

AUSTRALASIA'S SAFE SYSTEM APPROACH TO ROAD SAFETY

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Prepared: June 2005

1. A BRIEF STATEMENT OF THE ISSUE

Although further improvements are possible, road safety achievements in Australia and New Zealand represent an outstanding success story. However the rapid decline in the road toll that was achieved during the 1980s and early 1990s in Australia and since the beginning of the 1990s in New Zealand, is now showing signs of faltering. Further substantial reductions may require a new strategy.

2. AN EXTENDED ASSESSMENT OF THE ISSUE

The numbers of road deaths in Australia 1950-2004 are shown in Figure 1. The numbers of road deaths in New Zealand for the same period are shown in Figure 2.

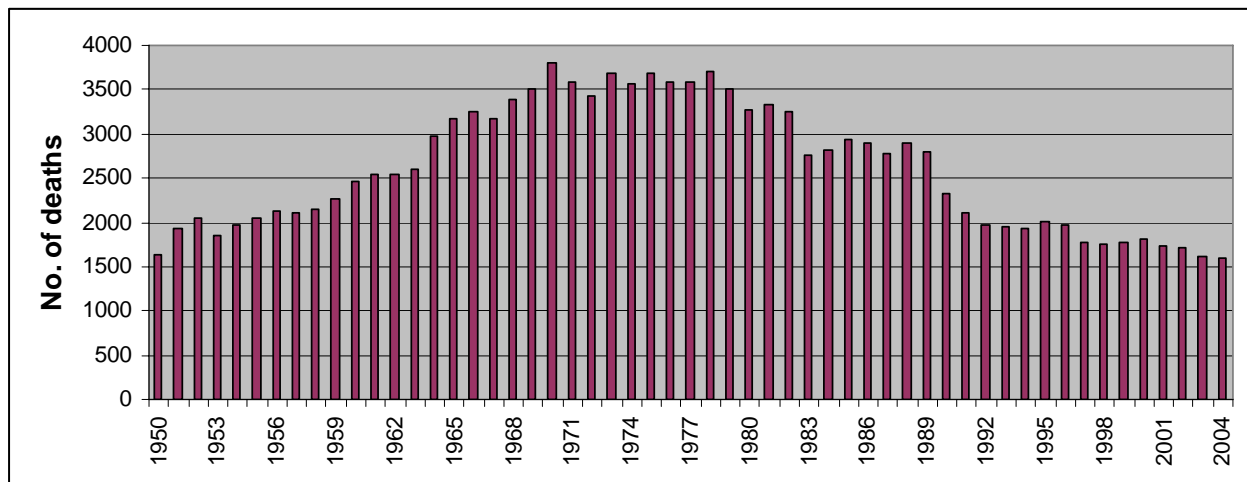


Figure 1: Road fatalities in Australia, 1950-2004

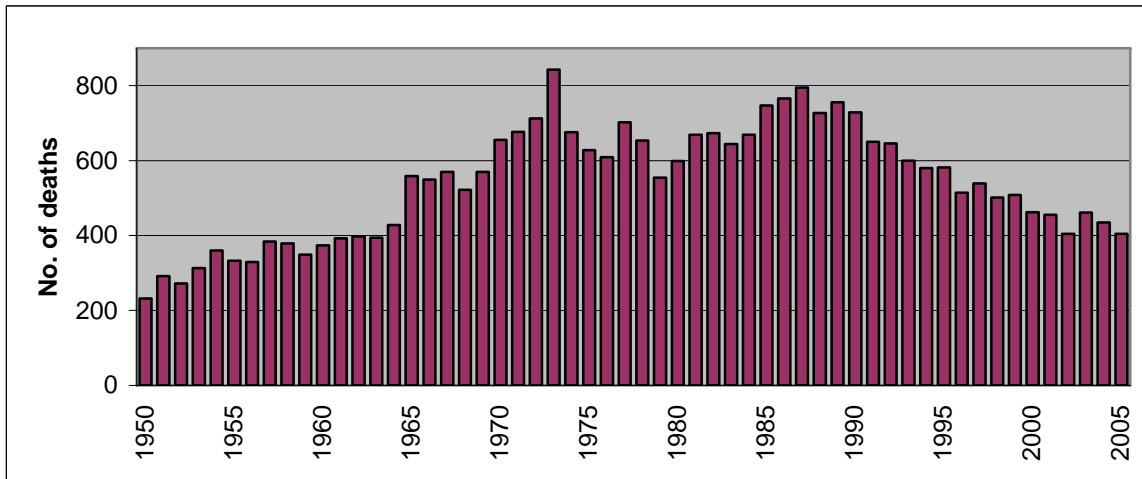


Figure 2: Road fatalities in New Zealand, 1950-2005

The recent decline in the absolute number of road deaths in both countries, as shown in Figures 1 and 2, may be attributed at least in part to a new, more systematic approach to tackling road safety issues, based on 'Haddon's matrix'¹, a version of which is presented in Table 1. The individual countermeasures in the matrix, have been selected from those introduced in Australia from around 1970 onwards².

Table 1: Principal road safety countermeasures in Australia, 1970 onwards, arranged in Haddon's matrix.

Phase	Host (human)	Vector (vehicle)	Physical Environment	Socio-political Environment
Pre-crash	1. Introduction of random breath testing in Victoria (1976) - and thereafter in other jurisdictions. 2. Introduction of intensive road safety advertising (1989). 3. Introduction of speed camera programs (1990).	General improvements to vehicle handling and control (improved braking systems, speed control devices, electronic stability control etc).	1. Introduction of 50 km/h speed limits in urban residential areas (1998-2004). 2. On-going road and other infrastructure improvement programs.	1. The National Ten point Plan (implemented 1990 onwards.) 2. The series of National Road Safety Strategies (1992 onwards). 3. Australian Rural Road Safety Action Plan implemented (1996). 4. A series of State and Territory Road Safety Strategies, especially from the 1980s onwards
Crash	1. Wearing of seat belts compulsory throughout Australia (1973). 2. Compulsory wearing of bicycle helmets throughout Australia (1992). 3. Improved vehicle crashworthiness.	1. Series of Australian Design Rules, providing better occupant protection (1969 onwards). 2. Motor Vehicles Standards Act (1989).	1. First of the national black spot programs launched (1990). 2. Other on-going road and infrastructure improvement programs. – including increased provision of clear zones and frangible poles	
Post-crash	Prompter provision of emergency medical services		1 Automatic post-crash emergency mayday systems 2. Increased use of mobile telephones and geographical positioning devices.	

The approach represented by Haddon's matrix and successfully implemented in Australasia, "helped to shift injury prevention away from an early, naïve preoccupation with ... pamphlets and posters to modifying the environments in which injuries occur. ... By developing new laws and enforcement mechanisms and through new technologies..., (road safety practitioners) sought to protect people from coming into contact with injurious amounts of energy"³. While the view of the road safety problem expanded to recognize particularly the role of vehicle and road factors, human behaviour and personal responsibility remained a critical consideration.

Behavioural countermeasures of the type listed in Table 1, were responsible for a large proportion of the road safety success enjoyed up until the early 1990s. As one example of the earlier impact of behavioural countermeasures upon the road toll, Table 2 provides estimates of the contribution of some main factors influencing road trauma trends in Victoria, 1990-96⁴. (It needs to be noted however some other researchers have questioned the appropriateness of the model underpinning Table 2 and have questioned the subsequent conclusions⁵.)

Table 2. Estimated reductions in serious casualty crashes attributable to various sources, Victoria, 1990-96.

	1990	1991	1992	1993	1994	1995	1996
Reduction in serious casualty crashes	26%	38%	41%	43%	41%	39%	40%
Contribution of increased unemployment	2%	12%	15%	16%	14%	10%	10%
Contribution of reduced alcohol sales	3%	6%	7%	9%	8%	9%	10%
Contribution of speed camera traffic infringement notices	10%	11%	11%	11%	11%	11%	11%
Contribution of speed and driver concentration publicity	5%	7%	7%	7%	6%	7%	6%
Contribution of drink-driving program	9%	9%	10%	10%	10%	10%	10%
Contribution of above behavioural road safety programs	22%	25%	25%	25%	25%	25%	25%

NOTE: 'Reduction in serious casualty crashes' is based on the modelled reduction in crashes as a proportion of the expected number of crashes if road safety and other initiatives had remained at 1988 levels. Due to the nature of the statistical model, the reductions shown above cannot simply be added up to estimate total contribution. If more than one contributor is being considered, the reduction of each must be applied in turn.

Taking the year 1990 as an example, speed and driver concentration publicity contributed 5% of the modelled 26% reduction in serious casualty crashes (or almost one-fifth of the reduction for that year). Speed camera activities contributed 10% and the combination of drink driving enforcement and publicity (which could not be separated) contributed a further 9-10% of the modelled reduction. Combined, these behavioural countermeasures accounted for a 22% reduction in serious casualty crashes (representing 85% of the total reduction). For the remainder of the study period however, the impact of the various behavioural countermeasures plateaued at 25%, with further crash reductions being attributable to other, mainly economic factors⁴.

Equivalent activities to those shown in Table 2, were also being implemented to varying extents in other Australasian and overseas jurisdictions and with varying degrees of effectiveness.

The proposition that other types of strategies are now required to complement behavioural countermeasures, is given greater emphasis by the reasoning underlying the current national road safety strategy. In reaching its target of a 40 percent reduction in road deaths from 9.3 per 100,000 people (1999) to 5.6 (2010), the strategy anticipates that the reductions will be achieved thus²:

Proportion of the target reduction

safer roads	48%
safer vehicles	25%
safer road users	23%
new technology	5%.

In round terms, the suite of countermeasures aimed at producing safer road user behaviour is likely to account for around one-quarter of the projected road toll reductions – with most of the reduction expected to be due to safer roads and vehicles.

The approach used by Haddon and others has been invaluable, first in providing a scientific approach to road safety and secondly, in emphasizing that behavioural interventions need to be complemented by other factors (particularly vehicle and road countermeasures). However it now seems that direct behavioural strategies, certainly relative to road improvement programs, have a more modest role to play in achieving further road toll reductions. Arguably, the time is ripe for a fresh approach to tackling road safety problems.

4. DESCRIBING A SAFE SYSTEM STRATEGY

Sweden has developed a 'Vision Zero' approach, one of the features of which strategy is to view any level of death or serious injury from the road system as unacceptable to a civilized society. The Netherlands has developed 'Sustainable Safety' as a closely related approach, with the aim of creating a traffic system in which no crash can result in serious injury or death.

Both Vision Zero and Sustainable Safety⁶:

- not only aim to eliminate death and serious injury from their transport systems but argue that it is a moral imperative to do so;
- recognize that the efforts of education and enforcement notwithstanding, road users will remain fallible – in some cases, deliberately, even criminally so;
- aim to develop a transport system able to accommodate human error. The basic means to achieve this is through better management of crash energy, so that no individual road user will be exposed to the possibility of death or serious injury;
- incorporate any number of options to allow the management of crash forces, including the physical separation of vulnerable road users from motorized traffic. In both approaches, the road network has a predominant role;
- rely also upon appropriate posted speeds as a primary protective component in a safe system – with 'appropriate' being determined by the need for survivable, non-maiming impact speeds in the event of a crash.

Both Vision Zero and Sustainable Safety have a comparable view towards road user behaviour within the transport system. The Sustainable Safety philosophy describes the road user as the weakest link in the transport chain⁷: the individual road user is largely unpredictable and cannot be relied upon to behave safely over the long term, education and information efforts notwithstanding. Similarly, Vision Zero does not argue against the need for educational and other programs to curb inappropriate behaviours. Nor does it argue against licensing policies aimed at ensuring only those fit to drive safely, use the roads. It does argue however, that for as long as inappropriate behaviours are likely, the system needs to strive to protect all road users from the impact of these behaviours.

Early development of Australasia's Safe System

The Austroads Council at its meeting in November 2003 accepted that at least for the immediate future, the greatest road safety gains would be achieved through adopting a Safe System approach. The description of the Safe System strategy that was presented to the Council and has since been further developed⁸, has close similarities to the Swedish and Dutch approaches:

- it is accepted that crashes will continue to occur, prevention efforts notwithstanding;
- the challenge for the proposed Safe System in the event of a crash, is to ensure that the impact forces released in the event of a crash are within the boundaries of human tolerance and that no fatalities will occur (and that serious injuries will be reduced);
- the key task of the Safe System is to manage vehicles, the road infrastructure and speeds in order to minimize the probability of death as a consequence of a road crash;
- as with Vision Zero and Sustainable Safety, the Safe System approach does not dismiss individual road user responsibilities and behavioural countermeasures (for example, it stipulates the need for alert and compliant road users) but explicitly points to these aspects as supporting components of the system.

An overview of Austroads' Safe System approach is given in Figure 3.⁸

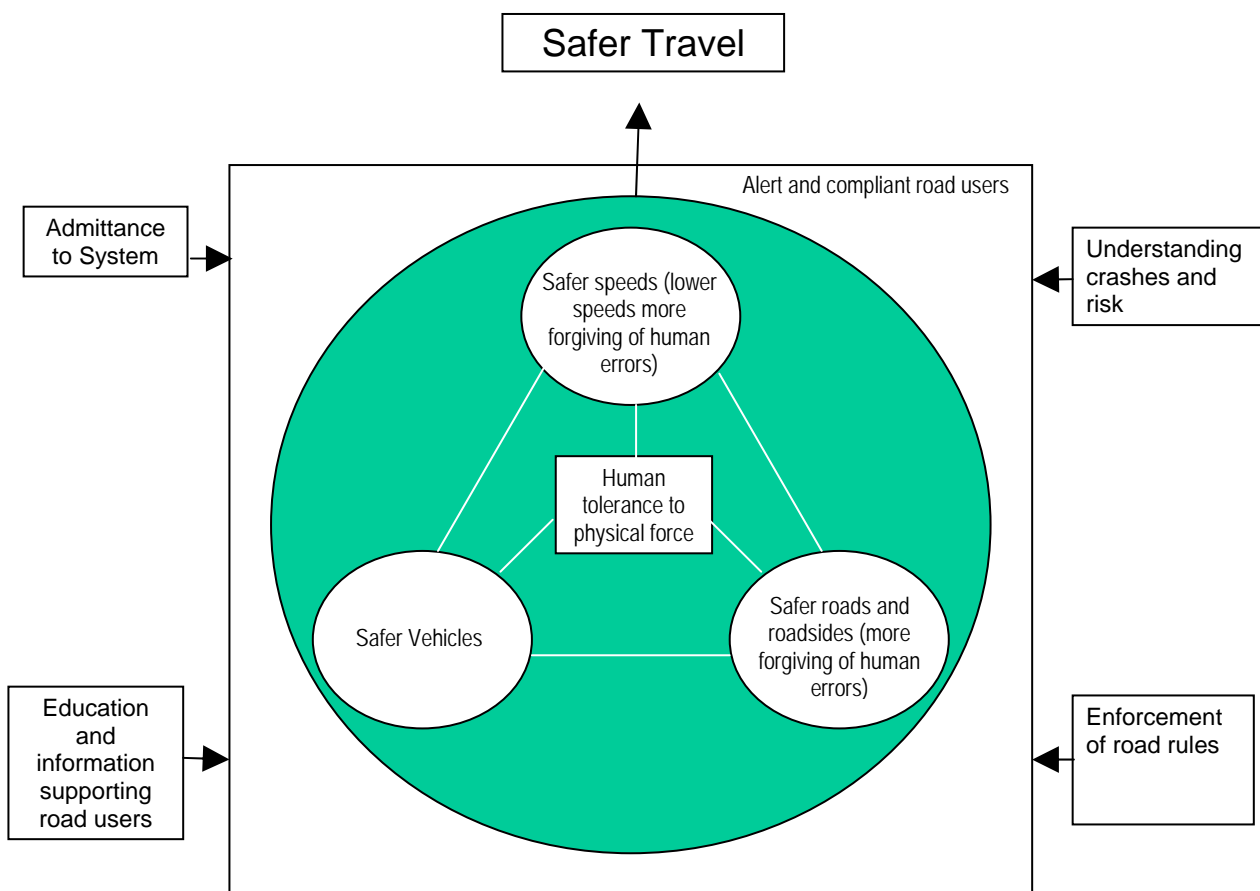


Figure 3: Austroads' Safe System.

It is proposed that the Safe System framework will be used to support three key road safety streams⁸

- safer roads and especially improved road risk assessment, treatment and standards – that is: improved risk analysis of the road network and its crash-related safety performance; identification of the most effective treatments including those offered by Intelligent Transport Systems; and a review of current safety standards (including those relating to speed limits, clear zones and roadside hazard control) to develop appropriate safety benchmarks for both new works and remedial treatments;
- safer speeds – whereby speed management is seen as a complementary measure to road-based improvements, especially in treating high-risk sections of the road network where there are no immediate engineering options;
- safer vehicles - to be achieved especially through improved marketing of vehicles with high safety ratings, largely through a two-pronged approach involving the promotion of vehicle crashworthiness ratings to the general public and the development of safer fleet vehicle purchase policies.

Safer road users have been described as the foundation of the Safe System strategy. Components in this context include compliance with road rules, admittance to the system (especially graduated licensing schemes for young drivers, strengthened sanctions to control unlicensed driving and improved assessment of fitness to drive in the face of medical conditions and functional declines) and information and education to support safer driving and travelling generally and greater awareness of risky behaviours specifically.

The Safe System approach will be used not only to determine implementation priorities but will also be a framework for allocating funds within Austroads' research and development program. It is intended that over time, this new approach will be included in national and jurisdictional road safety strategies and action plans.

5. POLITICAL, SOCIAL AND OTHER FACTORS

Vision Zero and to a lesser extent, Sustainable Safety, have had reasonable exposure in Australasia. Hence it is possible to predict with some confidence, the main political and social issues likely to be associated with the new Safe System approach:

- a reluctance to accept the goal of zero fatalities as realistic, and hence a tendency to dismiss the overall system philosophy as unworkable;
- on the one hand, a reluctance to accept lower posted speeds as part of the price for improved safety, paired with the demand that the responsible authorities should be providing safer roads;
- on the other hand, a public reluctance to accept the additional economic costs in developing a more crashworthy road network, leading to a likely political reluctance to raise and allocate adequate funds;
- a long-held acceptance, reinforced by intensive advertising/enforcement campaigns, that crash responsibility can best be anchored home to non-compliant road users, rather than to the designers of road systems.

As well as the broader challenges of public, political and economic acceptance on a number of fronts, other challenges include the need for suitable technical support. The provision of consistent and comprehensive crash data, the capacity to provide adequate and informative risk assessments across the road network, the capacity to develop engineering solutions to human factor problems and adequate skills in determining priorities for intervention, have all been mentioned as specific issues.

As with previous major road safety advances (for example, compulsory use of seat belts, random breath testing and lowered urban speed limits), the effectiveness of the Safe System approach will depend first and foremost upon the extent of forthcoming political commitment.

6. CONCLUSIONS

Austrroads' Safe System approach represents the latest evolution in road safety strategies in Australasia. While it remains firmly linked to previous efforts - for example, both it and the Haddon matrix have as a common key plank, the better management of crash energy – Safe System also has a number of distinctive characteristics. It:

- aims to reduce all fatalities arising from road crashes and to reduce all other serious road trauma
- recognizes that prevention efforts notwithstanding, crashes will occur
- seeks to manage crash energy through the interaction of travel speed, vehicles, roads and roadsides
- identifies that road users need to be informed of and encouraged to comply with road rules.

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