around school buses
14. Improve security of loads on trucks

ADVOCACY AND PROMOTION PRIORITIES

1. Influence emphasis on safety in car marketing
2. Encourage reduced vehicle to vehicle incompatibility
3. Encourage reduced aggressivity of impacting vehicle (less risk to other occupants)
4. Promote (possibly mandate) the availability of optional safety equipment
5. Improve the response of emergency services
6. Influence coverage of vehicle safety by the media
7. Promote insurance incentives for safety equipment
8. Promote taxi safety initiatives
9. Encourage improved rear seat design (anti-submarining and centre lap/sash seat belt)
10. Encourage improved roll-over protection
11. Monitor feedback on traffic injuries from medical researchers

PRIORITIES FOR STRATEGIC ALIGNMENT OF PROGRAMS

1. Restructure programs to focus on priority areas such as standards and regulation, research and monitoring, education and consumer information a, advocacy and promotion.
2. Pursue greater emphasis on post crash issues
3. Undertake strategic scanning in priority areas
4. Continue to align with national strategies and priorities
5. Pursue joint partnerships in projects to provide cost effective expenditure and strengthen relationships with stakeholders.

# CURRENT AND EMERGING STRATEGIES FOR SECURING COMPLIANCE WITH ROAD TRANSPORT LAWS

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*SOURCE: McIntyre, K. (1999). Current and emerging strategies for securing compliance with road transport laws. Paper presented at the 1999 Road Safety Research, Policing And Education Conference, University House, Australian National University, 28-30 November 1999*

This paper sets out directions for the development of national policy on compliance with road transport laws and suggests research priorities to enable development and implementation of that policy.

## Background

Traditional regulatory responses to road transport breaches have been □enforcement□ rather than □compliance□ orientated, tending to be overly reliant on the physical detection and prosecution of offenders and on increasing the maximum fines. As well, the driver and vehicle owner have been the □soft□ and usually, the only, targets of heavy vehicle enforcement policies.

These responses are limited in focus and effect and are self-defeating if not combined with broader, pro-active, strategies which enhance road transport compliance and which ensure the accountability of *all* parties who exercise control over activities that affect compliance. There are three main reasons for this:

the effectiveness of enforcement-based strategies to modify road user behaviour is dependent on there being a perception that there is a real possibility that breaches will be detected; however there are simply not enough policing resources to cover the whole road network and road users know only too well that the chance of apprehension at any one time is low; fines, no matter how high, will not have a sufficiently deterrent effect when the chance of detection is slight and the potential profits from offending are high; and targeting only the driver and owner of heavy vehicles does not deter the many □off-road□ parties who play a significant role in breaching the road laws.

To achieve the benefits of compliance with the road transport laws□safety, productivity, asset protection and competitive equity□a more comprehensive, effective approach is required.

In the national arena, the National Road Transport Commission (NRTC) is developing compliance policies that will involve a suite of complementary strategies, including:

- conventional (sanctions-based) compliance strategies that enable accountability of *all* relevant parties;
- incentives-based compliance strategies, including the use of performance-based standards and codes of practice;
- privileges-based strategies;
- education, training and communications-based strategies;
- consistent and well-targeted enforcement practices;
- monitoring the effectiveness of compliance/enforcement outcomes; and
- ongoing research to identify new challenges and solutions.

This paper examines how these strategies interrelate to create a fair and effective regulatory environment, and outlines various tools (existing, as well as new and innovative) that can make these strategies work for regulators and industry.

Recent impetus for such a multi-faceted approach came from the Australian Trucking Association□s *National Enforcement, Viability and Safety Workshop*, held in Albury on 12 and 13 March 1999. Priority compliance issues for what was termed a □Smart Compliance□ approach were identified by participants in the Workshop as:

- Minimising fatalities (safety)
- Consistent national law
- Targeted enforcement
- Penalties that fit the crime
- Reward for effort

These issues and actions suggested at the Workshop will be drawn upon in the development of the National Road Transport Commission□s strategic framework for compliance and are outlined in this paper.

The emphasis of this paper is on the conventional compliance aspects, as the primary emphasis of the National Road Transport Commission□s compliance work to date has been on laying down the necessary legislative structures to achieve broader compliance reform. However, work is starting on other strategies to enhance compliance. This new work is sketched out and research priorities to advance the new directions are identified.

## Conventional compliance a non-conventional approach

Conventional compliance is a □command and control□ model that involves a punishment being applied once a person has been held legally liable for a breach. The conventional compliance scheme provides the legislative platform for all compliance strategies, as well as the tools for enforcement action and the sanctions and penalties. Even if breach consequences are specified within other types of compliance schemes themselves □ for instance, when a privileges-based scheme provides for the reduction or withdrawal of the

privilege - recourse will still be through the conventional compliance scheme to prosecute the offender. Hence, this scheme must be strong and enforceable.

The National Road Transport Commission is developing new and innovative road transport compliance tools (in addition to retaining the best of existing and traditional tools) in its approach to conventional compliance.

These include:

- provisions that reflect modern chain of responsibility principles;
- a risk-based categorisation of breaches;
- enforcement powers linked to breach categories to increase the effectiveness of enforcement effort; and
- new sanctions and penalties that reflect a broad range of sanctions strategies, as well as changes to the more traditional fines and registration/licence orders to improve their deterrent effect.

**Chain of responsibility**

The aim of chain of responsibility provisions is to ensure that all who bear responsibility for conduct which affects compliance should be made accountable for failure to discharge that responsibility. This is achieved through provisions which clearly identify various parties responsibilities and hold them legally accountable for a breach of those responsibilities. Such provisions are far more direct for securing accountability for non-compliance than the use of traditional and legally cumbersome □cause or permits□ and □aid and abet□ style offence provisions, and enable all the responsible parties to know their legal obligations from the outset. Hence, as well as being of value to enforcement, chain of responsibility provisions are of value to compliance.

Chain of responsibility provisions have emerged in recent years primarily in the context of occupational health and safety laws and environmental regulation. These provisions are still rare in road transport law.

Chain of responsibility is a cornerstone of the National Road Transport Commission□s compliance and enforcement reforms, and has wide support from industry and government. The National Road Transport Commission has so far tailored chain of responsibility provisions for the Dangerous Goods Regulations and the Truck Driving Hours Regulations and is preparing provisions for the mass, dimension and load restraint requirements.

*Dangerous Goods Model*

Under the Dangerous Goods model, *packers, loaders, manufacturers, consignors, prime contractors and drivers,* each have defined legal responsibilities that correspond to their respective duties in the loading and transport of dangerous goods. The extent of their liability (primary or secondary) reflects the extent of their control over these duties.

*Driving Hours Model*

In the Driving Hours Regulations, a *general* duty is followed by a refinement of that duty in the case of specified parties□*consignors, employers and drivers*□who have special obligations.

*Mass, Dimension and Load Restraint Model*

In the current work, the National Road Transport Commission is currently developing a chain of responsibility specifically for mass, dimension and load restraint compliance, utilising activities, rather than titles or roles. The responsibilities that correspond to these activities have been couched as legal duties (subject to defined defences) and are expressed to apply to any person, regardless of that person□s formal title or role in the transport chain. In this model, any person involved in *consigning, packing, loading, carrying, driving or receiving* will have responsibilities in respect of compliance with the mass, dimension and load restraint requirements. This activity based model overcomes many of the legal and practical difficulties in attempting to assign titles to the countless different parties involved in all manner of different transport loading transactions.

In each of these areas, the tasks for the National Road Transport Commission have been to examine, through exhaustive consultations and research, the causes and reasons for the breaches and to form a chain of responsibility that encompasses all the responsible parties. In each case, directors and senior managers will have personal liability for offences committed by bodies corporate.

If the chain of responsibility proposal in the mass, dimension and load restraint context is accepted, it will be the first time that off-road parties can be held accountable, in a primary sense, for loading breaches. What is being demanded of them is that they take reasonable steps to prevent non-compliance with the road laws: it will no longer be acceptable to ignore the road safety, road damage and other consequences of their actions or inaction. This chain of responsibility has an important role to play in the development of a road transport compliance culture and is expected to produce positive benefits in road safety, infrastructure protection, and competitive equity outcomes.

A real concern is that enforcement agencies will not devote the necessary resources to pursuing the off-road parties in the chain - after all, the driver and vehicle owner will always be the easiest targets and bringing proceedings against other parties may require greater investigation effort and resources. However, the National Road Transport Commission is also preparing new evidentiary provisions and stronger enforcement powers to make the enforcement task easier. Also, there is a likelihood that **any** action taken against the off-road parties will send a powerful and important deterrent message and, in this regard, the value placed on maintaining a good public image and compliance record by many businesses should not be underestimated. Further, there will be industry and TWU pressure to take action, where appropriate, against the off-road parties.

**Risk-based rationale**

A fundamental rationale for the new national offences, powers, sanctions and penalties proposed by the National Road Transport Commission for the mass, dimension and load restraint requirements is the seriousness of the safety and other risk(s) posed by a breach of those requirements. The main implications of breaches of the requirements have been used as signifiers of the following categories of breach:

- *minor risk*, in which the risks of accelerated road wear and unfair competition advantage are the only appreciable effects;
- *substantial risk*, in which there is an increased risk of more substantial infrastructure damage, annoyance to other road users, traffic congestion and loss of productivity; and
- *severe risk*, in which safety is also jeopardised.

The hierarchy of powers and actions based on this rationale has the advantage of being more targeted and consistent, and also promotes a better appreciation of the impacts and relative severity of the offences by enforcers, industry, the community and the judiciary.

The rationale also provides an opportunity for a more equitable approach to be taken to some breaches. For example, the National Road Transport Commission is considering a proposal that a breach of an axle group mass limit need not be an offence where the gross vehicle mass limit has not been exceeded, in circumstances where there are no appreciable consequences for safety or infrastructure.

**Enforcement powers linked to risk categorisations**

The National Road Transport Commission is developing in its work on compliance and enforcement for the mass and loading requirements a set of enforcement powers specific to and commensurate with each of the minor risk, substantial risk and severe risk breach categories.

The National Road Transport Commission□s objectives in this work are:

- to provide the powers necessary for enforcement officers to administer the proposed conventional compliance regime consistently, efficiently and fairly;
- to enable enforcement effort and resources to be targeted effectively and appropriately at the offences of most concern (hence, the most intrusive powers are reserved for severe risk breaches, given that preventing any risk to safety is of paramount concern);
- to provide industry with the certainty that enforcement action following detection of a breach will be applied in a manner that is even-handed, consistent and appropriate to the breach; and
- to be sufficiently flexible to allow exceptions to the general rules to meet the needs of particular cases.

**Sanctions and penalties**

The traditional punishments in road transport enforcement have been fines, with licence or registration loss or even imprisonment in serious cases. Some jurisdictions have also applied demerit points in limited circumstances. The problems with traditional road transport punishments is that they address specific deterrence and punitive models of punishment only and are usually applied only against drivers and vehicle owners. The levels of these penalties might be considered high for individuals but may be regarded by many corporate offenders as little more than □add-ons□ before reaching the bottom line. As these penalties have not been applied against off-road parties they do not act as deterrents for those parties.

The National Road Transport Commission has been developing a comprehensive penalty framework that contains a combination of penalty levels and sanction strategies in a way which is intended to maximise compliance by all of the parties in the chain of responsibility, and to minimise the need for enforcement.
The penalty initiatives that have been developed include:

*Administrative penalties*

Formal warnings and infringement notices have been proposed by the National Road Transport Commission as administrative sanctions that may be applied as an alternative to inaction or taking court proceedings. These penalties free-up prosecutions staff and the courts for more serious breaches and repeat offenders.

*Fines*

The National Road Transport Commission is proposing new approaches to fines. For example, for mass breaches, maximum fines will escalate with increased mass, and double for second and subsequent offences.

*Commercial benefits penalty*

To address the financial incentives to commit breaches of the mass, dimension and load restraint requirements on high-value cargoes - particularly over long distances - the National Road Transport Commission has developed a penalty which involves the offender paying an amount up to three times the amount calculated to be the commercial benefit that was, or would have been, derived from the offence.

*Supervisory intervention order*

The supervisory intervention order is based on a rehabilitative notion of punishment and may be used to direct an offender to do things that will improve the person□s compliance with road laws, including appointing an auditor, obtaining expert advice on maintaining proper compliance, and implementing improved managerial and operational systems.

*Prohibition order*

As a punishment of last resort, a systematic or persistent offender may be prohibited from operating a heavy vehicle or carrying a particular type of load, or being otherwise involved in operating a heavy vehicle, except driving.

**Incentives-based strategies**

The National Road Transport Commission has long emphasised the need for appropriate incentives-based strategies (National Road Transport Commission (1994a); National Road Transport Commission (1997)) to complement the command and control model of conventional compliance schemes.

Reward for effort reaps better compliance outcomes than punishment because it is based on a simple, positive principle that attracts industry participation in achieving compliance. However, it must be combined with a strong conventional compliance strategy, because no matter how high the incentives offered, there will always be profits to be gained by some unscrupulous parties from non-compliance.

Emerging tools for incentives-based strategies include the national mass management accreditation model that is being developed by the National Road Transport Commission and that is already in place in most jurisdictions. In essence, the mass management scheme enables certain vehicles to operate at increased mass (the incentive) provided that they implement load control systems which are accredited by an approved accreditation provider, and comply with various audit and management requirements.

Alternative means of demonstrating compliance, such as through performance-based approaches and codes of practice might also be seen as □incentives-based strategies. The incentive to achieve compliance lies in the greater flexibility for industry in the way it manages its task, or configures and loads its vehicles, provided an equivalent, or better, compliance outcome is achieved than that which applies by more prescriptive approaches.

The National Road Transport Commission has recently embarked on work on Performance Based Standards (PBS). PBS infers regulation using the basic relationships or criteria governing productivity, road safety, infrastructure management and access, to augment the current prescriptive controls and incorporating conditions on compliance and enforcement. A PBS approach has the particular advantage of allowing closer linkage with road safety standards and targets, and building upon progress in other sectors (such as national road regulation and OH&S).

The use of industry codes of practice to provide guidance on matters covered by general duties in legislation is common in occupational health and safety, building and environmental legislation, but are rare in road transport law. They offer a more flexible approach than prescriptive legislative provisions and, because are developed by industry, are more likely to be accepted and complied with. Industry codes of practice are also being considered by the National Road Transport Commission for application in the national road transport law. In the mass, dimension and load restraint work, for instance, it is proposed that compliance with an approved industry loading code will in some circumstances amount to a defence to prosecution□compliance with the code being evidence that the offender had taken

□reasonable steps□ to prevent a contravention of the law. (It would be a very difficult task to define legislatively what are reasonable steps and what are not, because of the enormous variety of loading operations, controls and systems.)

Opportunities for other rewards for effort might be reductions in registration, licence or permit fees (providing links to privileges-based strategies); less stringent operating conditions (providing links to conventional compliance and PBS); preference being given by prime contractors to accredited sub-contractors; or even, as with mass management schemes, less frequent on-road inspection (providing links to enforcement strategies). These and other opportunities require further exploration and development.

**Privileges-based strategies**

These strategies rely on the granting of a privilege upon demonstration of the required degree of compliance. Removal or reduction of that privilege is the usual consequence of non-compliance. Licensing, registration, permit and concessional schemes are examples of these compliance approaches and are in common use by transport authorities. National heavy vehicle licence, registration and permit arrangements developed by the National Road Transport Commission have the added effect of removing opportunities for those who have lost their licence/registration/permit in one jurisdiction as a consequence of non-compliance, to simply re-obtain that privilege in a different jurisdiction and continue as before. Hence, there is a stronger deterrent effect created with a national privileges-based scheme.

**Education, training and communications-based strategies**

*Enforcers*

Because of the number and complexity of the road transport standards and laws governing the operation of heavy vehicles, extensive training of enforcement personnel is required. Without this training, the benefits that are expected to flow from the National Road Transport

Commissions reforms to heavy vehicle transport laws, and especially from the extension of responsibility to new and off-road parties, will not be realised.

The development of national competency criteria was also affirmed at the recent National Enforcement, Viability and Safety Workshop as a priority action and will be a new National Road Transport Commission project. It is especially important that nationally consistent training competencies be developed to ensure consistent application of the road transport laws and standards.

*Industry*

Industry itself must also be trained and educated, as even though operators and drivers are expected to know the legal requirements, it is often the case that breaches occur simply because of ignorance of the many requirements. Operators and drivers need to know the capabilities of their vehicles and the consequences of breaches for safety, infrastructure and competitive equity, quite aside from the legal implications. They also need to understand the commercial benefits of compliance - in terms of risk management, obtaining the benefits of incentives and privileges-based compliance schemes, and minimising the problem when a breach is identified.

In addition to traditional educative tools□manuals, information bulletins, news coverage, seminars, training programs□modern media tools, including website information, e-mail and software applications, provide opportunities for even more effective information flows.

There has also been a recent national initiative in industry compliance in general that the road transport industry might find useful. This is the Australian Standard for compliance programs, AS 3806-1998, which sets out the essential elements for establishing, implementing and managing an effective compliance program within an organisation and provides guidance on using these elements. AS 3806 is a practical means by which operators can more effectively implement any form of regulatory arrangement, be it legislative, industry self regulation or in-house company standards. It signals the emergence of compliance as a discipline which is being increasingly recognised by regulators, the courts and the marketplace.

*Other responsible parties*

Education strategies for the off-road parties in the new chain of responsibility provisions must be implemented prior to the introduction of the provisions. Participants at the Albury Workshop suggested the following educative actions to enhance the deterrent effect and the practical application of the provisions:

- Run an industry Customers awareness week (employ a Customers ambassador
- Educate and lobby industry customers and authorities re: non-acceptance of overloaded or other illegally delivered loads
- Promote/communicate Chain of Responsibility concept

*Public and judiciary*

Public education will assist in the safer sharing of the road network with trucks, create a better understanding of the road transport industry, and gain support for needed traffic safety efforts. Judicial education, mainly through public education strategies, improves the proportionality of penalties and hence the effectiveness of sentences to deter non-compliance.

At the Albury Workshop, a number of actions were recommended to achieve more effective public education, including the development of a □Sharing the Road□ communications strategy, informing the public of road transport enforcement strategies and the penalties applied to achieve compliance, and communicating the message of □good vs the bad on the road through teaching community bodies such as the AAA.

**Enforcement strategies**

To be fully effective, conventional compliance schemes and incentives and privileges-based compliance schemes must also be implemented with fair, well-targeted and consistent enforcement practices. To maximise current enforcement effort and resources, the National Road Transport Commission has an important role in stimulating the review of existing programs and practices and assisting in the development of nationwide approaches for the future.

As a first step in this process, the National Road Transport Commission is undertaking a survey of existing enforcement data sources. The Australian Transport Safety Bureau is funding this project. The survey will identify what data is available and its quality for analysis purposes. The next stage will involve the collation and evaluation of the data. This project will provide vital baseline data for the development of nationally consistent guidelines for effective enforcement programs.

To develop sound strategic directions for further work in this area, the National Road Transport Commission will be convening a national workshop in early 2000 to share information on current projects and identify the priority areas for development at the national level.

At the applied level, the National Road Transport Commission will be working with Austroads, to prepare guidelines for road managers and enforcement agencies on how to obtain optimum compliance with the proposed mass, dimension and load restraint compliance and enforcement provisions. Part of this work will involve guidelines for enforcement and training in the use of these provisions.
On-road presence, no matter how well targeted, is resource intensive and regulators are increasingly turning towards auditing arrangements and new technology (weigh-in-motion equipment, camera and surveillance technology) to support enforcement personnel effort. The National Road Transport Commission has been instrumental in developing accreditation and alternative compliance schemes that utilise auditing arrangements and minimise the need for on-road enforcement. The National Road Transport Commission is also working with the Intelligent Access Project (led by Tasmania) in the application of electronic road pricing as an ancillary part of enhanced route access for non-standard vehicle combinations.

Challenges for the future will be to ensure the civil liberties and privacy concerns associated with any use of auditors records and data collected by the new technology for compliance purposes, are addressed. Research on the privacy aspects of ITS has been undertaken by the Tasmanian Department of Infrastructure, Energy and Resources, however, only in respect of the use of ITS for road pricing purposes. The use of ITS expressly for compliance, safety and infrastructure protection purposes in Australia has yet to be fully investigated. These challenges present further research opportunities.

**Monitoring**

Ongoing monitoring and review is necessary to ensure the performance of any individual compliance strategy or suite of strategies and to ensure the strategies keep up with technological, social and legal developments and changes in the road freight task.

The National Road Transport Commission s work on the enforcement data collation and analysis project (referred to above) is a first step in this direction. It will provide the data to develop and evaluate the performance of reform measures. It will also enable the commencement of work towards national standardised data collection and the analysis of the resulting information for effective training and program direction.

To complement this project, the National Road Transport Commission is working with Austroads to identify trends in heavy vehicle speed and mass limits compliance using an analysis of available Culway and other weigh-in-motion data. This will allow the effectiveness of approaches to enforcement of speeding and overloading to be evaluated.

## Conclusions

In conclusion, regulators need a modern and comprehensive approach to secure compliance with the heavy vehicle requirements. This approach should incorporate a variety of complementary compliance strategies that are underpinned by a strong □conventional□ sanctions-based strategy, implemented with well-targeted enforcement practices and monitored to ensure their ongoing relevance and performance.

The National Road Transport Commission is progressing national compliance reforms within this broader strategic framework as well as working on initiatives that will also improve the effectiveness of more traditional regulatory approaches. This paper has presented an overview of the National Road Transport Commissions current work and priorities to develop these directions, and suggested some useful areas for research.

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Road Transport Reform (Compliance and Enforcement) (General) Bill 1997

Road Transport Reform (Driving Hours) Regulations 1999