



Towards a Holistic Framework for Road Safety

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Executive Summary

Increasingly in recent years, research and public policy has been pointing to the need for a paradigm shift in the way the Australian community deals with road safety. Professor Don Aitkin, Chairman of the NRMA-ACT Road Safety Trust, has emphasised the need for a cultural change in relation to how people consider speed and the use of motor vehicles, in the same way that cultural shifts have occurred in relation to smoking and the issue of AIDS. This research project sought to address the way in which road safety is perceived by the wider community and policymakers, and how it can be reframed using a holistic approach.

Given the almost universally acknowledged importance of speed as a major contributing factor in the number and severity of traffic crashes, a sub-theme is raised by the question: How can a holistic approach be applied in a way that reconnects road safety to communities that value social connectedness, quality of life and slower ways of being? A central assumption is that fundamental redesign of cultural arrangements is necessary in order to challenge the “culture of speed”.

Current road safety programs and thinking are constructed within a paradigm that tends to accept existing cultural arrangements, especially in relation to mobility and travel. Typically, programs favouring symptomatic solutions and technical and/or physical solutions are pursued as a way forward. We agree with the assessments of those practitioners in the road safety field who consider that large potential gains in road safety depend not on technical fixes, but on changes in social norms, that is in changes in social values, awareness, attitudes and behaviour.

This, of course, does not mean that technical innovations such as intelligent speed adaptation (ISA) and pedestrian avoidance technology are not valuable additions for road safety. The range of current car safety features and those under development also includes, for example, electronic stability control, adaptive cruise control, ABS brakes, various kinds of airbags, fatigue monitoring and warning systems, lane departure warning systems, and so on. Supporting the value of such technical innovations is the finding that the crashworthiness of new cars registered in Australia has improved progressively during the period 1983 to 2006. On the other hand, such technical approaches are still car-centric in orientation, and the term “risks of safety” has been used to describe the often-repeated pattern of the actual drop in fatalities not living up to the hopes of various safety devices. That is, technical improvements are likely to be weakened by behavioural responses that allow motorists to trade off safety benefits as performance benefits.

Recent critiques suggest the need for a much wider cultural change than is implied, for example, by just developing public education programs to change community attitudes to speeding. The combination of two major global issues—peak oil and climate change—is increasingly likely to affect transport and travel behaviour. Popular books such as *In Praise of Slow* by Carl Honoré (2004) question whether speed, busyness, and “saving time” should be the hallmarks of modern life. The current report therefore addresses questions such as: What is the nature of the cultural shift that is required to overcome death and injury on Australia’s roads? How can such a cultural shift be facilitated, both institutionally and in communities?

In the ACT, the Government has expressed a commitment to achieving a cultural shift in order to reduce deaths and injuries on its roads. It is exploring whether the Swedish Government's "Vision Zero" policy could be implemented in the ACT in the years ahead.

Our research leads to the following recommendations, which have important social, environmental, and economic benefits from their uptake. The recommendations are relevant to the ACT, and more generally to road safety in Australia:

Recommendation 1 on broader understanding of the huge cost of traffic crashes

We recommend that road safety agencies more effectively communicate the enormity of the problem of road deaths and injuries to both policy makers and the community. The annual economic cost of road crashes in Australia needs to be updated using appropriate measures and the collection of relevant data.

A fresh understanding of the enormity of the problem of road deaths and injuries is required at both policy and community levels. The annual economic cost of road crashes in Australia was conservatively estimated to be at least \$18 billion in 2005, which is of a similar order to the annual defence budget. A commensurate level of political leadership, support, and funding is required to address the cost issue. Complacency and lack of understanding of the size of the problem is also lacking at the community level.

Recommendation 2 on the value of the Swedish Vision Zero approach

The adoption of Vision Zero approaches by the ACT and other governments in Australia is supported. Successful implementation will require broad public understanding and involvement for successful cultural change.

Approaches such as the Swedish Vision Zero approach provide a useful model for advancing road safety by adopting a proactive and preventive approach, with the goal that no person be killed or seriously injured for life in road traffic. In Australia, transport systems are not designed on the basis of human tolerance, but instead on what are considered to be safe speeds for motor vehicles.

Using Vision Zero principles such as setting speed limits in accord with the human body's tolerance against external violence enables speed to be considered in a new light by policy makers, road engineers, vehicle manufacturers, and people driving vehicles.

So far in the ACT, the discussion surrounding the adoption of a Vision Zero approach has been very positive. Implementation of a Vision Zero approach requires broad public and stakeholder engagement in the vision in order that understanding of the principles involved is integral to cultural change, and to maximise commitment to such a vision.

Recommendation 3 on the deeper questioning of cultural priorities and the value of mobility management for road safety

The questioning of cultural priorities such as the spread of car dependent lifestyles should be part of road safety policy. Mobility management strategies should become integral to road safety policy and practice. For example, access to goods, services and social opportunities should be considered, rather than mobility per se as the only option.

A distinction can be drawn between “deep” sustainable change, which usually requires fundamental redesign of the systems involved, and “shallow” compensatory change. For example, one critique of Vision Zero suggests that Sweden has done little to counter the spread of car dependent lifestyles that result in more kilometres being driven. Mobility management (also called travel demand management) is currently not integral to road safety considerations. However, a strong case exists for mobility management strategies being of value in reducing overall crash risk, by reducing per capita vehicle travel (and hence exposure). That is, the *volume* of motorised traffic is a critical factor to consider in addition to speed.

Mobility management strategies are consistent with wider principles adopted for sustainable transport. These include access to goods, services and social opportunities, rather than mobility *per se*, and less movement of goods and services, for example by appropriate urban design and access through telecommunications.

Recommendation 4 on vehicle manufacturers and slower, smaller and lighter vehicles

Vehicle manufacturers should be actively included in the process of developing Vision Zero and safe system approaches, so that their role in producing safe vehicles and advertising responsibly is made clear.

To the extent that cars are still used, a strong case can be made on road safety and environmental grounds for slower, smaller and lighter cars, in contrast with cars that are designed and marketed with an emphasis on speed and power. The increasing use of electric cars may offer an opportunity here.

Recommendation 5 on climate change, peak oil and links with road safety policy

Policy and practice in road safety should be integrated with policy and strategies addressing climate change and peak oil, as there are considerable synergies involved in regard to road transport.

The combination of two major global issues—peak oil and climate change—is increasingly likely to affect transport policy and travel behaviour. Climate change is generally considered to be a major sustainability emergency for humanity. With peak oil, there is significant risk of a crisis arriving before sufficient preventative action can take effect. Efforts to cut greenhouse gas emissions from transport are linked to the reduction of single-person car use for urban trips, investment in world-class public transport systems, and the design and redesign of local neighbourhoods. There is also evidence for the management of driving speeds as an effective carbon abatement policy. In the ACT, separate roundtables convened on road safety and sustainable transport should be considered as having overlapping agendas.

Recommendation 6 on encouraging a shift to active modes of transport

Findings from behavioural science on understanding behaviour change need to be used to facilitate the shift to non-motorised modes, given a range of behavioural and practical constraints. Infrastructural and other policies are also needed to facilitate the shift.

Recent public policy reports on road safety, and those on climate change and peak oil, typically encourage a shift away from default car use to walking and cycling, as well as to public transport. The multiple health, environmental, economic, transport and

community liveability benefits of active travel are now well established. However, behavioural and infrastructural issues need to be addressed to facilitate a shift to active travel. The need for redesign is exemplified by the Gehl report for Central Sydney. It concluded that the city is not geared to the needs of pedestrians, and is dominated by cars. There needs to be a reorientation of road space and road rules to give pedestrians priority over motor vehicles.

More generally for public transport, increased funding is needed to address the requirements of effective public transport such as service quality (frequency of service, ease of interchange, comfort, safety), integrated timetabling and route planning, as well as responsiveness to customer needs.

Recommendation 7 on community programs significant for road safety

Much greater attention and support should be given to community travel behaviour change initiatives by policy makers. TravelSmart travel behaviour change programs and Walking School Bus (WSB) programs have significant value for road safety and deserve to be expanded.

Currently, community programs are typically rated as being of low effectiveness in the range of possible speed management programs, as in the Global Road Safety Partnership's 2008 *Speed Management: A Road Safety Manual for Decision-makers and Practitioners*. "Soft" transport policy measures that encourage voluntary behaviour change unfortunately do not yet have mainstream status.

TravelSmart travel behaviour change programs have significant value for road safety and deserve to be expanded. Their advantages include modal shifts and reduced car use, and involvement by a high proportion of participants contacted in the target population. Professor Peter Newman suggests that the importance of the TravelSmart program in bringing about a transition to more resilient cities should not be underestimated. In the Travelsmart Belconnen project run in 2006-2007, car travel was reduced by 12.7%, in terms of vehicle kilometres travelled. This is significant in road safety terms when travel demand management is accepted as a valid road safety objective.

Walking school bus (WSB) programs have multiple social, health and safety benefits including: addressing obesity and low fitness levels in children; promoting child pedestrian and road safety; the development of social and community networks; environmental improvements; and encouraging sustainable travel choices. The outcomes from our research on WSB in the ACT support other research on the benefits of the walking school bus. However, the discussions also highlighted the need for much better funding, marketing, and support if this approach is to be more than a marginal approach to road safety.

Travel behaviour change programs are, of course, greatly facilitated by infrastructure spending on walking, cycling and public transport.

Recommendation 8 on whole-of-community change and integrative management

A separate Office of Road Safety in the ACT with a budget and staffing commensurate with the costs of road crashes to the community is recommended. Such an office should adopt a holistic and whole-of-government approach that extends beyond a narrow focus on road safety to include a wide range of fields and skills relevant to road safety including health, environment, sustainable transport, planning, behavioural change and education. The same approach deserves to be applied more broadly in Australia, given the enormous cost of road crashes in Australia.

Recent road safety inquiries in the UK recommended that a high level body or independent road safety commission be established to work across the whole of government to integrate efforts from fields such as health, environment, sustainable transport and behavioural change. The complexity of the cultural change required with respect to road safety points to the value of holistically oriented management systems in facilitating whole-of-community change. Vision Zero approaches need to be integrated with a common vision for a sustainable transport system developed in conjunction with energy, transport, health, environment, and education agencies.

With respect to organisational direction and integrative management, policies can frequently fail if responsibility is shared among too many players. A study discussed in our report, namely *Halving Roadway Fatalities: A Case Study from Victoria, Australia 1989-2004*, provides useful lessons in terms of 'success factors' for organisational effectiveness in relation to road safety. The value of influential 'champions' to create political and community saliency for more fundamental change in relation to road safety was underlined.

There could be value in having a network of ACT champions for road safety, in addition to the road safety roundtable already convened. Chief Minister Jon Stanhope has championed the Vision Zero idea for the ACT, and significant others championing road safety objectives from other areas including health, environment and police could form part of a champions network to facilitate cultural change.

Recommendation 9 on promoting slower ways of being and civility in society

For a wider cultural shift, greater attention should be given to the Slow City movement—an ecological and humanistic response favouring local, traditional cultures, a relaxed pace of life and conviviality. Time costs shape travel choices and behaviour and should be addressed as part of wider policies to facilitate road safety.

David Engwicht in discussing such priorities refers to the "Great Civility Outbreak"—a cultural revolution in which it becomes the social norm to be 'civilized' and 'a good citizen'. So-called "time pressure" is emerging as a modern malaise, with implications for people's driving behaviour on the roads, as borne out by surveys by the insurance company AAMI on the increasing prevalence of road rage. Time costs also shape travel choices. Organisational practices related to flexitime and telework, for example, are relevant. Although the issue of time may seem too hard or complex, and outside the scope of environmental and public health policy, the need for a deeper cultural shift suggests that time as an issue should be addressed as part of road safety policy. The work of Dr Lyndall Strazdins, National Centre for Epidemiology and Population Health, The Australian National University considers the issue of 'time' and its relevance for a range of policy considerations.

1. Introduction

This research project sought to address the way in which road safety is perceived by the wider community and policymakers, and how it can be reframed using a holistic approach. Given the almost universally acknowledged importance of speed as a major contributing factor in the number and severity of traffic crashes (Global Road Safety Partnership, 2008, p. 159), a sub-theme is raised by the question: How can a holistic approach be applied in a way that reconnects road safety to communities that value social connectedness, quality of life and slower ways of being? A central assumption is that fundamental redesign of cultural arrangements is necessary in order to challenge the “culture of speed”.

In Australia, Professor Don Aitkin, Chairman of the NRMA-ACT Road Safety Trust, has emphasised the need for a cultural change in relation to how people consider speed and the use of motor vehicles, in the same way that cultural shifts have occurred in relation to smoking and the issue of AIDS (“Too many crosses to bear on roads,” 2005).

Increasingly in recent years, research and public policy has been pointing to the need for a paradigm shift in the way the Australian community deals with road safety. A publication prepared for World Health Day 2004 by the Australian Transport Safety Bureau (2004) cast the problem of traffic deaths and injuries as a major public health issue. Likewise, McIntosh (2004), although acknowledging the impressive improvements in road safety in the final quarter of the 20th century, points to the need for a new paradigm in order to significantly move beyond the plateau over the last ten years in road deaths and trauma.

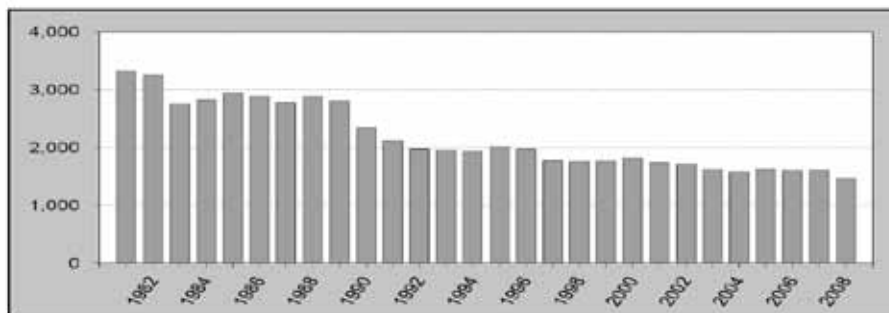


Figure 1 Australian annual road deaths from 1982 through 2008 (Department of Infrastructure Transport Regional Development and Local Government, 2009b)

The annual economic cost of road crashes in Australia has been conservatively estimated to be at least \$18 billion in 2005, this being an Australian Transport Safety Bureau estimate based on a Bureau of Transport Economics study of the cost of crashes in 1996 (Australian Transport Council, 2008, p. 8). Such a cost is enormous and likely to be an underestimate, being of a comparable order to Australia’s annual defence budget. The ongoing physical, social and emotional impacts of road crashes as a result of serious injuries are also devastating for many people.

In 2005-2006, the number of people seriously injured in road traffic crashes in Australia was 31,204, a figure that has been increasing at an average annual rate of 2.5% since 1999-2000, when 26,697 people were seriously injured (Berry & Harrison, 2008, p. 37).

Such costs appear to be not generally well understood, with costs being distributed across the community, including crash victims and their families, the health system, vehicle repair and replacement, and vehicle owners' insurance. The importance of road safety in terms of its policy priority and institutional support is thus greatly underrated.

Given the high cost of poor road safety, road safety should be rated as a major public policy issue. McIntosh (2004) refers to a call by the Australian Automobile Association (AAA), the Australian Local Government Association (ALGA), and the Australian Trucking Association (ATA) for "a new national approach that moves road safety from its current status as a narrow transport issue to the wider stage of being seen as a preventable public health issue" (p. 12).

Current road safety programs and thinking are constructed within a paradigm that tends to accept existing cultural arrangements. Typically, programs favouring symptomatic solutions and technical and/or physical solutions are pursued as a way forward. For example, a significant report prepared by the Australian Transport Safety Bureau (2004) recasts road safety within a broad public health framework, but still concludes with a chapter on "the future" which focuses on using technology to improve safety, as with the emergence of Intelligent Transport Systems (ITS). We agree with the assessments of those practitioners in the road safety field who consider that large potential gains in road safety depend not on technical fixes, but on changes in social norms, that is in changes in social values, awareness, attitudes and behaviour (Grigg, 2004; Grzebieta, 2005).

This, of course, does not mean that technical innovations such as intelligent speed adaptation (ISA) and pedestrian avoidance technology (Hagon, 2009) are not valuable additions for road safety. The range of current car safety features and those under development also includes, for example, electronic stability control, adaptive cruise control, ABS brakes, various kinds of airbags, fatigue monitoring and warning systems, lane departure warning systems, and so on. Supporting the value of such technical innovations is the finding that the crashworthiness¹ of new cars registered in Australia has progressively improved during the period 1983 to 2006, such that the risk for 2006 cars is about half that of 1983 cars (Newstead, Watson, & Cameron, 2009). On the other hand, such technical approaches are still car-centric in orientation, and the term "risks of safety" has been used to describe the often-repeated pattern of the actual drop in fatalities not living up to the hopes of various safety devices (Vanderbilt, 2008, p. 262). That is, technical improvements are likely to be weakened by behavioural responses that allow motorists to trade off safety benefits as performance benefits (Adams, 1995; Wilde, 2001).

Recent critiques suggest the need for a much wider cultural change than is implied, for example, by just developing public education programs to change community attitudes to speeding. Popular books such as *In Praise of Slow* by Carl Honoré (2004) question whether speed, busyness, and "saving time" should be the hallmarks of modern life. David Engwicht (1999; 2005) likewise promotes the notion of "psychological traffic calming" in his books *Mental Speed Bumps* and *Street Reclaiming*. The current report therefore addresses questions such as: What is the nature of the cultural shift that is required to overcome death and injury on Australia's roads? How can such a cultural shift be facilitated, both institutionally and in communities?

1 Crashworthiness ratings measure the relative safety of vehicles in preventing death or severe injury to their own drivers in crashes.

The structure of this report is as follows. We begin with an overview of the research design followed by a discussion of issues related to speed and cultural change. Next we consider paradigm shifts and cultural change, including new ways to address road safety, such as Sweden's Vision Zero approach. Following this is a section that asks the question "How deep is the paradigm shift?". This addresses "deep" change in contrast with "shallow" compensatory change. Subsequently, there are sections on: climate change and peak oil as key drivers of change; models of social and cultural change; and the role of active transport and public transport in road safety. The latter section includes discussion of community-based initiatives such as the Walking School Bus and TravelSmart. Implementation is explored in the next section on integration and whole-of-community change, followed by a conclusion and recommendations.

Research Design

The project as originally framed in 2006 aimed to develop a holistic model for reconnecting road safety with a community that values quality of life and slower ways of being. Hence the project was called "slowing down in the community". It aimed to do this, in part, by investigating and evaluating the Walking School Bus program in Canberra.

A significant objective was to reframe the way in which road safety is perceived by the wider community and policymakers, using a holistic approach. The project considers road safety within an emerging paradigm related to transport, environment, and energy.

In general, research approaches and the methods selected are contained within the broader research frame encompassing a researcher's philosophical stance and research paradigm (Higgs, 1998). In our research, holistic thinking, synthesis across different fields of study, and the use of a critical approach are prominent.

Holistic thinking asks the question "How can I best understand the whole?" and uses eclectic methods of inquiry. It contrasts with specialist thinking that asks instead: "What aspect am I qualified to examine?" using methods of inquiry specific to the specialism through measurement, observation or interpretation (Brown, 2008; Brown, Ingle Smith, Wiseman, & Handmer, 1995, p. 64). Holism is sometimes contrasted with reductionism, with holism involving the integration of many competing theories, data, and ideas. Synthesis-based thinking is markedly different from the thinking underlying the isolation and definition of distinct concepts. The latter is associated especially with empirical types of knowledge, questions, and methods.

Likewise, the term "critical" emphasises the link to critical theory, with its emancipatory interest and its favouring of socio/political questions over technical/instrumental ones (Kincheloe & McLaren, 2000). Such an approach contrasts with positivist models that are associated with "value free" and "objective" knowledge, and which serve to obscure the political and ideological dimensions of problems.

The "call to action", in both an ethical and a political sense, is another dimension that has been used to draw a distinction between positivist and postmodern critical theories (Lincoln & Guba, 2000, p. 174). Thus the policy formulation aspect of the policy cycle—that is, the clear definition and understanding of a policy problem—is pertinent for the recommendations made in this report (Rist, 2000).

The range of research methods used included:

- literature reviews and synthesis
- focus groups
- in-depth interviews
- policy analysis

An initial extensive literature review across various fields of study—for example, road safety, transport policy, sustainable transport, and health—resulted in the publication of an article entitled “Towards a holistic framework for road safety in Australia” (May, Tranter, & Warn, 2008). This has attracted positive interest from prominent road safety practitioners in Australia.

Based on the success of this overview and other information obtained on the long timeframes associated with obtaining the necessary approvals from the ACT Department of Education and Training, the original intention to select a number of schools and areas for a walking school bus evaluation was subsequently revised.

Instead, three focus groups were planned:

- one with a group of ‘experts’ with wide ranging interests across road safety, health, sustainable transport, and environment
- a second focus group with parents and practitioners involved with the Walking School Bus program in Canberra
- a third focus group with participants in the TravelSmart Belconnen project

Two of these were subsequently conducted at the Australian Defence Force Academy, namely the focus group with ‘experts’ on 11 December 2007 and another one with ‘walking school bus’ people on 7 July 2008.

The participants in the ‘experts’ group came from the following organisations:

- National Centre for Epidemiology and Population Health, ANU
- Sustainability Policy and Programs, ACT Department of Territory and Municipal Services
- ANU Green
- Roads ACT
- NRMA-ACT Road Safety Trust
- Walking School Bus, YWCA
- Bicycle Federation of Australia

The participants in the 'walking school bus' group included parents associated with the WSB at the following schools in the ACT: Campbell Primary School, Aranda Primary School, Turner Primary School, Majura Primary School, and Trinity Christian School. A person with relevant interests from Roads ACT also attended, as well as a research student from the ANU interested in the issue of 'time'.

The third group with TravelSmart Belconnen participants was not convened, as privacy concerns were raised by the Department of Territory and Municipal Services—the agency with access to the names of TravelSmart Belconnen participants. A subsequent advertisement in *The Chronicle* in October 2008 did not generate interest in participating in a focus group discussion. Instead, we drew on the work of consultants who independently evaluated the TravelSmart Belconnen project (IMIS Integrated Management Information Systems Pty Ltd and SMEC, 2007) as part of our focus on evaluating community based initiatives relevant to road safety.

Thus the research as it progressed took on the character of action research (Reason & Bradbury, 2001), in which the initial research questions and subsequent action and research modified the later research steps and design.

A later research step included separate in-depth interviews and discussions held in 2009 with two prominent champions in the areas of sustainable transport and road safety, namely:

- David Engwicht, author of a number of pertinent books such as *Mental Speed Bumps* and *Street Reclaiming*, and originator of the 'walking school bus' idea that has subsequently evolved and spread in practice to a number of countries
- Professor Ian Johnston, former director of the Monash University Accident Research Centre, who is prominent in a number of current national and state road safety initiatives and policy bodies.

This final report aims to provide a synthesis across multiple perspectives, drawing on the literature reviews, focus group findings, and interviews. It concludes with a range of policy relevant recommendations.

2. Speed and Cultural Change

Overview

Excessive and inappropriate speed is a widespread social problem in many countries. In highly-motorised countries it is a major cause of one in three of all fatal and serious crashes (Joint Transport Research Centre (OECD and ECMT), 2006; Peden et al., 2004). The World Health Organization's (WHO) *World Report on Road Traffic Injury Prevention* provides an excellent summary of risk factors and associated research (Peden et al., 2004, Chapter 3), with similar research cited in Australian policy documents. Compelling evidence has been available for some time now for reduced speed limits, and lower travel speeds in reducing pedestrian trauma (Australian Transport Safety Bureau, 2004, Chapters 13 and 14; McLean, Anderson, Farmer, Lee, & Brooks, 1994).

The WHO report discusses risk as a function of four main elements (Peden et al., 2004, p. 71). The first is exposure. In times of economic growth, for example, traffic volumes increase, along with the number of crashes and injuries. Other examples include land use planning practices that influence the length of a trip or travel mode choice, and the mixing of high-speed motorised traffic with vulnerable road users. The second element is the underlying probability of a crash, given a particular exposure. Inappropriate or excessive speed is relevant here, with crash risk increasing as speed increases, especially at road junctions and while overtaking. Empirical evidence from speed studies in various countries has shown that an increase of 1 km/h in mean traffic speed typically results in a 3% increase in incidence of injury crashes (or an increase of 4-5% for fatal crashes), and a decrease of 1 km/h in mean traffic speeds results in a 3% decrease in the incidence of injury crashes (or a decrease of 4-5% for fatal crashes) (Peden et al., 2004, p. 77).

The third of the four elements is the probability of an injury, given a crash. Speed is again implicated, with the number and severity of injuries increasing as speeds increase. For example, the probability of serious injury for belted front-seat occupants is three times as great at 30 miles/h (48 km/h) and four times as great at 40 miles/h (64km/h), compared with the risk at 20 miles/h (32 km/h). Pedestrians have a 90% chance of surviving car crashes at 30 km/h or less, but less than a 50% chance of surviving impacts at 45 km/h or above. The probability of a pedestrian being killed rises by a factor of eight as the impact speed of the car increases from 30 km/h to 50 km/h. The fourth element covers risk factors influencing the severity of post-crash injuries, such as delay in detecting a crash.

In spite of numerous studies across many countries showing that fatalities and serious injuries have fallen when speed limits have been lowered and increased when speed limits have been raised (Peden et al., 2004, p. 127), governments in most countries are reluctant to reduce speed limits, primarily because arguments based on shorter journey times and restrictions to mobility have held sway (Johnston, 2004). Nevertheless, a relatively recent and important development in addressing the problem of speed has been to recognise the thresholds of physical resistance of the human body to the energy released during a crash, and to consider these thresholds as critical input for the development of laws, regulations and infrastructure (Joint Transport Research Centre (OECD and ECMT), 2006, p. 10). Vision Zero in Sweden (which regards deaths and serious injuries in road traffic as unacceptable) and the Sustainable Safety program in the Netherlands are cited as exemplars of good practice in road safety. Colombia is a developing country that is beginning to develop a similar strategy (Peden et al., 2004, p. 158).

Institutional perceptions of speed related issues

A national report on road safety in Australia emphasises the issue of speed management, stating that its importance “in reducing the road toll should not be understated” (House of Representatives Standing Committee on Transport and Regional Services, 2004, p. 31). It flagged the need for attitudinal change, suggesting that many people do not understand that speed limits are intended primarily to reduce road trauma. Evidence presented to the committee indicated that there is still an erroneous belief that ‘good’ drivers should be able to set their own limits (p. 32).

Further, there is not a sufficiently safe vehicle and road infrastructure for the speeds common on much of the network. As Johnston (2004, p. 258) puts it: “Controversy exists because we have failed to convince the community that, in many parts of our road networks, everybody should slow down in the interests of protecting the community at large”. Moreover, he states that the weight of evidence for speed reduction is irrefutable. For road safety this necessarily means increasing attention to reducing traffic volumes and vehicle speeds. In the case of pedestrians, separating pedestrians and vehicles is often preferable, but in other circumstances speed reduction provides a highly cost-effective option.

Over a decade ago, the Monash University Accident Research Centre (Fildes & Lee, 1993) undertook a “speed review” study. Twelve action items were identified for their importance in reducing speed related crashes by participants coming from four main categories of organisation, namely researchers, state government authorities, federal government authorities, and motorists’ representatives. The most highly rated in terms of importance encompassed a range of issues including speed limits, road design and marking, education and publicity, and speed enforcement technology.

The need for a change in community attitude to speeding was rated highly desirable among the expert groups assembled for the Monash University research project. There was a sense expressed that many people do not perceive it as dangerous to speed. Thus, it was felt that a program similar to that previously undertaken to bring about a change in the community’s attitude to drink driving was needed. As with drink driving, continuing (reinforcing) and interlinked measures encompassing publicity, education, enforcement, and engineering initiatives were considered to be necessary. It was also argued that the main avenues for speed control are engineering, legislative, educational and promotional measures, each interacting with enforcement policies and practices in an integrated way (Croft, 1993). However, the wider cultural critique we are investigating was not present, and educational programs were still framed as top-down initiatives within the prevailing paradigm associated with car and road dominance.

Community attitudes to speed

In Australia, there is some evidence of a positive change in community perceptions of speeding. The Australian Government has conducted a long running national survey of community attitudes to road safety, with the 2009 survey being the twenty-first in the series (Department of Infrastructure Transport Regional Development and Local Government, 2009a). Earlier reports in the series were issued by the Australian Transport Safety Bureau, for example, the nineteenth (Australian Transport Safety Bureau, 2006b) and preceding ones in the series. The Australian community continues to identify speed as the factor most often leading to road crashes. Other important factors nominated include drink driving, inattention/lack of concentration, and driver fatigue.

Various indices are supportive of measures that favour slowing down. For example, in 2009, the proportion of the community believing it is acceptable to speed if driving safely was 12% lower than it was in 1995. There has also been a marked increase over the past decade in community awareness of the link between speeding and road crashes. In 2009, 75% agreed that “if you increase your driving speed by 10 kilometres per hour you are significantly more likely to be involved in an accident”, well above the 55% agreement obtained in 1995 (Department of Infrastructure Transport Regional Development and Local Government, 2009a, p. ix).

On the other hand, community attitudes to 50 km/h zones in residential streets show that the acceptance level has remained virtually unchanged over the past five surveys, with 77% acceptance in 2004 and 2005, 78% in 2006, and 79% in 2008 and 2009. Community support for lower speed limits still needs to be developed. Only 19% support the introduction of more sub-60 km/h zones, whereas 69% support the status quo, and 12% consider that the number of sub-60 km/h zones should be reduced (Department of Infrastructure Transport Regional Development and Local Government, 2009a, p. x). A survey by the insurance company AAMI (2009) suggests that drivers in New South Wales are the most frustrated with restricted speed zones around shopping centres and schools, with 41% saying there are too many, followed by Victorian (34%) and Western Australian drivers (29%).

In contrast with the above evidence of a positive shift in community attitudes over time, other evidence from surveys by AAMI reveals significant underlying attitudinal and behavioural problems linked to driver behaviour. For example, the 2005 *AAMI Crash Index* found that 44% of Australian drivers admit that they have gestured rudely or yelled at another driver, up from 22% acknowledging this in 1996 (AAMI, 2005). Further, 27% of drivers do not consider themselves to be speeding unless they are exceeding the speed limit by more than 10 km/h. More recent surveys continue to reveal the widespread nature of speeding on Australian roads. The 2009 *AAMI Crash Index* found that exceeding the speed limit is common, with only 16% of drivers nationally saying they never speed. 66% say they speed some of the time and 12% say they speed half of the time. Drivers in the ACT are the worst offenders with just 12% saying they never speed, and 12% saying they speed all the time. 44% of ACT drivers consider that travelling 5 to 10 km/h over the speed limit isn't speeding compared with just 16% of South Australian drivers (AAMI, 2009).

In relation to road rage and aggression on Australian roads, the most recent *AAMI Crash Index* (AAMI, 2009) reports that 91% of drivers say that motorists are becoming more aggressive, continuing a trend that has steadily worsened since AAMI began canvassing driver attitudes and behaviour in 1996. People are now four times as likely to tailgate drivers who angered them, as compared with the findings in 1996. The survey suggests that conditions on the roads have deteriorated to the extent that 60% of drivers worry about being a victim of road rage.

Changing attitudes and behaviours in relation to speeding is a broad-scale challenge, given the ubiquitous nature of speeding. An Australian report that investigated attitudes and beliefs about speeding and its countermeasures (Australian Transport Safety Bureau, 2006a) argued that normative and attitudinal factors should be employed to a much greater extent in countering speeding. For example, campaigns should continue to identify speeding as a major factor in road crashes. Such campaigns should also increase the social disapproval of speeding, with specific disapproval messages directed at those who exceed the speed limit by particular margins (p. 9).

Changes in attitudes to speed limits were observed in focus group discussions held in Western Australia. After information on the safety benefits of reduced speed limits was presented to participants, there was improved support for reduced speed limits from people who were previously indifferent (Fildes, Langford, Andrea, & Scully, 2005). Given the increased probability of a pedestrian being killed or seriously injured at speeds exceeding 30 km/h, it is clear that 30 km/h is the speed limit best suited to vulnerable road users. However, as part of a process of moving forward in stages, it seems more likely that Australian communities would initially be more willing to accept a 40 km/h limit in the vicinity of shopping and community facilities.

Young people, of course, are a high-risk group for deaths and injury from road crashes. A recent University of Adelaide study suggests that many young drivers with new licences are still too inexperienced to handle a vehicle safely. The findings support raising the provisional licence age to 18 and having a maximum speed limit of 80 km/h during the first year of driving to reduce the number of crashes among young drivers (*Maximum 80kph urged for P-plate drivers*, 2009). On the other hand, a study in Spain revealed an ambivalent attitude among young people in relation to authoritarian measures and enforcement devices (Ramos et al., 2008). A driving cultures program at the Centre for Cultural Research at the University of Western Sydney is pertinent. The program aims to promote safe driving practices among young and inexperienced drivers by using an innovative cultural approach to driver education (Redshaw, 2005). It examines the social/cultural dimensions of driving, and the influence of attitudes to driving of young drivers. The issue of 'control' and how it can be exerted, as well as its relationship with power is significant. At a more practical level, Freeth (2009) has demonstrated the value of education and coaching for P-plate drivers by exposing the discrepancy between "perceived risk" and "actual risk", thus heightening a sense of vulnerability. Such coaching in low risk driving relies on the application of skills and behaviours to reduce crash level risk. Central to low risk driving is the concept of the "crash avoidance space"—that is the space required to avoid, or reduce the risk of a crash occurring.

Car design and advertising, and speed

An additional pivotal issue is the way in which cars are made and marketed in modern societies. Cars are designed, built, marketed, and sold with a substantial emphasis on speed and power, and travel speed is glorified in television, film, printed media, and through motor sport (Johnston, 2004, 2005; Tranter & Lowes, 2005; Warn, Tranter, & Kingham, 2004). The increase in top speeds and acceleration has made it much easier to drive at inappropriately fast speeds, thus counteracting other vehicle safety improvements.

The impact of motor sport on the culture of speed in Australia is accentuated by the staging of motorsports events in significant public places (even Australia's Parliamentary Zone, arguably Australia's most powerfully symbolic national space). The symbolic characteristics of these places serve to give official sanction to the culture of speed (Tranter & Lowes, 2006). In effect, motor racing events in such places increase the appeal, and hence the advertisement, of motor sport, speed and the fast life.

The advertising budgets supporting car-based lifestyles are large. One cause for optimism comes from surveys in Australia showing that a majority of adult Australians agree there is too much emphasis on speed in advertising. Many people would like to see a greater focus on safety rather than speed in car advertising (Australian Transport Safety Bureau, 2004, p. 298).

A study using a content analysis of Australian motor vehicle advertising coded 444 advertisements broadcast on Australian TV between 1999 and 2004 (Sheehan, Steinhardt, & Schonfeld, 2006). The most encouraging result was that the themes of 'performance' and 'exciting/fun to drive' diminished significantly since the *Advertising for Motor Vehicles Voluntary Code of Practice* was introduced in 2002 and revised in 2004. However, although the acceleration, speed and traction themes did not increase over the period reviewed, themes relating to general driving safety are represented in a very low proportion of advertisements.

Johnston (2005) calls for a sea change in the way people view and use the car, and asks whether we can imagine a future society where the bulk of private motor vehicles are effectively the same—small, fuel efficient, low polluting, crashworthy, and capable only of relatively low travel speeds. Speedometer design needs to be addressed, as currently a range of speeds that are illegal in Australia—120 km/h to 240 km/h—occupies half of the speedometer (Johnston, 2004). Moriarty and Honnery (1999) also examine the case for slower, smaller and lighter urban cars, and find that not only would they yield large benefits in reducing traffic fatalities, but reduced car mass and air drag would help fuel efficiency, and thus lower air pollution and greenhouse gas emissions.

Nonetheless, the social barriers to such a change are significant. A number of participants in our focus group of 'experts' touched on the issue of aspirations. As one said:

I do think it is enormously important how we think about the way to success in life ... perhaps even in places like Germany where a Mercedes or a BMW is like the pinnacle of aspiration for people on the planet. If we attach it to things like that it will be ever thus.

Another commented on the use of a car vis-à-vis bus transport:

My friend the other day said: "Oh I'm really sorry I'm late – I had to catch the bus like a peasant".

Yet another stated:

Clearly, vehicle design is critical ... there has been better braking, air bags and all that sort of stuff, but they're also getting faster and you might argue they are creating a culture of speed.

3. Paradigm Shifts and Cultural Change

In Britain, the call for a paradigm shift in road safety has been highlighted in recent official reports. A House of Commons Transport Committee (2008) report entitled *Ending the Scandal of Complacency: Road Safety beyond 2010* points out that the deaths of three thousand people and injuries to a quarter of a million people is a “staggering annual toll to pay for mobility” (p. 3). Further, the committee comments: “It is inconceivable that any transport system invented today would be accepted, no matter what its benefits, if it involved this level of carnage” (p. 3). The report therefore highlights the need for a “step-change in approach”. The following excerpts highlight the need for a new vision integrated with other important policy objectives, and underline the adoption of a systems approach. Consequently, they also emphasise an integrated institutional approach:

A new vision is needed for road safety in Britain beyond 2010. This should be underpinned by a strategy that explains how casualty reduction, danger reduction and the various other important policy objectives, such as a sustainable transport system, economic efficiency, climate change, social inclusion and physical health are integrated. (p. 34)

The systems approach to road safety, now adopted by the Netherlands, Sweden and elsewhere is different to that pursued by the UK. We believe that it is time for the UK to move towards this more fundamental approach which is accepted for other transport modes. (p. 39)

We do not believe that the Department for Transport’s forthcoming road safety strategy review will have sufficient profile or the necessary cross-governmental authority to bring about the fundamental and long-term change that is needed. We therefore recommend that the Government establishes an authoritative and independent road safety commission that has powers to work across the whole of Government. (p. 42)

At a more concrete level, evidence presented to the committee by Rod King’s 20’s Plenty for Us (the campaign for 20 mph to become the default speed for residential roads) suggests that active transport will become increasingly important. The benefits include (House of Commons Transport Committee, 2008, p. Ev 341):

- Lower pollution
- Lower oil use
- Better health
- Better accessibility
- Fewer casualties
- Lower noise
- Better quality of life

The Swedish Vision Zero policy requires a paradigm shift in addressing road safety by having fatalities and serious injuries reduced to zero (Tingvall & Haworth, 1999). The Vision Zero policy is radical in its approach as compared with previous initiatives, as shown by its basic strategic principles:

- The traffic system has to adapt to address the needs, mistakes and vulnerabilities of road users
- The level of violence the human body can tolerate without being killed or seriously injured is the basic road transport system design parameter
- Vehicle speed is the most important regulating factor for safe road traffic

The Vision Zero approach in Sweden focuses on ethics, as with the goal that no person be killed or seriously injured for life in road traffic, and the Sustainable Safety approach in the Netherlands likewise adopts a proactive and preventive approach. Examples applicable to both (but expressed here using language typical of Vision Zero) include setting speed limits in accord with the human body's tolerance against external violence, a road environment with an infrastructure adapted to the limitations of the road user, and road users who are well informed and adequately educated. Specific actions within the safety strategies thus include the use of 30 km/h speed limits in built-up areas, "2 + 1 lane" highways² with a median barrier, the use of roundabouts rather than traffic lights, and the physical separation of vehicles with major differences in masses, speeds and directions.

The Stockholm Environment Institute (Whitelegg & Haq, 2006) investigated the costs and benefits of adopting a Vision Zero policy in the UK. On the positive side, a vision is something that can be constantly used to inform policy development and thinking. It coincides with a strong interest in Sweden in public health, quality of life, health and safety at work, and an "aviation safety culture" approach in terms of risk. Claes Tingvall (Director of Traffic Safety, Swedish Road Administration) indicated that he "believes Vision Zero has produced a very positive standard of thinking about road safety and has established a high level of consensus and shared values across diverse groups of people including the automotive industry, Volvo, and politicians" (p. 22).

On the downside, some of those interviewed, including experts and those in focus groups, considered that the zero target is "idealistic", "unrealistic", and "unattainable", and that a big stumbling block is changing people's attitudes (p. 29). Helmut Holzapfel, Professor of Traffic Planning, University of Kassel believes the concept of Vision Zero is valuable, but considers that Sweden has done little to counter the spread of car dependent lifestyles that result in more kilometres driven (p. 25). He considers that clearly stated intermediate goals are also needed, together with a clear process of evaluation and policy changes to assist in keeping the process on target. Switzerland has a long list of actual measures specified in some detail, which are capable of achieving reductions in deaths and injuries.

Related to the issue of vision is the adoption of a *systems approach*, which a major WHO report on traffic injury prevention considers an essential tool for effective road crash injury prevention (Peden et al., 2004, p. 12). Evidence from a number of countries is cited, suggesting that over recent decades systemic improvements aimed at vehicles, roads and users have produced a marked decline in road deaths and serious injuries.

² **2+1 road** is a specific category of three-lane road, consisting of two lanes in one direction and one lane in the other, alternating every few kilometres, and separated usually with a steel cable barrier.

Such a systems approach characterises the development of a road safety strategy for Western Australia 2008-2020 (Corben, Logan, Johnston, & Vulcan, 2008). It uses combinations of “Safe System” elements, namely safe roads and roadsides, safe speeds, safe vehicles and safe road use. The report concludes that if the combination of initiatives is fully adopted, it has the potential to result in large reductions in severe road trauma in Western Australia, with annual serious casualties estimated to fall around 50% of their 2006 levels by 2020.

The Parliamentary Advisory Council for Transport Safety (PACTS) in the UK (2007) is another body that called for a more integrated and holistic approach to road safety. It too emphasises the importance of a vision to guide future road safety policy. Additionally, it argues for an engagement plan to involve organisations and policy fields that have not traditionally worked in road safety be developed as part of the strategy.

PACTS is supportive of the Swedish Vision Zero policy based on the assumption that no one should be killed or seriously injured in road traffic. In its assessment this is a “paradigm shift in approach to road safety” (p. 17) as it abandons the traditional economic model where road safety is provided at reasonable cost, and the traditional transport model in which safety must be balanced against mobility.

Importantly, PACTS notes for Vision Zero that *speed is the key factor* for controlling the safety of the system and as a focus for intervention. However, it also draws on an Audit Commission finding that around one fifth of people identified speed and the *volume* of traffic among the issues that most need tackling to improve the quality of life of residents (p. 21).

Addressing road safety within a broader framework consequently leads to consideration of issues such as:

- Fostering neighbourhood renewal and the use of local area agreements as part of an approach to road safety (p. 27)
- Using street designs to calm traffic naturally, which draws on the idea of psychological traffic calming (p. 34)
- Adopting land use planning that contributes to active travel (p. 36)
- Encouraging a shift away from “default car use to walking and cycling, as well as public transport” (p. 29)
- Providing information about options to achieve modal shift, as with individualised travel marketing programs (e.g. TravelSmart in Australia) (p. 37)

With respect to integration at an organisational level, PACTS emphasises that “building partnerships between the levels of government and communicating the intersections between road safety and other policy objectives is a specific task and a skill and requires dedicated attention” (p. 26). Thus policies to tackle a variety of social and sustainability agendas such as climate change, social exclusion, obesity and urban renewal can all overlap with the objective of reducing casualties. Therefore PACTS supports the setting up of a high level body or agency to facilitate the greater coordination of road safety issues, with membership including those with expertise in public health, sustainable travel, and attitudinal and behavioural change, to ensure that road safety is considered in its widest context (p. 27).

A recent report commissioned by the Department for Transport in the UK (Broughton et al., 2009) acknowledges the slowing trend in fatality reduction in many countries, and hence the need for a new approach for achieving substantive additional reduction. As part of this effort, a chapter on visions for road safety is included. As mentioned above, these are used in a number of countries including Sweden and the Netherlands, and are under consideration in others. A vision can act as a promotional tool, as well as acting to frame policies on what a future safety scenario should look like. However, although a vision is useful for ensuring that road safety gains a prominent position in transport policy and decision-making processes, raises public interest, and raises support for (sometimes controversial) road safety initiatives, it is not a substitute for a safety *strategy* (Loo, Hung, Lo, & Wong, 2005).

A strategy is a collection of plans that aims to fulfil the vision. Loo et al. (2005) developed a framework for comparing road safety strategies, with vision being the first of nine significant components. The others components are: (2) objectives; (3) targets; (4) an action plan; (5) evaluation and monitoring; (6) research and development; (7) quantitative modelling; (8) institutional framework; and (9) funding.

Broughton et al. (2009) suggest that a vision must be credible, challenging, appealing and memorable, and identify three preconditions for the effective adoption of such a vision (p. 119):

- Breadth of institutional and stakeholder commitment to the concept of a vision
- Fresh public understanding of existing risk on the roads and the possibility of change
- Public and stakeholder engagement in the formulated vision

Major factors identified as important for the success of road safety initiatives are the necessary political will, proper organisation, and knowledge. Broughton et al. (2009) provide support for such principles by noting that experience in Sweden, the Netherlands and New Zealand underlines the importance of securing parliamentary commitment on grounds that are hard to refute, demonstrating that there are cost-effective measures through which the vision can be pursued, and obtaining the engagement of stakeholders and the public using readily understandable concepts on lines of action. A celebrated example of the importance of political will and commitment was a major initiative by the French President to improve France's safety record compared with other countries. A change in culture and practice of the enforcement of traffic law, using widespread implementation of the speed cameras and also electronic breathalysers, resulted in substantial reductions in fatality numbers.

Once again, the Broughton et al. (2009) report flags the need for road safety policy to be considered in the context of wider policies, such as those linked to climate change, improving people's safety and health, enhancing quality of life, and promoting greater equality of opportunity. For example, addressing climate change is helped by reducing the risk associated with travel on foot or by bicycle (either right to the destination or to and from public transport) and enhancing the safety of motor vehicles and their use in ways that encourage increased fuel efficiency. However, Broughton et al. do not address the way in which macro-level integrative visioning and planning is to be implemented at a more operational level, and some of the objectives supported (e.g. support for economic growth) appear to contradict paradigmatic social change coming from other directions.

How deep is the paradigm shift needed?

Challenges to the current paradigm for road safety are coming from a number of directions, including new thinking on health, ecologically sustainable transport, global environmental change, and the “slow movement”. The importance of two key drivers of global change—climate change and peak oil—is sufficiently great to devote a separate section to it further below. Some general principles are discussed in the current section. Two examples are then given—namely the place of travel demand management, and the way time is structured in society.

At a more general level when considering change, a distinction can be drawn between “deep” sustainable change, which usually requires fundamental redesign of the systems involved, and our relationships with them, and “shallow” adaptive, substitutive and compensatory change, which usually unintentionally protects and perpetuates the very structures and processes that are the sources of the problems that we are attempting to solve. Hill (1999) uses an “E-S-R” model to distinguish between “efficiency”, “substitution” (shallow) and “redesign” (deep) approaches to change. The model was first developed for re-conceptualising pest control, from the inefficient to efficient (E) use of pesticides, to substitutes (S) such as biological controls, to the integrated redesign (R) of complex agroecosystems to favour crops and natural controls over pests. Efficiency and substitution strategies may serve either as stepping stones or as barriers to the more fundamental redesign approaches. A holistic, integrated, whole system approach calls for redesign and innovation at the industrial and business levels, enabled by supportive changes in institutional structures and processes (at the political and socio-cultural level) (Hill, 2006).

With respect to road safety, Whitelegg (1983) raised similar issues almost three decades ago. He asked to what extent our solutions are locked into a particular view of technology and society, and are therefore tied to producing incremental improvements without any fundamental alteration in the structure of the problem itself. As he put it (p. 153):

In the case of road safety it can be argued that solutions which build on the acceptance of the motor car as a major and immutable technology will reinforce that position and generate a primary paradox: solutions designed to reduce a major negative effect of motorised transport contribute to the perpetuation of the circumstances which lead to road traffic accidents. The lack of policy suggestions outside of this “predominant technology” leads to great confusion in road traffic accident research.

Whitelegg further considers that the categorisation of people, vehicles and roads as the prime dimensions of road safety policy has created its own difficulties in relation to road traffic crash research. In his view at that time, progress made in road design, vehicle engineering, and studies of driver and pedestrian behaviour had “not been matched by advances in our understanding of the role and function of the transport system as a whole and of the needs and susceptibilities of different groups and individuals for whom movement in cities and elsewhere is an integral part of normal existence” (p. 153). The prevailing approach, he suggests, carries with it the strong implication that the original “design” is without major defects, and the answer to problems within it lies in some aspect of quality control of the component elements, namely people, roads or vehicles.

More recent work, however, on the “politics of mobility” (Vigar, 2002) and the relationships between transport, environmental sustainability and public policy points to a move beyond a narrowly defined transport policy approach to encompass a much wider set of health, social and environmental concerns. Travel by private vehicle (and also air travel) is widely considered to be more damaging to the environment than

by other modes of travel. Motor cars are considered to be less efficient than mass transit both in terms of individual journeys, and in terms of the energy used in their manufacture and maintenance. Consequently, Vigar (2002, p. 190-193) demonstrates how the “predict and provide” paradigm was increasingly questioned during the 1990s particularly in relation to road building, with a gradual perceptual shift occurring from “roads as solution” to “roads as a problem”. A reframing towards a “new realism” is becoming apparent. Thus, where the “predict and provide” model constructs “changes in travel demand as an expression of underlying social and market dynamics” and as being inevitable without serious consequences (particularly economic), a “new realist” approach argues that “travel demand can be influenced by public policy” and that travel demand management is an appropriate policy response.

Mobility management (also called travel demand management) is currently not integral to road safety considerations, being usually considered more in relation to congestion reduction, energy conservation and emissions reductions, and improved mobility options for non-drivers. However, Litman (2009) presents a strong case for mobility management strategies that reduce per capita vehicle travel (exposure) being of value in reducing overall crash risk. That is, the *volume* of motorised traffic is a critical factor to consider in addition to speed. He puts the case for change in how road safety is considered as follows (p. 35):

Current transport planning practices give little or no consideration to safety impacts of changes in vehicle mileage. This tends to overvalue roadway and vehicle improvements that increase vehicle mileage (such as highway capacity expansion which induce vehicle travel on a particular roadway, and vehicle fuel efficiency and safety improvements that increase per capita vehicle mileage), and undervalues mobility management programs that reduce vehicle mileage.

There is acknowledgment of increasing travel as an issue in official documents, but not of travel demand management as a strategy for dealing with the problem. For example, in Australia the *National Road Safety Action Plan 2009 and 2010* (Australian Transport Council, 2008) states (p. 55):

Australia has had an extended period of economic growth. Studies have shown that increased economic activity and discretionary income are generally associated with higher levels of road trauma due to increased travel, including more travel during high-risk periods in the 24-hour cycle.

The reason that mobility management is given little or no significance according to Litman is that distance-based analysis treats mobility (the amount that people travel) as being outside the scope of policy interventions. In contrast, he makes the case for distance travelled being a significant risk factor, and therefore mobility management being an appropriate way to reduce crash risk.

Further, he argues that many experts and individual drivers prefer to focus on reducing the small percentage of high risk driving by other motorists, rather than vehicle travel in general, or their own vehicle travel in particular. While not underestimating the value of “targeted” programs directed at high-risk driving, Litman (2009, p. 5) maintains that the safety value of reducing average-risk travel has been underestimated.

The value of a population strategy of prevention being necessary where risk is widely diffused through the whole population has similarly been put for preventive medicine in general (Rose, 1992). In contrast with a high-risk strategy of prevention,

the population strategy is based on the axiom that a large number of people exposed to a small risk may generate many more cases than a small number exposed to a high risk. Rose suggests that because so many people drive their cars every day and nearly all return home safely, no one really expects to have a crash on any particular occasion. Therefore, few feel any personal responsibility for the major problem of death and injury on the roads. Although high-risk strategies are valuable (for example, those targeting drinking drivers and illegal street racers), Rose argues that the major public health arising from a small but widespread risk is left unaddressed, unless a population strategy is adopted. Johnston (2004) argues for a population based speed reduction preventive strategy, based predominantly on the mismatch between extant speed limits and levels of infrastructure safety.

Mobility management strategies are consistent with wider principles adopted for sustainable transport (May, 2006). These include access to goods, services and social opportunities, rather than mobility *per se*, and less movement of goods and services, for example by appropriate urban design and access through telecommunications. Litman (2009, p. 3) uses the following broad categories for various mobility management strategies:

- Improved transport options e.g. transit improvements, walking and cycling improvements, telework, flextime
- Pricing initiatives e.g. congestion pricing, fuel tax increases
- Land use management e.g. smart growth, new urbanism, car-free planning
- Implementation programs e.g. commuting reduction programs, freight transport management, tourism transport management

Examples of how these strategies affect travel include:

- Flextime and telework – reduces peak-period travel on a particular road by shifting travel time, or reduces commuting trips
- Congestion pricing – reduces peak-period vehicle travel on a particular road by shifting travel route, time, destination and mode
- Smart growth, new urbanism – creates more accessible land use, reduces trip distances, shifts modes e.g. to walking and cycling, and reduces travel speeds

Litman (2009, p. 35) speculates on how much safety can be achieved through mobility management programs. Examples given include personalised marketing programs towards walking, cycling and public transport that have reduced local vehicle trips by 7 to 14%, with an associated reduction in road crashes of 5-10%. London's congestion pricing reduced crashes within the charge area by about 25%. Residents of smart growth communities³ tend to drive 15 to 25% fewer miles, and have 20 to 40% fewer per capita crash fatalities than residents of conventional, car-oriented communities. Given that many strategies have synergistic impacts, Litman contends that mobility

³ Smart growth concentrates growth in the centre of a city to avoid urban sprawl, advocates transit-oriented and walkable communities, and has mixed-use development with a range of housing choices.

management programs that use a variety of strategies (e.g. road and parking pricing, improved travel options, and smart growth land use policies) can be expected to reduce per capita crashes by 20 to 30% or more when applied. Significantly, conventional planning tends to overlook the full costs of decisions that increase vehicle travel (such as roadway capacity expansions), and undervalues the full benefits of mobility management strategies that reduce vehicle travel distances.

Recent confirmation of an enforced application of a mobility management strategy is provided from a study of higher petrol prices and reduced motor vehicle fatalities (Sivak, 2008). Pricing reforms such as increased fuel taxes can be expected to reduce vehicle mileage, with moderate to large safety benefits. The study examined trends in motor vehicle fatalities in the USA, petrol sales, and distance driven, for the 12 months from May 2007 to April 2008. The results show substantial year-to-year reductions in motor vehicle fatalities over this period, with the fatalities dropping by 22.1% and 17.9% respectively in March and April 2008, whereas fuel sales went down by 3.4% and 1.0% respectively. The author concludes that the results cannot be fully explained by the reductions in fuel sales and distance driven, suggesting that a major shift in behaviour may also be occurring. The shift may involve disproportionate reductions in distance driven for more risky driving conditions and for drivers with lower incomes (who tend to have higher crash rates), as well as possible reductions in speeds as a means of increasing fuel economy.

Another example, from a holistic perspective, of an issue that has an important bearing on road safety, is the way time is considered and structured in a society. Thus, so-called "time pressure" is emerging as a modern malaise (Strazdins & Loughrey, 2007). It is linked to changes in working life, with longer work hours and faster work pace. In many families both parents must combine working with caring. Surveys in 2007, 2008, and 2009 by the Centre for Work + Life at the University of South Australia show that many employees experience frequent interference from work in their personal, home and community lives, with many people feeling overloaded at work, and feelings of time pressure being common and growing. The 2009 survey reveals evidence of a worsening of work-life interference for women. Thus, two-thirds of full-time working women reported that they are often or almost always rushed or pressed for time, up from 59.4% in 2007. Part-time working women also share this sense of time pressure, with 58% saying they are often or always rushed or pressed for time, compared with 51% in 2007 (Pocock, Skinner, & Ichii, 2009).

Time costs shape travel choices and behaviours. Relevant here is the 2005 AAMI survey entitled "Congestion rage: symptoms of a busy, over-stressed society", with 60% of drivers admitting that if they are in a hurry, they are more likely to lose their temper with other drivers. Professor David Hensher considers that "the symptoms of road rage by drivers and passengers are often associated with pressures on their time, given all the competing demands" (AAMI, 2005, p. 6). AAMI's research suggests that traffic congestion is a major source of aggression on the roads. Since 2005, the *AAMI Crash Index* found a more than tripling of the number of drivers who say it takes them thirty minutes or more to drive to work—from 8% in 2005 to 30% in 2009. Moreover, in the same period the research identified an 18% increase in the number of drivers who attribute aggression and road rage to traffic congestion—from 70% in 2005 to 88% in 2009 (AAMI, 2009, p. 5). Time pressure is likely implicated in the finding that more than one third (36%) of Australian drivers sometimes speed to arrive at home or work sooner (AAMI, 2006). Two thirds of drivers in Sydney said they would use public transport if it were as quick as car travel. Time waiting for public transport is viewed as particularly wasteful, so that both the actual journey time and the waiting time act

as disincentives (quoted by Strazdins & Loughrey, 2007). In Australia, despite the twin environmental and health benefits associated with walking and cycling, less than 5% of people walk to work each day and only 1% cycle. Instead, four out of five Australian commuters travel by car (Flood & Barbato, 2005).

Stazdins and Loughrey ask why, in relation to the modern epidemics of obesity, Type 2 diabetes, and heart disease, behaviour change has not occurred on anything like the scale required. Further, they ask: How can policy respond to these public health and environmental threats? They argue that current solutions have an unacknowledged time dimension, which is vital in bringing about the changes needed. The availability of free time has declined, and if interventions are to be successful, they must avoid adding to time burdens. Policies and interventions in relation to road safety need to take account of this time dimension.

The need for fundamental redesign at a much broader level is reflected in the Slow Cities movement. Surprisingly little attention has been paid to this movement by road safety researchers. Yet it may provide considerable potential for improvements in road safety. Knox (2005) asserts that globalisation has created a “fast world” with “people and places directly involved, as producers and consumers, in transnational industry, modern telecommunications, materialistic consumption and international news and entertainment”. Countering this trend is the development of the Slow City movement—an ecological and humanistic response favouring local, traditional cultures, a relaxed pace of life and conviviality. Engwicht (2005, p. 159) in discussing such an approach refers to the “Great Civility Outbreak”—a cultural revolution where it becomes the social norm to be ‘civilized’ and ‘a good citizen’.

In 2001, the first 28 Slow Cities were certified, the majority being located in northern Italy, particularly in Tuscany and Umbria. The list has since grown to include cities in Europe and Brazil, for example. While the movement strictly applies to cities of 50,000 people or less, many of the principles of Slow Cities can be applied in any city. In general, Slow Cities are concerned with specific values and practices associated with improving the quality of life and liveability of a city. These include issues such as fending off the advance of fast food, a commitment to planting more trees and creating more green space, keeping public squares free of advertising, banning car alarms, reducing noise pollution, light pollution and air pollution, fostering alternative sources of energy, improving public transport and promoting eco-friendly architecture. The emphasis is on making places for people rather than for cars.

An important principle of slow cities is that they promote a more human, less frenetic way of life. Slow Cities are not just, however, about a fast city slowed down; they are about challenging the dominance of speed, accepting the view that it is OK to be slow (Honoré, 2004). This challenge to the dominance of speed is important for road safety in multiple ways. First, if this is applied to urban speed limits and average driving speeds, there are immediate and clear road safety benefits, as speed is a significant factor in traffic accidents. Second, if the slow cities movement can encourage people to use local public spaces, then one impact of this is reduced traffic levels, as well as more careful driving from psychological traffic calming (Engwicht, 2005). At a larger spatial scale, Slow Cities encourage the use of local materials and foods, reducing the need for transport of goods and materials, particularly by trucks. An additional road safety benefit is therefore achieved by reducing the number of heavy vehicles on streets.

4. Climate Change and Peak Oil as Key Drivers of Change

The combination of two major global issues—peak oil and climate change—is increasingly likely to affect transport and travel behaviour. Peak oil refers to the global peak and subsequent decline in the production of oil. Both have received extensive coverage in the media (particularly climate change). Climate change is increasingly being considered as a major sustainability emergency for humanity (Lovelock, 2009; Spratt & Sutton, 2008). More pragmatically, a wide-ranging report prepared for Brisbane City Council on climate change and peak oil suggests that Council should call for a sweeping change in attitude and policy by government at all levels, that it should lead by example, and that sustainability should be fully integrated into Council decision making processes at all levels (Maunsell Australia Pty Ltd, 2007). The report is the result of an expert Climate Change and Energy Taskforce set up to advise Brisbane City Council on preparing the city for climate change and peak oil. The taskforce was chaired by Professor Ian Lowe.

Significantly, road safety issues are being linked to the sustainability agenda, including the pivotal issue of climate change, and concerns about sedentary lifestyles and an obesogenic environment (Parliamentary Advisory Council for Transport Safety (PACTS), 2007; Racioppi, Eriksson, Tingvall, & Villaveces, 2004). A report by the World Health Organization demonstrates well how road safety can be integrated with health and environmental concerns (Racioppi et al., 2004, p. 35). A range of road safety related issues including speed management, traffic calming, reducing transport demand, road pricing, the promotion of safe cycling, walking and public transport, and reducing the power of vehicles have positive and synergistic effects on reducing road crashes, mitigating climate change, promoting physical activity, and promoting community cohesion.

A recent book on resilient cities considers the way in which climate change and peak oil constitute a “double whammy” for resource intensive cities (Newman, Beatley, & Boyer, 2009). The authors argue that there are many reasons—environmental, health, social, and economic—to overcome car dependence. This is best understood in terms of a lack of resilience, with a city needing many kinds of transport and land use options, rather than just one type to be resilient. To emphasise the singular focus on cars, the authors draw on transport planner Eric Britton’s reference to the “New Mobility Agenda” of breaking the stranglehold of the single “car-only” option for cities (p. 87).

In contrast, the title of another recent book—*Two Billion Cars – Driving toward Sustainability* (Sperling & Gordon, 2009)—demonstrates the degree to which the car-centric model is embedded in modern societies. The planet has over one billion vehicles today, and is accelerating towards a second billion. By 2020, the authors project that over two billion vehicles will populate the earth, more than half of them cars. The increasing consumption of oil, and the carbon dioxide emissions from it, is the direct consequence of the continuing growth of oil-burning vehicles worldwide. In spite of the widespread concern and discussion about climate stabilisation and the need for deep cuts in emissions, vehicle sales, oil consumption, and carbon dioxide emissions are continuing their strong upward growth. The authors seek to address this unsustainable transport pathway by focusing on the reinvention of vehicles, fuels, and mobility, the latter factor in particular being an acknowledgement of the “spreading hegemony of cars” and a “transportation monoculture” (p. 6).

The contradiction between the need to cut greenhouse gas emissions and road transport's increasing contribution to emissions is demonstrated in more detail by Australian data. The vast majority of domestic passenger and freight trips are undertaken in road vehicles, which account for 75% of transport fuel use. In addition, the demand for transport energy is growing at about 2.4% per year (CSIRO Future Fuels Forum, 2008, p. 12).

In 2007, transport contributed 14.6% of Australia's national greenhouse gas inventory emissions (Department of Climate Change, 2009). Transport emissions are one of the strongest sources of emissions growth in Australia. Road transport was the main source of transport emissions, accounting for 87% of 2007 transport emissions. Passenger cars are the largest road transport source. Emissions from light commercial vehicles (LCVs) and trucks have also grown strongly. The remaining transport emissions come from civil aviation (6.8%), shipping (3.7%), and railways (2.5%).

Projections forward to 2020 done by the Bureau of Transport and Regional Economics (2005) using base case or business-as-usual assumptions confirm the long-term growth in transport sector emissions flagged in earlier studies. BTRE projections for the road sector have Australian vehicle kilometres travelled (VKT) growing steadily over the projection period, from 222 billion kilometres in 2004 to around 289 billion kilometres in 2020 (an increase of 30% or close to 1.7% per annum) (see Figure 2). If peak oil occurs before 2020, these projections may prove to be over-estimates.

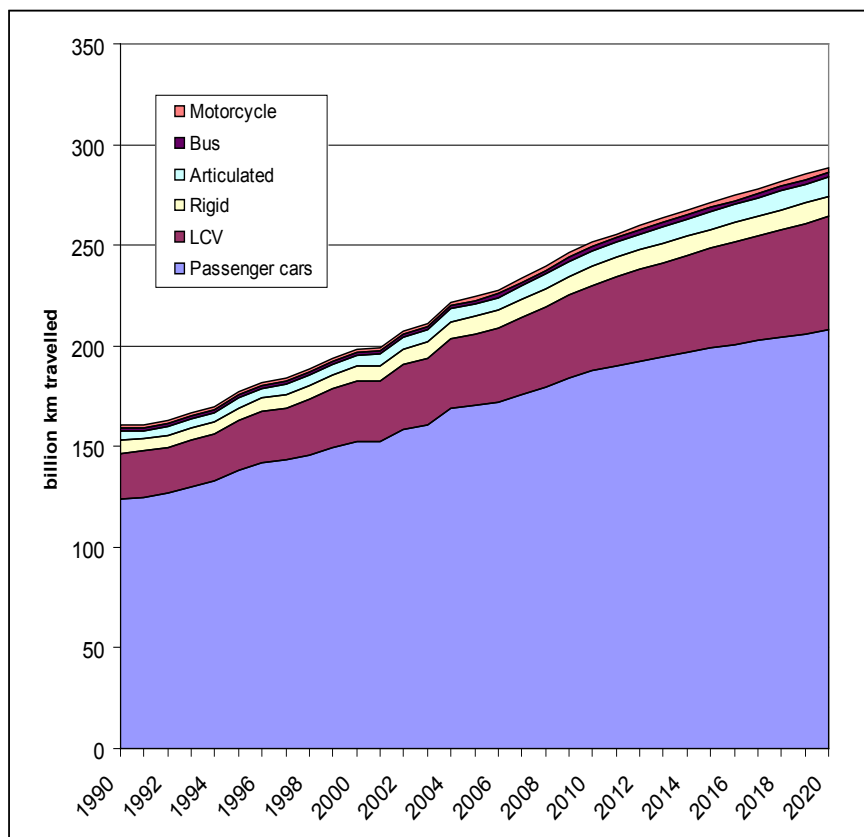


Figure 2 Base case projected growth in road vehicle travel for Australia, 1990 - 2020 (Bureau of Transport and Regional Economics, 2005)

By 2010, emissions from the Australian road transport sector are projected to increase 55.5% above the level for 1990, and by 2020, emissions for road transport are projected to increase to 74.7% above 1990 levels (Bureau of Transport and Regional Economics,

2005, p. 9). These projections are shown in Figure 3. The projected increase of 30% in national vehicle kilometres travelled (VKT) by all vehicles (between 2004 and 2020) includes an increase of 23% in travel by passenger cars (including 4-wheel drive passenger vehicles).

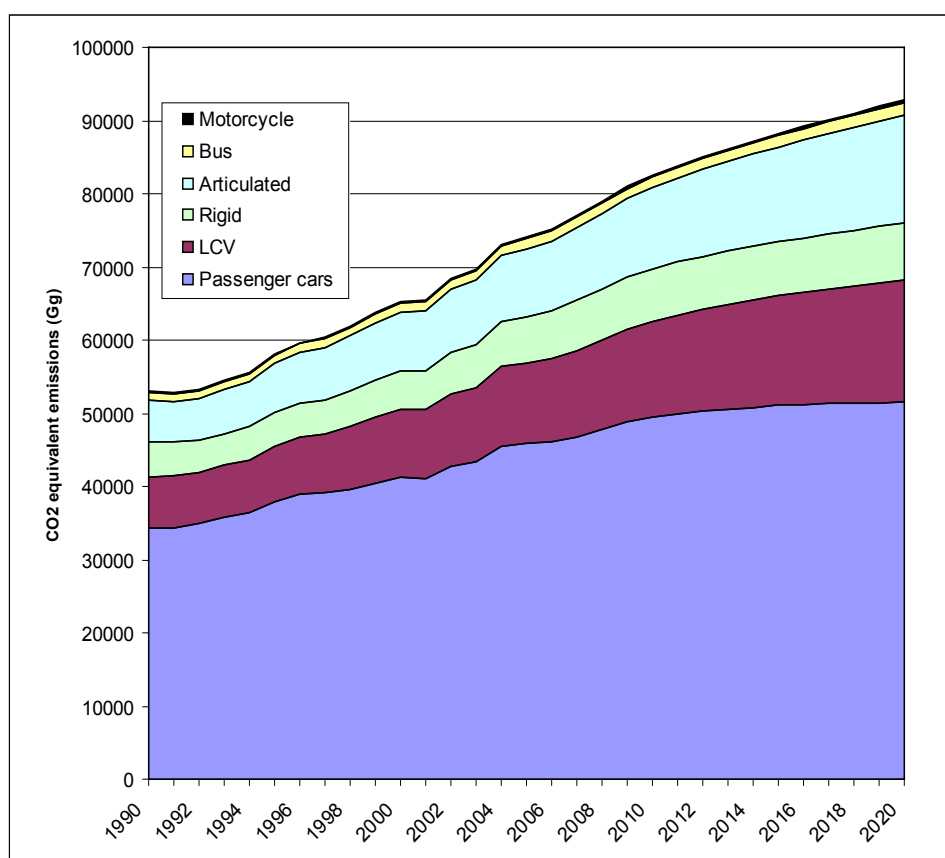


Figure 3 Base case projected growth in greenhouse gas emissions by road vehicles for Australia, 1990 – 2020 (Bureau of Transport and Regional Economics, 2005)

Another major energy issue with significant implications is the continuing availability of conventional oil (also called “cheap oil”). There is a growing literature pointing to a short to medium term supply problem e.g. Bentley (2002), Heinberg (2003), Deffeyes (2005), Kilsby (2006), and publications from the Association for the Study of Peak Oil (ASPO) such as Campbell (2006). A review of energy futures for Australian transport suggests there is significant risk of a crisis arriving before sufficient preventative action can take effect (Kilsby, 2006). In the above mentioned projections to 2020 for greenhouse gas emissions from transport, the greatest acknowledged uncertainty concerning the projections is whether there will be significant disruptions to oil supply during the forecast period, with consequent increases in fuel prices impacting on transport activity levels (Bureau of Transport and Regional Economics, 2005, p. ix). Maintaining Australia’s resilience in the face of “peak oil” has significant implications in relation to quality of life and mobility, producing food, and meeting energy needs (Cork, Walker, & Buckley, 2008). The addition of diminishing oil supplies as another major global driver of change therefore suggests that communities across the world will increasingly be faced with the need to redesign their transport systems and to modify travel behaviour (Kilsby, 2006).

With respect to advancing a sustainability agenda, assessments on a range of policy fronts come to similar conclusions. For example, in Lowe's (2008) assessment of energy use and the need to face up to the twin forces of climate change and peak oil, he stresses that there must be planning immediately to reduce transport fuel use and to reduce single-person car use for urban trips. Rather, investment in world-class public transport systems for all major urban areas is needed. Likewise, in relation to urban settlements, Gleeson and McManus (2008, p. 39) recommend that:

Australia must discard transport policies that massively favour private motorised travel over public transport and non-motorised forms of 'active transport' such as walking and cycling.

The same authors support urban policies that promote child-friendly cities, which include a wide range of concerns in addition to considerations such as traffic and noise impacts on children. The opportunities for a stimulus for positive changes in society that might be triggered by peak oil (or even by considering the onset of peak oil) are also discussed in relation to child-friendly cities by Tranter and Sharpe (2007).

Many submissions to a recent government inquiry on Australia's future oil supply urged the federal government to be more involved in improving urban public transport infrastructure (Senate Standing Committee on Rural and Regional Affairs and Transport, 2007, p. 151). The Senate committee argues that demand management is an important counterbalance to the usual supply oriented approaches, as reflected in the following comment from the committee (p. 163):

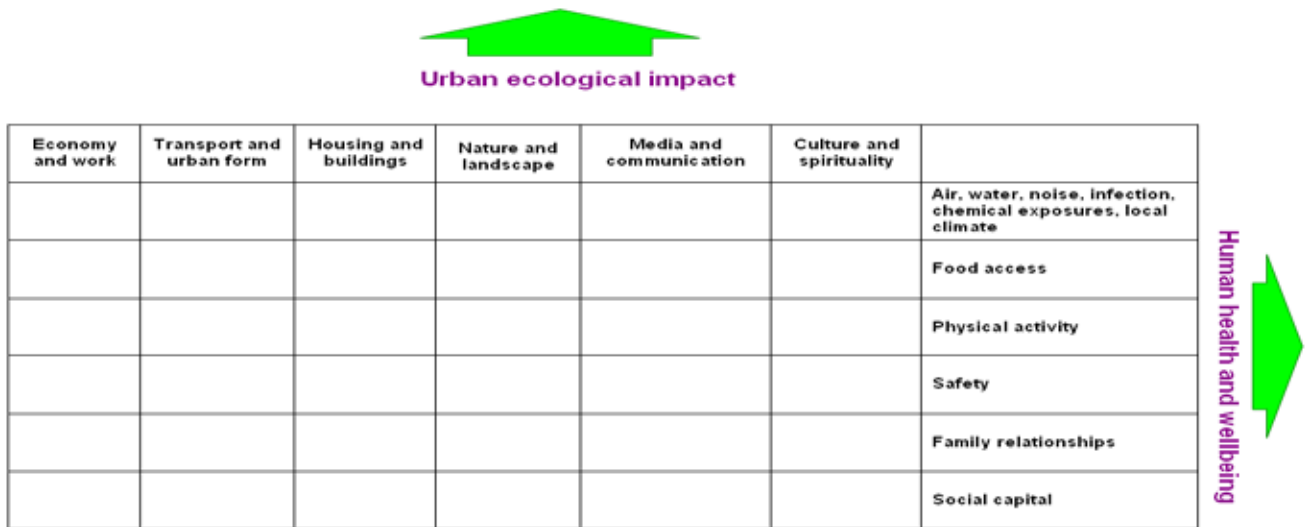
A litre of oil saved through a fuel efficiency measure, or by turning a car trip into a bicycle trip, is just as real as a litre of oil found by new exploration or produced in a coal to liquids plant.

Prominent medical journals are also increasingly framing the discussion of health in broad cross-sectoral terms. Growth in fossil-fuel based land transport is discussed in terms of its adverse health effects from climate change, road traffic crashes, physical inactivity, urban air pollution, energy insecurity, and environmental degradation. With respect to traffic related injuries and deaths, limiting the speed and volume of motorised traffic is one important prevention strategy.

The key to urban sustainable transport is considered more in terms of the design of local neighbourhoods, well-serviced and easy to navigate by active transport (cycling and walking), supplemented by high quality public transport powered by renewable energy for longer journeys (Woodcock, Banister, Edwards, Prentice, & Roberts, 2007). Similarly, Capon (2007b) discusses changes in cities as an evolutionary process with four distinctive stages I to IV: poverty, industrial, consumption, and sustainable eco-city. The high-consumption lifestyles associated with stage III are characterised by chronic diseases such as obesity, diabetes, heart disease, depression and injury. In contrast with earlier public health interventions based on water supply and sanitation, the reforms associated with ushering in the aspired to stage IV are more likely to be initiatives such as mass transit and safe walking and cycling paths to local shops and services. Systems thinking, and collaborative relationships between urban planners, transport planners, and public health workers, are required.

Holistic frameworks for considering population health and sustainability are therefore relevant for rethinking road safety. One such example is shown in Table 1 (Capon, 2006b). On the horizontal axis of the table are six domains encompassing physical and cultural aspects of the environment. On the vertical axis, there is a list of influences on health and well-being (so-called "determinants" of health).

Table 1 Holistic framework for population health and sustainability (Capon, 2006b)



The integrated thinking that underlines this approach is demonstrated by considering the cells of the matrix. The physical hazards from roadways and traffic crashes are located at the intersection between the “Transport and urban form” column and the “Safety” row in Table 1. An example of the intersection of “Transport and urban form” with “Physical Activity” is the contemporary high use of the private motor vehicles for even short trips, which is associated with the obesity epidemic (Hinde & Dixon, 2005). The time and stress of travel is a pertinent example of the way in which “Family relationships” intersects with “Transport and urban form”.

With respect to environmental design factors, Capon (2006a) produced a checklist for healthy and sustainable urban environments that includes:

- less than 500 metres to bus, train or tram stop with regular services (at least every 30 minutes, off peak)
- less than 500 metres to shops
- less than 500 metres to parks
- less than 30 minutes by mass transit to a range of employment, educational, social and cultural opportunities
- safe walking and cycling paths to a primary and secondary school
- mix of housing types and prices, suitable throughout the life cycle
- housing built, or adapted, using environmental principles
- good outdoor and indoor air quality
- sense of community in the neighbourhood
- tolerant and safe environment

Walkable communities tend to have higher measures of “community health” and well-being, given their higher levels of interaction and “social capital”. There are also reductions in damaging vehicle emissions, fewer crashes and greater space for children’s play (Cavill, 2001).

Fortunately, there are examples of cities moving in constructive directions by taking steps to reduce their dependency on oil-consuming, greenhouse gas emitting modes of transport (Newman et al., 2009). For example, Perth and Portland are cities that have begun a transition to more resilient pathways, by building rail systems and creating transit-oriented developments (TODs). Importantly, forward-thinking political leaders are needed to overcome obstacles in the way of sustainable visions, as well as an aware and politically active citizenry demanding better options to confront climate change and peak oil. Newman et al. discuss seven elements of a more resilient transport system (p. 90), namely:

1. A transit system that is faster than traffic in all major corridors.
2. Viable centres along the corridors that are dense enough to service a good transit system.
3. Walkable areas and cycling facilities that can mean easy access by non-motorised means, especially in these centres.
4. Services and connectivity that can guarantee access at more times of the day or night without time wasted.
5. Phasing out freeways and phasing in congestion taxes that are directed back into the funding of transit and walk/cycle facilities as well as traffic calming measures.
6. Continual improvement of vehicle engines to ensure emissions, noise, and fuel consumption are reduced, especially a move to electric vehicles.
7. Regional and local governments that can enable visionary sustainable transport plans.

On the latter point, a peak oil contingency plan prepared for Maribyrnong City Council (Fishman, Hart, & Hurley, 2009) highlights a range of measures for staff travel to work. These include, for example, encouraging sustainable transport use amongst staff, introducing financial incentives to encourage a shift away from unnecessary car use, and telecommuting and video conferencing options and facilities.

The sustainability agenda discussed above suggests that to the extent people travel in cars, it means travelling less far, in more energy efficient ways, and at slower speeds. Rationalising car design, regulation and driver education should be at the forefront of policies to reduce road transport emissions (Anable, Mitchell, & Layberry, 2006, p. 28). These researchers quote research from the Netherlands showing that a combined approach of downsizing power and speed, enforcing speed limits, and in-car guidance of drivers' behaviour could reduce CO₂ emissions by 50%. Such measures are associated with the term "ecological driving". Johnston (2005, p. 67) notes that many fleet operators are interested in the adoption of more fuel-efficient driving styles and practices, which also happen to be associated with lowered crash risk.

The synergies between road safety objectives and reducing greenhouse gas emissions are supported by research showing that the management of driving speeds in particular is an effective carbon abatement policy (Anable et al., 2006). The authors argue that (p. 31):

A policy of current speed limit enforcement and, better still, lowering speed limits, would bring significant, certain, immediate, equitable and highly cost-effective reductions in carbon emissions.

The research examines the relationships between reducing speed and a number of other related factors, including reducing casualties, reducing CO₂, reducing travel demand, and improved traffic flow. Thus reduction in speeds has the potential to slow traffic growth, providing additional safety benefits. The researchers suggest that the traffic smoothing effects of a 60 mph limit on motorways in the UK would help to reduce harsh driving styles and overtaking which can cause flow breakdown, disruption, and crashes. Their findings indicate that a properly enforced 70mph speed limit would cut carbon emissions from road transport by nearly 1 million tonnes of carbon per annum, while a new 60 mph limit would nearly double this reduction, reducing emissions by an average 1.88 million tonnes per annum.

Other social benefits flow from reducing speeds. A report on road traffic noise in the UK suggests that road traffic is the biggest cause of noise pollution in the UK, and that reducing speeds and also traffic volumes are effective ways of reducing noise (UK Noise Association - Paige Mitchell, 2009). The report argues that reducing speed, and thus traffic noise, would cut the cost that noise imposes on the economy, and improve the health and well-being of millions of people in the UK.

One of the problems in convincing people not to speed is the discrepancy between the perceived individual advantages and the societal disadvantages. A campaign launched by the Dutch Ministries of Environment and Transport brings together the social (especially environmental) and individual advantages of not speeding (European Road Safety Observatory, 2006, p. 29). The emphasis is on increased comfort and saving money for the individual driver, and increased environmental quality and road safety for the society as a whole.

In Australia, motoring organizations such as the NRMA have also become increasingly concerned about the issue of petrol prices. The NRMA ran topical feature stories in its member magazine, *The Open Road*, with front cover captions such as "The fuel crisis: Are we about to run out?" (Robshaw, 2005) and "Fuel: What's *your* alternative?" (Sheedy, 2006). A "glovebox guide" issued by the NRMA (<http://www.mynrma.com.au/cps/rde/xchg/mynrma/>) lists ten tips for saving petrol and includes items that have ramifications for road safety. For example, one is to "Avoid hard acceleration and braking"—it encourages people to "flow with the traffic – smooth driving can reduce fuel consumption by up to 30 per cent". Another is to "Watch your speed: By travelling at 90 km/h on multi-lane roads rather than 110 km/h you can reduce fuel consumption by 10 per cent or more". Importantly, these have road safety advantages as well.

5. Models of Social and Cultural Change

A “top-down” model of social change is associated with addressing power and politics, and facilitating change within decision-making centres. In contrast, a “bottom-up” model conceives change as being driven from a community level, with a priority being a change in people’s mindsets and habits. In our discussions with Professor Ian Johnston and David Engwicht, we found support for the value of both models. However, where, for example, educational programs are still framed as top-down initiatives within the prevailing paradigm associated with car and road dominance, they miss the wider cultural critique we investigated. It is here that influential “champions” can act to create political and community saliency for more fundamental change as part of top-down approaches (US Department of Transportation: Federal Highway Administration, 2006, p. 18).

Further, there is an inevitable tension between enforcement measures and educational approaches (House of Representatives Standing Committee on Transport and Regional Services, 2004). For example, the success of covert, random, mobile speed enforcement measures in Victoria, Australia, including speed cameras and tougher tolerances, is linked to a system-wide strategy saying in effect: “If you speed, you will be caught”. Similarly, a recent spike in road crash rates in New South Wales has been linked to an increase in speeding, with resultant calls for the increased use of speed cameras, based on research showing that the unpredictability of enforcement ensures a consistent deterrent effect. The advocate, a prominent road safety researcher (Grzebieta, 2009), suggests that “those who argue against introducing more speed cameras are, in effect, saying they want the right to speed and not get caught. It is an extraordinary and unsupportable position”.

However, it can be argued that such enforcement does little to change the underlying culture of speed. Thus, one can speak of a “safety climate” that is achieved by enforcement and regulation, and a “safety culture” which considers motor vehicle deaths and injuries in a public health framework. That is, the greatest successes in public health have resulted from cultural change, and traffic safety is considered in the same way as other preventable causes of death and disease (Sleet, Dinh-Zarr, & Dellinger, 2007).

In the USA, Dula and Geller (2007) consider that the number of crash-related deaths constitutes a national tragedy, and that traffic safety needs to be elevated to the level of a true societal value. Further, they believe that only an appropriate focus on the human dynamics of safety, including environmental, personal, and social variables, can achieve a significant improvement in relevant human behaviour. They contrast a top-down dependent culture with other models, such as a bottom-up independent model and an interdependent model linked to empowerment.

A dependent top-down culture is characterised as one that is safety conscious by avoiding penalties, whereas a major quality of an interdependent culture is actively caring for others, with good citizenship associated with good driving. Systems thinking (as with an environment/behaviour/person focus) characterises the interdependent model. Dula and Geller (2007, p. 13) point to a multitude of local, regional, and national levels for the learning of “traffic safety culture” including schools, and community and neighbourhood organisations. Once again, this perspective emphasises that “traffic safety requires thinking outside the traditional engineering and regulation boxes” (p. 16).

Promoting a broad cultural change in relation to road safety may promote new cultural values about speeding. Sofoulis argues for a shift from a “morally weak emphasis on enforcement and consequences ... towards an ethic of care and responsibility” (House of Representatives Standing Committee on Transport and Regional Services, 2004, p. 124). The Centre for Cultural Research at the University of Western Sydney (where Soufoulis is based) has therefore focused its efforts on initiatives such as facilitated workshops where young people can discuss the personal and cultural meanings of driving.

While acknowledging the place of mass approaches such as those aimed at drink driving, changing behaviour and culture at more fundamental levels is typically associated with bottom-up initiatives to bring about change at the local community and personal levels. Already, the proceedings of recent road safety conferences carry many accounts of local projects undertaken with the guidance and involvement of local government road safety officers, community groups, other community agencies, and the police (Smith, 2004).

Holistic thinking can be applied at a variety of scales when examining the city from metropolitan right down to neighbourhood, street or even household scales. In understanding cultural change the earlier work of Brindle (1991; 1992) is still valuable. Brindle’s “Darwin Matrix”, used for classifying various forms of “traffic calming”, is shown in Table 2. This model is useful in providing specific meanings for a not well-defined term. Thus, it identifies three levels of traffic calming (labelled L for local; I for intermediate; and M for macro or city-wide). Such actions may involve the familiar physical traffic control and design treatments (“E” for engineering or environmental), and social and cultural changes (“C” for culture).

Table 2 A framework for classifying traffic calming measures (The “Darwin Matrix”) (Brindle, 1991)

Scope of measure	Physical/environmental (‘Technique’) E	Social/cultural (‘Ethos’) C
L Local (street or neighbourhood)	LE Local area traffic management Low-speed street design Speed control devices	LC Neighbourhood speed watch Community action to oppose extraneous traffic <i>Walking School Bus</i>
I Intermediate (traffic corridor, regional road)	IE Lower speed zones Shopping precincts with pedestrian focus Bicycle lanes	IC Voluntary behaviour change Mode choice (walk, cycle, bus) and reduced use of car travel – <i>TravelSmart</i>
M Macro (city-wide)	ME Travel demand management (TDM) Changing urban form and structure Total system measures e.g. fares policy	MC Cultural change Loss of choice e.g. <i>peak oil and climate change</i> policies leading to behavioural changes such as reduction in car travel, lower driving speeds etc.

Specific examples in each cell of the six-cell matrix are given in Table 2. Traditionally, most examples of traffic calming have fallen into the LE box, but Brindle argues for a shift towards greater attention to cultural change over engineering approaches.

The ultimate goal is to move towards the MC box in the lower right-hand corner of the matrix. However, the large social and structural changes involved in moving beyond “calming” challenge the deeply-rooted “culture of the car”. Changes in community preferences at this level drive engineering actions, rather than vice versa. An example is an increased appreciation by drivers of the road safety and other benefits of lower speeds, and the fact that lower, more uniform speeds will not lead to increased delay. The assumption of shorter travel time for higher speeds is not justified, particularly in urban areas, meaning that the cost impact of lowering speed limits is often less than is usually perceived by road users, given that factors such as the number of intersections, roadway capacity, and congestion come into play (Fildes et al., 2005).

The concept of “effective speed” is also useful in questioning the pervasive belief about the speed of cars. ‘Effective speed’ calculates speed by using the standard formula distance over time, but takes into account the full time costs associated with a vehicle, including the time spent at work earning the money to operate a car. Studies

of effective speed (Tranter, 2004; Tranter & Ker, 2007) show that most cars have lower effective speeds than cyclists, and that it is futile from this broad perspective for motorists to attempt to 'save time' by driving faster. In addition, larger, more powerful cars have lower effective speeds than smaller, more fuel-efficient cars.

Returning to the lower right-hand corner of the "Darwin Matrix" in Table 2, cultural change at the macro level implies a large city-wide reduction in car travel, with an attendant revolution in what is currently accepted in many developed societies. It is likely that the policy and behavioural changes linked to climate change and peak oil discussed previously will increasingly operate at this level.

A related macro-level question is that of a choice of futures with each having differing implications for road safety. For example, Newman et al. (2009) lay out four scenarios as possible outcomes of diminishing oil supplies and the impacts of climate change on cities. These they label as 'collapse', 'the ruralised city', 'the divided city', and 'the resilient city'. Their sympathies are with the resilient city as the only option that will support life on the planet, will not be vulnerable to oil shortages and carbon taxes, and will be equitable. Lyons and Loo (2008) similarly outline four scenarios for the future with four associated infrastructure systems. One such scenario is called 'perpetual motion', characterised by a society driven by constant information, consumption and competition. In this world, instant communication and continuing globalisation fuel growth, with demand for travel remaining strong. In the 'good intentions' scenario, the need to reduce carbon emissions constrains personal mobility, traffic volumes have fallen, and mass transit is used more widely.

A possible response to scenario planning is to use it as a stimulus for establishing a preferred vision. It is useful to remember that a scenario is a possible future out of the myriad of possible future pathways. A vision, on the other hand, is a future being striven for. Newman et al. (2009) propose a vision for resilient cities and explain how to achieve such a vision. "Critical futures studies" is an approach of particular value here, not in predicting the future, but in allowing the opportunity for the creation of alternative futures (Inayatullah, 2002). With respect to transport and road safety, analyses of traffic in Bangkok (Inayatullah, 2002, p. 212) and transport futures for South-East Queensland (Hay, 2004) are instructive. Futures studies is also at home with a social ecological approach.

Social ecology is a holistically oriented field of study focusing on the interrelationships between personal, social, and ecological issues. With its focus on sustainability, well-being and progressive social change, social ecology provides an inclusive, evolving framework for reconceptualizing cultural, political, and socio-economic structures to enable people to work together to implement improved futures (Hill, 1999). We consider that this critically based approach is valuable, in contrast with some systems approaches that integrate a range of competing issues, but which are more inclined to accept current cultural arrangements as "given".

A working social ecological model for road safety is shown at Figure 4. Such a model implies the need for a much wider cultural change than just the development of public education programs to change community attitudes to speeding. It contrasts a paradigm linked to car and road dominance and a "culture of speed" with one focusing on sustainable transport and "slow" values. The former is more broadly associated with consumerism, individualism, and globalisation. As Hamilton (2001, p. 190) observes, globalisation depends on more than neo-liberal economic orthodoxy: "It represents the export of a culture and a psychological disposition based on growth, compulsive consumption and the exploitation of the natural world".

With respect to localism, one participant in our focus group of ‘experts’ commented:

The whole concept of localism, the way we live needs to be connected into the community. This is a really important area to explore. There is the range of health benefits I have talked about and there is the potential to reduce injury of course. The safety angle, time, emissions, the pollutants, the noise factor and the general conviviality of cities where you can walk and cycle. Like Copenhagen, where people stop on the street and talk to another bike rider. You know, you can't do that much in a car.

A holistic road safety paradigm is associated with characteristics such as localism, community, and well-being. A dynamic component is included in Figure 4 (using arrows), drawing on Lewin’s (1935) “force-field analysis” model. It is useful for identifying those forces helping to move towards road safety and those hindering such change. Positive change is facilitated by strengthening and adding to the enhancing forces, and removing and weakening the restraining forces (barriers).

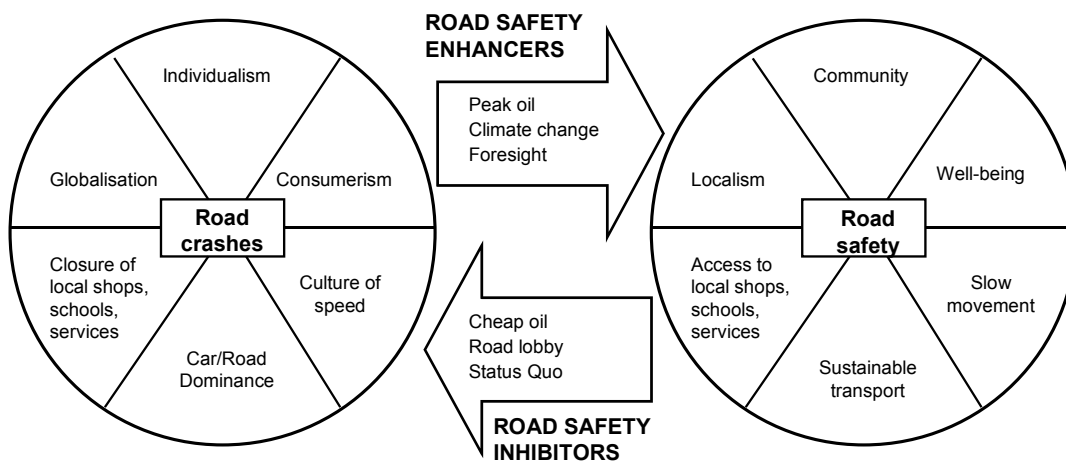


Figure 4 Working social ecological model of road safety (May et al., 2008)

This holistic model for road safety is consistent with an emerging worldview associated with sustainability rather than material progress, and with a “health-creating society” rather than a “wealth-producing economy” (Eckersley, 2006, p. 312). This worldview focuses on well-being, with current problems perceived as symptoms of a deeper condition that must be addressed through “whole-system change”.

6. The Role of Active Travel and Public Transport in Road Safety

Recent public policy reports on road safety, and those on climate change and peak oil, as discussed above, typically encourage a shift away from default car use to walking and cycling, as well as to public transport. The active transport modes deserve closer analysis of how they can become part of road safety strategies, how their uptake can be facilitated, and what limitations typically apply.

Of value in understanding the modal shares for cars, walking, cycling, and public transport, is a study of the performance of different modes of travel in Australia's seven capital cities (the State capitals plus Canberra) based on census data using journey-to-work figures from 1976 to 2006 (Mees, O'Connell, & Stone, 2008). It reveals substantial increases in car driving and declines in more 'sustainable' modes over the period concerned. However, in the last decade, there have been some modest reversals of this pattern. For example, over the last decade walking to work is growing in all capital cities, although the levels of mode share for walking in these cities (typically in the 2 to 5% range) are still small when compared with car use. In Melbourne for example, the number of car drivers increased by 66.4% between 1976 and 2006, but only 43% of this increase was associated with increase in the growth in the workforce. The other 57% was a result of a shift away from environmentally friendly modes. Sydney was the best performer in 2006, with the lowest share for travel to work by car drivers (63.4%), the highest mode share for public transport (21.2%), and the equal second highest share for walking (4.9%).

In the USA, Gardner and Stern (2002, p. 101) contend that the reason most people prefer car driving to mass transit (public transport) systems is that the perceived benefits outweigh the disadvantages. That is, the list of perceived advantages is long and the list of perceived disadvantages is short. In the case of car driving, the list of perceived advantages includes speed, comfort, independence, arrival/ departure flexibility, route selection, prestige, delayed costs, privacy and enjoyment of driving. The perceived disadvantages include traffic congestion, and vehicle, petrol and maintenance costs.

The reverse generally applies for alternative modes of land transport and public transport, with the perceived list of advantages being short, and the perceived list of disadvantages being long. The perceived advantages include low cost, making friends, keeping fit and the ability to work and read. The perceived disadvantages include exposure to weather, discomfort and crowding at peak hours, noise, long walks to stops, waiting times, unreliable arrival times, small cargo capacity, limited route selection, limited time flexibility, low prestige and long travel times.

To address the disadvantages of public transport, Newman (2005, p. 126) suggests that "travel options are required where public transport is faster than other traffic down all main corridors". Increased funding is also needed to address the other requirements of effective public transport such as service quality (frequency of service, ease of interchange, comfort, safety), integrated timetabling and route planning, as well as responsiveness to customer needs. Such measures increase the perceived advantages of public transport, and decrease the list of perceived disadvantages.

Active transport is used to describe travel between destinations by walking, cycling or other non-motorised modes (Thomson, 2009). The multiple health, environmental, economic, transport and community liveability benefits of active travel are now well

established in the research literature (Garrard, 2008). However, although pedestrians and cyclists are legitimate road users, they are frequently overlooked in transport systems that are shaped by the dominance of car travel, as in Australia.

Measures to restrict or limit the freedom of the car driver can often run up against fierce lobby groups defending these alleged freedoms (Diekstra & Kroon, 2003). In addition, at an individual level, attempts to reduce private car use can often evoke psychological resistance, as the car is perceived as a symbol of independence (Tertoolen, Van Kreveld, & Verstraten, 1998). At a more pragmatic level, many people have become car dependent even for very short trips without considering the use of alternatives. In a British study investigating the question “why do people use their cars for short trips?” (Mackett, 2003), the main reasons identified were:

- Carrying heavy goods, usually, but not always shopping
- Giving lifts, particularly taking children to school
- Shortage of time
- The car was needed for another trip before returning home.

Other research demonstrates that more women would be encouraged to walk to work were it not for dropping off or picking up children on their way to and from work. The perceived time pressures on working mothers were thus an important explanatory factor for high levels of car use on the journey to work. These time pressures overrode concerns about the detrimental physical, social, and psychological effects of travelling by car on their children (Goodman, 2001).

These examples demonstrate that the decision to walk or cycle is ultimately a behavioural one, and that people will only engage in the activity once several criteria are satisfied. To increase the use of active transport, it is important to apply findings from social science about what motivates people’s behaviour, as well as making changes to the built environment to make active transport more attractive and safer. Behaviour change programs often assume that people will change if they receive information about why and how to reduce car use. This assumption is incorrect (Ampt, 2003; McKenzie-Mohr & Smith, 1999), and is based on an “impoverished view of the complexity of human-social engagement” (Hobson, 2001, p. 193).

Examples from our focus group of ‘experts’ underline the value of behavioural interventions. One concerns ANU Green and a program designed to promote cycling at the university. A person managing the program said:

Every single person we spoke to made significant lifestyle changes purely because somebody held their hand for a while and said “Hey, it’s really good to get on a bike, it’s quick, it’s easy”.

Another example involved the self-monitoring of work trips and the mode of transport used:

One of the things we are exploring in the urban systems program at CSIRO is a login for the day on your computer showing how you got to work. There is a personal best, so the number of times to you came in a car pool, or came by walking or cycling or in a hybrid car rather than in a big four-wheel drive. So that’s not to make it punitive, but to really encourage people to think about their choices.

An international literature review of walking and cycling notes that the market for non-motorised travel is strongest where distances are relatively short, although this applies more to walking than cycling (Krizek, Forsyth, & Baum, 2009). Although people will walk further than the 400 metres that has been proposed anecdotally as a maximum walking distance, distance is still a real barrier for walking. Cyclists are willing to travel longer distances than pedestrians, although there remains a decline in cycling generally after four kilometres. Interventions to promote walking and cycling need to be considered separately as the modes have distinctly differing characteristics and infrastructure needs.

Understanding non-motorised travel (NMT) is a complex endeavour, with many factors affecting NMT travel behaviour (Krizek et al., 2009, p. 10). These cover issues such as the weather and topography through to pricing, education, infrastructure and community design. For example, Krizek et al. refer to a travel survey of the Melbourne Metropolitan area showing that 40% of all trips are less than 2 kilometres (p. 40). The modal share for cycling for these 40% of trips is considerably less than the Netherlands, where a comparable 44% of all trips are less than 2.5 kilometres. This suggests that other factors relating to culture, parking, safety, pricing, lack of facilities, or inability to carry goods could possibly be involved. Overcoming such impediments is important if an increase in modal share for cycling is to be achieved.

Interestingly from a road safety perspective, Garrard (2008) concludes that there is good evidence from four types of study that low neighbourhood speed limits (generally 30 km/h or less) are associated with higher active transport participation in industrialised countries, cities and municipalities. Reduced vehicle speed is likely to improve perceptions of safety and community liveability, with strong evidence existing for traffic hazards (including vehicle speed) being a major constraint on active transport in Australia. Further, there is consistent evidence for the relationship between speed and risk of injury to pedestrians and cyclists. In Australia, transport systems are not designed on the basis of human tolerance, but instead on what are considered to be safe speeds for motor vehicles. Garrard contends that such cultural values and norms are reflected in speed limits considered to be unacceptably high in other countries.

A review of Central Sydney undertaken for the City of Sydney by Danish urban planner Professor Jan Gehl likewise found it to be dominated by cars, and not geared to the needs of pedestrians (Capon, 2007a; *The Gehl report - a blueprint for greener, more vital, connected CBD*, 2007). Pedestrian walking routes are unconnected, and pedestrians wait too long at traffic crossings. Gehl's recommendations included the creation of:

- A green city – improving connectivity and a continuous network of linked public spaces and parks
- A better city for walking – a connecting pedestrian network, including pedestrian-priority streets
- A better city for cycling – a well connected network of safe, dedicated cycle lanes supported by bicycle parking facilities
- A strong public transport city – a quieter central city public transport system
- A traffic calmed city – restricting east-west vehicle movement, reducing parking availability, and introducing a 40 km/h speed limit

Such strategies are geared especially to an improved quality of life. They would, of course, reduce deaths and injuries from motor vehicle collisions with pedestrians, cyclists and other cars. Comments from participants in our focus group of 'experts' were in accord with such an approach. One said:

Culture is absolutely fundamental and we don't have the right culture. And one thing I think is really important is infrastructure. How we design our cities, the roads, bridges, the public transport systems ... because the infrastructure and the way we present it is going to influence our culture.

Another commented:

I come back to the subdivision level, about how you lay out your cities. It's absolutely fundamental—if you don't get that right then everything else is a problem.

The Gehl report and the earlier mentioned study of work travel modes in Australian capital cities (Mees et al., 2008) both suggest that policy and funding priorities need to be directed away from urban motorways towards more environmentally friendly modes, particularly public transport and walking. There also needs to be a reorientation of road space and road rules to give pedestrians priority over motor vehicles. Mees et al. refer to good international evidence suggesting that walking and public transport complement one another. The increases in walking in capital cities over the last decade appear to be associated with increased inner-city living, along with rising CBD employment. The revitalisation of Perth's public transport system through rail expansion and a strong focus on the integration of rail and bus services provides a good model for progressive multi-modal transport planning and implementation.

Specific programs that encourage active transport and modes of travel other than the car include the Walking School Bus and voluntary travel behaviour change programs such as TravelSmart.

The Walking School Bus

One pertinent example of a cultural response to road safety at the local neighbourhood level is the Walking School Bus (WSB), an idea first proposed by Engwicht (1992). As he put it, it is "an invention to overcome the problems of traffic safety and perceptions of stranger danger" (Engwicht, 1999, p. 78). His approach suggests that much more attention should be given to social/cultural measures (the "ethos" of what we are doing).

In recent years, the practice of encouraging children to walk to school has declined, and parents in Western societies are increasingly 'chauffeur' their children to and from school because of fears related to road safety and 'stranger danger'. Australian data showing substantial declines in walking and/or cycling to school over recent years and decades are summarised by Garrard (2008, p. 18). Such behaviours compound unsustainable transport practices, whereas the WSB concept promotes increased child-friendliness as central to sustainable city policies (Tranter, 2006).

The WSB program is promoted as a fun, safe and active way for primary school children to travel to and from school with adult supervision. Each walking "bus" travels along a set route with at least one adult volunteer "driver", picking up children at designated stops and walking them to school.

The process, led by the same or different drivers, can be reversed in the afternoons. Ideal routes are up to 1.5 kilometres long. Walking school buses are now widespread throughout Australia, New Zealand, Canada, the USA, and England.

These programs have multiple social, health and safety benefits including: addressing obesity and low fitness levels in children; promoting child pedestrian and road safety; the development of social and community networks; environmental improvements; and encouraging sustainable travel choices (Kingham & Ussher, 2007; O'Brien, 2003). Of particular relevance here are the wider cultural benefits of WSB programs, and the modelling of ways of being in the community that de-emphasise speed and the ubiquitous use of motorised transport.

The road safety benefits of WSB programs for children, parents, and local residents are numerous (Figure 5). These encompass not only the road safety benefits for children. Walking school buses also reduce the need for car trips as well as creating an environment that increases the care that local drivers take (through psychological traffic calming). The issues depicted in Figure 5 are now discussed in more detail.

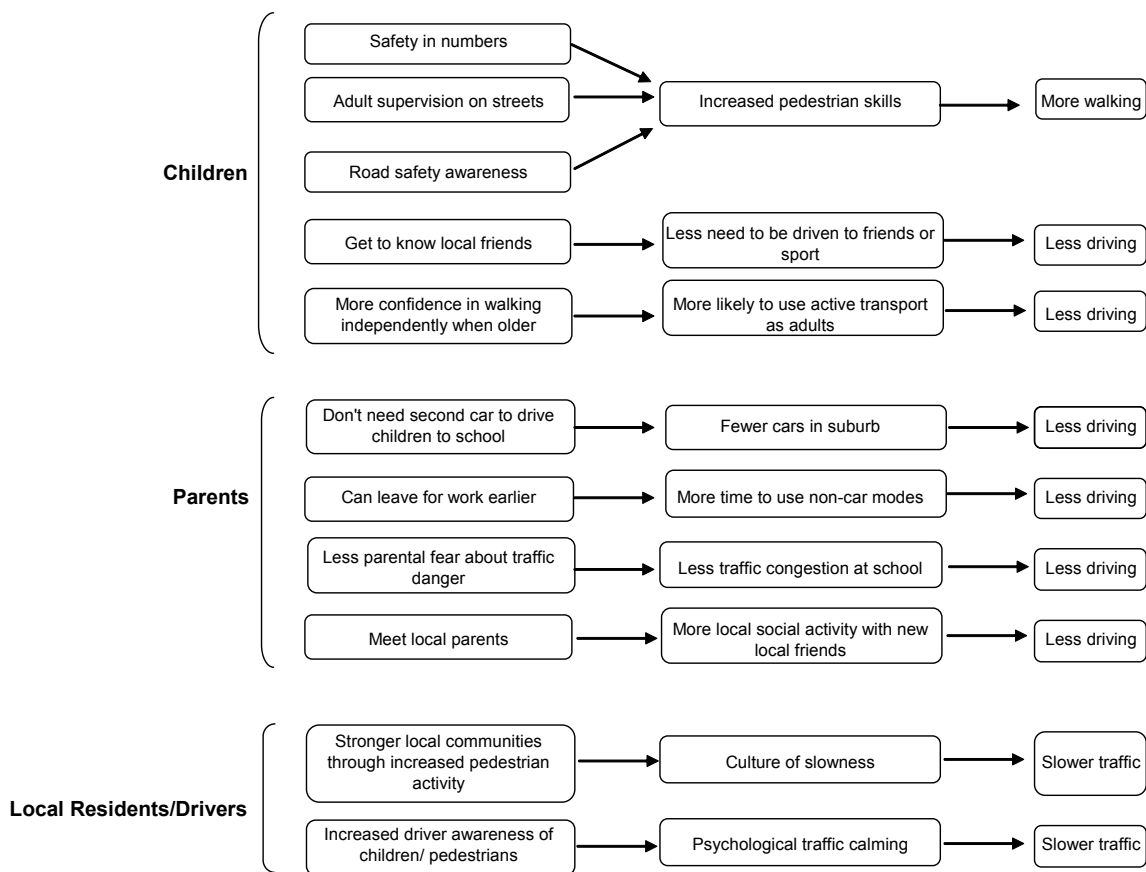


Figure 5 Impacts of 'walking school buses' on road safety (May et al., 2008)

Children in walking school buses are supervised by adults, and therefore are less vulnerable to injury from traffic accidents as they are assisted in crossing roads. They are also more visible to motorists as a result of being in a group and usually wearing bright vests. While walking to school, they learn important road safety skills such as how to cross a road safely. As one participant of the WSB focus group put it:

My son didn't cross roads and now he's fantastic because he's been on the 'bus' and everybody says "OK look left, look right" and he just does that naturally now. It's something he has learnt and it's not through me, it's through other people and it's a lot better learning process, so it's a huge educational road safety thing.

Increased local friendship networks mean that children have less need to be driven to sport, as they can play independently in their local neighbourhoods. As children mature, more confidence in independently walking to school and to other places cultivates the use of active modes of transport, thus facilitating reduced car traffic.

Various influences on parents can provide road safety benefits by reducing the number of vehicle kilometres driven in a city. For example, WSBs can reduce the need to purchase a second car to drive children to school. With children using the walking school bus, working parents can leave home earlier than if they were driving children to school, and have more time to use alternative modes of transport to work (e.g. cycling or public transport). Parental fears about traffic danger are reduced when WSBs become more common, resulting in more parents allowing their children to walk to school, which then reduces the traffic congestion at the school gate. In turn, this lack of traffic at the school reinforces the reduction in parental fear about traffic danger, and thus a positive feedback system is initiated. Just as children get to know other children on WSBs, parents who are involved in the walking school bus program are likely to meet and socialise with local parents, reducing the need to drive, or reducing the distances driven for social contact.

The outcomes from our WSB focus group support other research on the benefits of the walking school bus including social benefits, health benefits, time benefits for parent coordinators, and changing children's habits in the direction of more independent mobility, the latter being linked to increasing confidence and the necessary road safety skills to walk to school alone once at an older age (Kingham & Ussher, 2007).

However, the discussions also highlighted the need for much better funding, marketing, and support if this approach is to be more than a marginal approach to road safety. Attrition rates for volunteers can be high, and administration run on a shoestring appears to hamper wider participation in WSB programs. Our WSB focus group findings were also in accord with those from a useful external review of the ACT Walking School Bus program, carried out by the Walking School Bus regional coordinator of the Auckland Regional Transport Authority (Kendall, 2007). She agrees that the relatively low numbers of WSB pupils hamper tangible benefits for schools, and that secure long term funding for the program is needed so that program providers can focus on the delivery of the program, rather than the solvency of the program.

Focus group participants saw the need for perhaps a logo, and funding for a broad marketing and awareness campaign. They saw greater potential impacts resulting from the program, provided the necessary funding was there to back the program up to a much greater extent than it currently is.

A few comments are instructive:

I just don't think there is a volunteer mindset even at a Christian school.

We just operate in isolation. The first time I met a coordinator was last week at morning tea. And that's part of the problem with a lot of funding programs. They don't fund for coordination, communication and marketing.

We need a full time coordinator in every school in the ACT ...

Many of the 'success factors' discussed in the WSB focus group mirrored those highlighted in walking school bus examples in Victoria (VicHealth, 2006). These include:

- Leadership and enthusiasm shown by parents and schools
- High-level commitment from government, community health and other organisations, schools, parents, and children
- Supportive partnerships between local government, health and road safety agencies
- Innovative communication and promotional strategies that utilized local media, celebrity walkers, and a communication network between school coordinators
- Positive action from roads agencies on pedestrian needs
- A high level of community input into infrastructure needs around schools

An example from the focus group on the latter point is illustrative:

Over the years we have had a very active residents' association. When we built the suburb there was no footbridge over Belconnen Way. But the association lobbied and to their surprise they asked for half a million and that bridge ended up costing over a million dollars twenty years ago. It's a real asset to our community. To drive to Aranda Primary School from my place is a 4 km drive. To walk, it's around 800 metres.

In the ACT, Kendall (2007) considers that school management and staff should be encouraged to be more supportive of WSB routes in their schools, and that the WSB program should link in with other complementary programs in the ACT such as Health Promoting Schools and the Australian Sustainable Schools Initiative.

Although the walking school bus example demonstrates impacts that are local, it shows how health and environmental factors (such as physical activity, road safety, family relationships and social capital) intersect with broad policy areas such as transport and urban form. The macro impact applies when such a model is repeated across local communities making up a city environment. It provides a link between local activities and broad policy objectives relating to road safety, health, and climate change.

Voluntary travel behaviour change programs (TravelSmart)

Travel behaviour change programs can facilitate cultural change at the intermediate spatial level, as with the various *TravelSmart* brand name programs. Such programs have the explicit aim at the household level of switching individual travel behaviour from the use of cars to public transport, walking and cycling (Transport WA, 1999), indirectly providing road safety benefits. Such an approach is important because of the lack of local neighbourhood-based community in many Australian suburbs.

James and Brog (2001) outline how the use of the TravelSmart Individualised Marketing program can be used to influence people's trips through an in-depth interactive approach and the use of travel diaries. Benefits to the community from increases in walking include not only reduced greenhouse gas emissions, but also reduced car running costs and improved health from physical activity. Travel behaviour change programs of this kind have yielded abatement of the order of 5-18% of personal transport emissions, and a re-survey in South Perth showed that the reduction is more sustained than expected (Energy Strategies, 2003, p. 56).

The strength of such community-based social marketing approaches depends on people being able to access and discuss locally relevant information in their homes, in contrast with impersonal mass media programs (McKenzie-Mohr & Smith, 1999). The conversation is key to behavioural change, as the material is discussed with people on a one-on-one basis. In some cases, the householder comes up with solutions to issues through the conversation alone. Other tools typically offered to households include (Ampt, Wundke, & Stopher, 2006, p. 102):

- Journey plans for walking, cycling, or public transport
- Local activities guides
- Specific information on saving time and money, increasing fitness, and gaining independence
- Kilometre monitor to keep track of kilometres driven
- Activity sheets for children
- Letter or confirmation of the householder's verbal commitment to try a travel change

This approach allows perceived barriers and benefits to be addressed in a more considered way, and when people can see their options and make new travel choices, the changes are more likely to be sustained. This is because the benefits in terms of the values of the participant (whether it be to save time, money, the environment or gain independence or fitness) are considered in relation to behaviour change (Ampt, 2003).

Newman et al. (2009, p. 111) contend that the importance of the TravelSmart program in bringing about a transition to more resilient cities should not be underestimated. With more than a third of the Perth population having been visited by a TravelSmart officer, and with 15% of people becoming less car-dependent, public support for new rail initiatives in Perth surged to high levels.

An example in Canberra is the Travelsmart Belconnen project, which took place between August 2006 and April 2007 as part of the National Travel Behaviour Change Project. The project sought to produce benefits by:

- making the costs of travel evident, and better informing choice
- lowering greenhouse gas emissions, and
- encouraging healthier, more sustainable ways of travel such as walking, cycling and bus use

Canberra's Belconnen program involved 11,000 households being contacted, with 43% agreeing to take part, which is higher than in projects elsewhere. The TravelSmart team discussed with participants their travel patterns and how they might reduce their car use. Outcomes were positive, as might be expected with this type of intervention. Car travel was reduced by 12.7% (in terms of vehicle kilometres travelled), and participants believed they had made personal gains in terms of monetary savings (42%), health (40%), environment (11%) and time (3%). Other social benefits arose from reduced traffic and parking congestion, fewer accidents and reduced pollution (ACT Commissioner for Sustainability and the Environment, 2007; IMIS Integrated Management Information Systems Pty Ltd and SMEC, 2007).

Community-based travel behaviour change initiatives are deserving of much greater attention in the road safety area. They have the advantage of promoting a shift from "practical consciousness" to "discursive consciousness", where a change in behaviour is facilitated by debate about habitual behaviours that are taken for granted (Tranter & May, 2005). However "soft" transport policy measures that encourage voluntary behaviour change do not yet have mainstream status (Chapman, 2007).

7. Integration and Whole-of-community Change

It is clear from the above discussion that the concept of “integrated transport” is an important guiding principle, including the processes, institutions and structures within which transport technologies develop (Potter & Skinner, 2000).

Policy makers should pay as much attention to implementation as to policy formulation, as good ideas are pointless if they cannot be carried out. A range of factors has an influence on policy implementation. Together with broad contextual issues such as economic, social and political conditions, implementation is affected by the nature of the problem, the diversity of problems being tackled by government, the size of the target group, and the extent of behavioural change required (Bridgman & Davis, 2000, p. 117).

The complexity of the cultural change required with respect to road safety points to the value of holistically oriented management systems. Brown (2008, p. 109) argues for the value of drawing on a range of “knowledge cultures”, which can contribute to collective decision making (Figure 6). These include individual commitment (personal lived experience), community support (mutual place-based experience), specialised advice (from academic disciplines and professions), organisational direction (providing strategic agendas and regulations), and holistic purpose (collective vision and metaphors that span divisions). To achieve whole-of-community change, Brown suggests that rather than focusing on divisions between silos, the ground rules for collective decision-making are best served by integrative webs and networks offering opportunities for synergy and collaborative action.

Whole of community change involves:



Figure 6 Whole of community change draws on various knowledge cultures (Brown, 2008)

Nonetheless, with respect to organisational direction and integrative management, policies can frequently fail if responsibility is shared among too many players. As more agencies become involved, the complexity of coordination overwhelms the original policy intent. Successful implementation is therefore associated with a single agency or at least a dominant one (Bridgman & Davis, 2000, p. 117). This observation ties in with recommendations from parliamentary committees in the UK considered above, suggesting that a high level body or independent road safety commission be established to work across the whole of government to integrate efforts from fields such as health, environment, sustainable transport, behavioural change and so on (House of Commons Transport Committee, 2008; Parliamentary Advisory Council for Transport Safety (PACTS), 2007).

A recent WHO report argues that the construction of multi-sectoral institutional capacity, across government and non-government spheres is regarded as a key to developing road safety, with the importance of a national political commitment highlighted (Peden et al., 2004, p. 14). The same WHO report suggests that effective strategies have a greater chance of being applied if there is a separate government agency with the power and the budget to plan and implement its program. One example of a “stand alone” agency is the Swedish Road Safety Office (SRSO) established in the late 1960s. In 1993, the SRSO merged with the more powerful and better resourced Swedish National Road Safety Administration, to which the ministry of transport and communications delegated full responsibility for road safety policy.

In facilitating cultural change and initiatives such as a so-called “speed management program”, winning the support of politicians, high-level community decision-makers and the community itself is critical (Global Road Safety Partnership, 2008, p. 94). Achieving broad-based stakeholder support is also essential for implementing such programs from a holistic perspective. Examples of the wide range of stakeholders involved in road safety issues and their roles are shown in Table 3. These include government and legislative bodies, users/citizens, industry, police, various NGOs and special interest groups, professionals and the media.

Table 3 Examples of stakeholder roles in speed management
Adapted from Global Road Safety Partnership (2008, p. 97)

Stakeholder	Role
Political and government leaders	Vision, legislation, approve programs
Finance authority	Approve (extra) budget
Road authority and/or road safety department	Road engineering, traffic laws, traffic management, advertising, signage
Licensing authority	Test and authorise drivers
Police	Traffic law enforcement
Education Department	Education about road safety issues, facilitate group discussions with young drivers
Health Department	Champions to highlight the consequences of crashes, promotion of active travel
Environment Department	Environmental issues e.g. climate change policy and air quality, sustainable transport policies
Transport Department	Transport policy including public transport
Community leaders	Advocacy
Road safety community groups	Advocacy, campaigns
Media	Influence public opinion
Research institutions	Research and advocacy
Employers/ transport industry	Influence/control drivers and employees
Motoring organisations	Influence drivers and policy makers
Insurance sector	Finance, influence practice, research reports
Vehicle manufacturers	Production of safe vehicles and responsible advertising

Particular networks of stakeholders or “discourse coalitions” are implicated in the way particular discourses are transmitted, understood, and gather momentum (Vigar, 2002, p. 16). The media, for instance, constitutes one of the institutional sites or “policy arenas” where policy issues are discussed. The unpacking of “storylines” and “practices” is useful in showing how a policy discourse that frames a particular view of reality is dominant and perhaps has an overly influential role in a policy area.

Implementation requires a clear plan of action in relation to public awareness and knowledge, legislation, speed limits, enforcement and penalties. Such plans typically show objectives in detail and their timing, the targets to be achieved, and specific accountabilities for actions to be taken (ACT Department of Territory and Municipal Services, 2009; Australian Transport Council, 2008). Examples of actions from the various stakeholders are shown in Table 4. Some elements of typical speed management programs and implementation considerations are shown in Table 5.

**Table 4 Examples of actions by various stakeholders involved in speed management
Adapted from Global Road Safety Partnership (2008, p. 105)**

Stakeholder	Actions
National, state and local authorities (depending on government structure)	<ul style="list-style-type: none"> • Raise public policy profile of road safety given the huge financial and human costs of road crashes • Transport ministers to work in close conjunction with environment and health ministers • A common vision for a more sustainable transport system developed in conjunction with energy, transport, health, environment, planning agencies, education etc. • Harmonise speed control for similar road types • Adopt a proactive role in explaining the dangers of speeding and reasons for speed management measures
Local authorities	<ul style="list-style-type: none"> • Define the function of each road and review existing speed limits • Develop low-speed zones as an integral part of local transport plan • Ensure policy support for speed management issues e.g. charter on speed-related issues
Police	<ul style="list-style-type: none"> • Ensure road safety enforcement is closely aligned with speed management policies
Vehicle industry	<ul style="list-style-type: none"> • Promote systems that assist the driver in respecting speed limits • Forbid promoting or glamorising speed in advertising campaigns
Insurance	<ul style="list-style-type: none"> • Become more involved in road safety and take a business approach to investments in speed related policies and practice • Pursue an incentives-based approach e.g. reduce premiums for relevant technology such as intelligent speed adaptation, and for areas with low speed limits
Media	<ul style="list-style-type: none"> • Adopt an educational role to better explain to the public the danger of speed and the reasons for speed management practices • Avoid advocating high-speed driving, either directly or indirectly
Professional associations and intergovernmental agencies	<ul style="list-style-type: none"> • Play a leading role via conferences, symposia, and committees in fostering exchange of information and views
Schools and communities	<ul style="list-style-type: none"> • Local community programs to reduce traffic and traffic speeds. Teachers and parents can contribute to 'safe routes to schools' projects
Other stakeholders e.g. medical profession	<ul style="list-style-type: none"> • Others dealing with the consequences of road crashes such as doctors, have an important role to play, including as advocates for prevention
Road users	<ul style="list-style-type: none"> • The attitude, behaviour and culture of the road user (whether as a driver, pedestrian, or cyclist) are key to any program. User acceptance, support, and compliance are critical.

**Table 5 Some elements of speed management programs and implementation considerations
Adapted from Global Road Safety Partnership (2008, pp. 114 and 120)**

Element	Description	Effectiveness	Cost to implement	Considerations
Define road hierarchies	Review functions of the road environment and activities. Zone roads accordingly.	High	Low	
Speed limit setting	Establish maximum permissible travel speeds for motorised vehicles	High	Low	
Speed limit signage	Advise drivers of legal speed limits through signs and markings	High	Medium	
General deterrence and enforcement of speed limits	General deterrence is regarded as a highly effective speed reduction strategy.	High	Medium	Highly visible but unpredictable or randomised speed enforcement is most effective. People are reminded that they can be penalised anywhere and at any time.
Speed cameras (mobile and fixed)	The right balance between fixed and mobile camera operations to detect offenders.	High	Medium	Is there political and community support for speed camera enforcement? A powerful tool for speed management.
Public education and social marketing	Appealing to the public to support speed management actions, and publicity campaigns to advise drivers that there will be strong enforcement	Medium to High	Medium	Needs to be backed up by necessary enforcement. Can be effective in gaining community support for speed management.
Promote new vehicle speed control technologies	Advise organisations to use technologies such as speed limiters and intelligent speed adaptation devices	Medium	Low to promote and High to implement	
Community programs	People in local communities taking action to promote safe travel speeds can be a useful complement to government actions	Low	Low	TravelSmart travel behaviour change programs have the potential to be classified in a highly effective category by reducing car dependence.
School-based education	Educating school children about speed risk in appropriate ways can be helpful in creating a speed-risk conscious generation	Low	Low	Is school-based education complementary with parent education? 'Walking school bus' programs can increase effectiveness of this category with adequate funding and support.

Of particular relevance for implementation are lessons learned from a case study of road safety in Victoria, undertaken by Professor Ian Johnston for the Federal Highway Administration in the USA (US Department of Transportation: Federal Highway Administration, 2006). The study drew upon interviews with politicians, senior agency staff, and others with firsthand knowledge of how traffic safety strategies were framed and implemented. The US Federal Highway Administration was particularly interested in how Victoria had achieved success in bringing down its crash and death rates. A key finding of the case study is the critical importance of political saliency—that is, committed political leadership by the government is vital, as is committed bureaucratic leadership from each agency responsible for implementing various components of the plan. The case study also recommended finding “champions” in the form of an individual or group who can help create the necessary political and community support.

Such champions need not always come from within a narrow road safety community either. For example, a Professor of Disability Studies dealing with disabling brain injuries from road crashes in Australia argues for a radical rethink in the way young people are taught to drive, including addressing aggressive self-talk that is dysfunctional in its effects on driving behaviour (Rees, 2006).

A second key element of Victoria’s success was the way in which the diversity of institutions involved in implementation came together in an integrated and coordinated way. The catalyst for this came in part from a public outcry over the number of deaths on Victorian roads being 10% greater in 1989 than the levels in 1988 and 1987. As a result, the Minister for Transport demanded action. The key agencies involved in various aspects of road safety—VicRoads, Victoria Police, Department of Justice, and the Transport Accident Commission—were charged collectively with the task of reducing deaths on Victorian roads. Accountability mechanisms for each agency and between agencies were instituted, and cooperative relationships among senior staff in the various agencies were forged. This approach contrasts with the traditional model in which each agency was responsible only for matters under its immediate control. Victoria’s first formal traffic road safety strategy was formed in 1990, and a range of initiatives were introduced as part of an integrated approach. These included a considerable number of traffic safety legislative and regulatory amendments, the use of speed cameras as a method of speed limit enforcement, increased random breath testing, and a long-term program of public education to keep traffic safety in the public arena.

Other significant “success factors” identified by the Victorian case study include the use of an evidence-based strategic plan that includes specific actions and targets for achievement, together with public release of the plan and mechanisms for monitoring progress. In addition, intensive and ongoing public education to keep traffic safety in the public arena, together with a supportive media, can act synergistically with community support and a political willingness to act.

With respect to community support and involvement, it is likely that a top-down hierarchical approach characterised by a “to and for” approach will be increasingly replaced by “with and by” collaborative relationships and partnerships between organisations and communities that involve co-created learning (Leadbeater, 2008). Hill (2006; 2008) similarly argues the case against magic-bullet, Olympic scale projects delivered by conspicuous heroes, with no follow-through or provision for ongoing support. Rather he argues for the effectiveness of diverse, mutually supportive and workable initiatives that have long-term support and include opportunities for

continuing improvement. Many people can collaborate in making things happen. Such an outlook underlines the importance of public and stakeholder involvement in Vision Zero approaches. At a community level, Engwicht (2005) supports the celebration of values that automatically promote road safety. He suggests that “an outbreak of civility” is an antidote to traffic problems, citing examples such as walking programs, relaxed shopping centres, farmers’ markets, and practical actions by residents to reclaim the social space of streets.

8. Conclusion and Recommendations

In the ACT, the Government is interested in pursuing a cultural shift in order to reduce deaths and injuries. In the foreword to the *ACT Road Safety Action Plan 2009-2010* (ACT Department of Territory and Municipal Services, 2009, p. iv), Chief Minister Jon Stanhope states:

The two most common factors leading to road crashes and road deaths in the ACT are speed and alcohol. Yet the general community perception is that it is OK to speed, and drivers continue to be caught for drink driving.

The ACT Government is committed to achieving a cultural shift in order to reduce the deaths and injuries on our roads.

The Government is exploring whether the Swedish Government's "Vision Zero" policy could be implemented in the ACT in the years ahead. Zero is not a target to be achieved by a certain date, but an aspirational target which ultimately aims for no one being killed or seriously injured within the road transport system. This will take a change in mindset for all of us.

Such a goal has received enthusiastic media support in Canberra through articles, editorials, and letters to the editor (Andrews, 2009; Hull, 2009; "Letters to the editor: Vision Zero approach to road toll good, with tweaking," 2009; "Road to zero toll," 2009). There are plans to consult the community more widely via a series of public information sessions.

An initial road safety roundtable meeting of thirty stakeholders from government and non-government organizations was held on 14 May 2009. The purpose of the meeting was to consider how the ACT can move towards a Vision Zero approach to road safety, particularly as part of the ACT's next Road Safety Strategy covering the period from 2011.

Our research leads to the following recommendations, which have important social, environmental, and economic benefits from their uptake. The recommendations are relevant to the ACT, and more generally to road safety in Australia:

Recommendation 1 on broader understanding of the huge cost of traffic crashes

We recommend that road safety agencies more effectively communicate the enormity of the problem of road deaths and injuries to both policy makers and the community. The annual economic cost of road crashes in Australia needs to be updated using appropriate measures and the collection of relevant data.

A fresh understanding of the enormity of the problem of road deaths and injuries is required at both policy and community levels. The annual economic cost of road crashes in Australia was conservatively estimated to be at least \$18 billion in 2005, which is of a similar order to the annual defence budget. A commensurate level of political leadership, support, and funding is required to address the cost issue. Complacency and lack of understanding of the size of the problem is apparent at the community level.

Recommendation 2 on the value of the Swedish Vision Zero approach

The adoption of Vision Zero approaches by the ACT and other governments in Australia is supported. Successful implementation will require broad public understanding and involvement for successful cultural change.

Approaches such as the Swedish Vision Zero approach provide a useful model for advancing road safety by adopting a proactive and preventive approach, with the goal that no person be killed or seriously injured for life in road traffic. In Australia, transport systems are not designed on the basis of human tolerance, but instead on what are considered to be safe speeds for motor vehicles.

Using Vision Zero principles such as setting speed limits in accord with the human body's tolerance against external violence enables speed to be considered in a new light by policy makers, road engineers, vehicle manufacturers, and people driving vehicles.

So far in the ACT, the discussion surrounding the adoption of a Vision Zero approach has been very positive. Implementation of a Vision Zero approach requires broad public and stakeholder engagement in the vision in order that understanding of the principles involved is integral to cultural change, and to maximise commitment to such a vision.

Recommendation 3 on the deeper questioning of cultural priorities and the value of mobility management for road safety

The questioning of cultural priorities such as the spread of car dependent lifestyles should be part of road safety policy. Mobility management strategies should become integral to road safety policy and practice. For example, access to goods, services and social opportunities should be considered, rather than mobility per se as the only option.

A distinction can be drawn between “deep” sustainable change, which usually requires fundamental redesign of the systems involved, and “shallow” compensatory change. For example, one critique of Vision Zero suggests that Sweden has done little to counter the spread of car dependent lifestyles that result in more kilometres being driven. Mobility management (also called travel demand management) is currently not integral to road safety considerations. However, a strong case exists for mobility management strategies being of value in reducing overall crash risk, by reducing per capita vehicle travel (and hence exposure). That is, the *volume* of motorised traffic is a critical factor to consider in addition to speed.

Mobility management strategies are consistent with wider principles adopted for sustainable transport. These include access to goods, services and social opportunities, rather than mobility *per se*, and less movement of goods and services, for example by appropriate urban design and access through telecommunications.

Recommendation 4 on vehicle manufacturers and slower, smaller and lighter vehicles

Vehicle manufacturers should be actively included in the process of developing Vision Zero and safe system approaches, so that their role in producing safe vehicles and advertising responsibly is made clear.

To the extent that cars are still used, a strong case can be made on road safety and environmental grounds for slower, smaller and lighter cars, in contrast with cars that are designed and marketed with an emphasis on speed and power. The increasing use of electric cars may offer an opportunity here.

Recommendation 5 on climate change, peak oil and links with road safety policy

Policy and practice in road safety should be integrated with policy and strategies addressing climate change and peak oil, as there are considerable synergies involved in regard to road transport.

The combination of two major global issues—peak oil and climate change—is increasingly likely to affect transport policy and travel behaviour. Climate change is generally considered to be a major sustainability emergency for humanity. With peak oil, there is significant risk of a crisis arriving before sufficient preventative action can take effect. Efforts to cut greenhouse gas emissions from transport are linked to the reduction of single-person car use for urban trips, investment in world-class public transport systems, and the design and redesign of local neighbourhoods. There is also evidence for the management of driving speeds as an effective carbon abatement policy. In the ACT, separate roundtables convened on road safety and sustainable transport should be considered as having overlapping agendas.

Recommendation 6 on encouraging a shift to active modes of transport

Findings from behavioural science on understanding behaviour change need to be used to facilitate the shift to non-motorised modes, given a range of behavioural and practical constraints. Infrastructural and other policies are also needed to facilitate the shift.

Recent public policy reports on road safety, and those on climate change and peak oil, typically encourage a shift away from default car use to walking and cycling, as well as to public transport. The multiple health, environmental, economic, transport and community liveability benefits of active travel are now well established. However, behavioural and infrastructural issues need to be addressed to facilitate a shift to active travel. The need for redesign is exemplified by the Gehl report for Central Sydney. It concluded that the city is not geared to the needs of pedestrians, and is dominated by cars. There needs to be a reorientation of road space and road rules to give pedestrians priority over motor vehicles.

More generally for public transport, increased funding is needed to address the requirements of effective public transport such as service quality (frequency of service, ease of interchange, comfort, safety), integrated timetabling and route planning, as well as responsiveness to customer needs.

Recommendation 7 on community programs significant for road safety

Much greater attention and support should be given to community travel behaviour change initiatives by policy makers. TravelSmart travel behaviour change programs and Walking School Bus (WSB) programs have significant value for road safety and deserve to be expanded.

Currently, community programs are typically rated as being of low effectiveness in the range of possible speed management programs, as in the Global Road Safety Partnership's 2008 *Speed Management: A Road Safety Manual for Decision-makers and Practitioners*. "Soft" transport policy measures that encourage voluntary behaviour change unfortunately do not yet have mainstream status.

TravelSmart travel behaviour change programs have significant value for road safety and deserve to be expanded. Their advantages include modal shifts and reduced car use, and involvement by a high proportion of participants contacted in the target population. Professor Peter Newman suggests that the importance of the TravelSmart program in bringing about a transition to more resilient cities should not be underestimated. In the Travelsmart Belconnen project run in 2006-2007, car travel was reduced by 12.7%, in terms of vehicle kilometres travelled. This is significant in road safety terms when travel demand management is accepted as a valid road safety objective.

Walking school bus (WSB) programs have multiple social, health and safety benefits including: addressing obesity and low fitness levels in children; promoting child pedestrian and road safety; the development of social and community networks; environmental improvements; and encouraging sustainable travel choices. The outcomes from our research on WSB in the ACT support other research on the benefits of the walking school bus. However, the discussions also highlighted the need for much better funding, marketing, and support if this approach is to be more than a marginal approach to road safety.

Travel behaviour change programs are, of course, greatly facilitated by infrastructure spending on walking, cycling and public transport.

Recommendation 8 on whole-of-community change and integrative management

A separate Office of Road Safety in the ACT with a budget and staffing commensurate with the costs of road crashes to the community is recommended. Such an office should adopt a holistic and whole-of-government approach that extends beyond a narrow focus on road safety to include a wide range of fields and skills relevant to road safety including health, environment, sustainable transport, planning, behavioural change and education. The same approach deserves to be applied more broadly in Australia, given the enormous cost of road crashes in Australia.

Recent road safety inquiries in the UK recommended that a high level body or independent road safety commission be established to work across the whole of government to integrate efforts from fields such as health, environment, sustainable transport and behavioural change. The complexity of the cultural change required with respect to road safety points to the value of holistically oriented management systems in facilitating whole-of-community change. Vision Zero approaches need to be integrated with a common vision for a sustainable transport system developed in conjunction with energy, transport, health, environment, and education agencies.

With respect to organisational direction and integrative management, policies can frequently fail if responsibility is shared among too many players. A study discussed in our report, namely *Halving Roadway Fatalities: A Case Study from Victoria, Australia 1989-2004*, provides useful lessons in terms of 'success factors' for organisational effectiveness in relation to road safety. The value of influential 'champions' to create political and community saliency for more fundamental change in relation to road safety was underlined.

There could be value in having a network of ACT champions for road safety, in addition to the road safety roundtable already convened. Chief Minister Jon Stanhope has championed the Vision Zero idea for the ACT, and significant others championing road safety objectives from other areas including health, environment and police could form part of a champions network to facilitate cultural change.

Recommendation 9 on promoting slower ways of being and civility in society

For a wider cultural shift, greater attention should be given to the Slow City movement—an ecological and humanistic response favouring local, traditional cultures, a relaxed pace of life and conviviality. Time costs shape travel choices and behaviour and should be addressed as part of wider policies to facilitate road safety.

David Engwicht in discussing such priorities refers to the “Great Civility Outbreak”—a cultural revolution in which it becomes the social norm to be ‘civilized’ and ‘a good citizen’. So-called “time pressure” is emerging as a modern malaise, with implications for people’s driving behaviour on the roads, as borne out by surveys by the insurance company AAMI on the increasing prevalence of road rage. Time costs also shape travel choices. Organisational practices related to flexitime and telework, for example, are relevant. Although the issue of time may seem too hard or complex, and outside the scope of environmental and public health policy, the need for a deeper cultural shift suggests that time as an issue should be addressed as part of road safety policy. The work of Dr Lyndall Strazdins, National Centre for Epidemiology and Population Health, The Australian National University considers the issue of ‘time’ and its relevance for a range of policy considerations.

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