The study also enabled a demonstration that increased road investment can help reduce this risk. A good example of governments working together and investing to improve safety is the Brunswick Heads to Yelgun section of the Pacific Highway, where major work was completed in July 2007. The Federal and NSW Governments split the $256 million price tag for this project.

Before the upgrade, it rated just 2 stars. Today, it rates 4 stars — it is now divided, has wide lanes, overpass and underpass intersections and has much improved roadside conditions.

The report calls on Federal and State Governments to continue to invest in completing high standard freeway links between Sydney, Melbourne and Brisbane, and between the M2 and F3, the M4 and Sydney Port / Anzac Bridge, and between the F6 and Sydney Port.

It argues that two or three stars are unacceptable on these important, heavily trafficked national highways and upgrades are urgently required to bring them up to 4 stars in the short term and 5 stars in the longer term.

The report also makes a case for improvements in other key highways with sealed shoulders, regular overtaking opportunities, safer intersections and the best achievable level of roadside safety through removal or protection of hazards such as trees, poles and steep embankments.

The bottom line is that safe drivers in safe cars should not die as a consequence of unsafe roads.

Road Safety in Five Leading Countries

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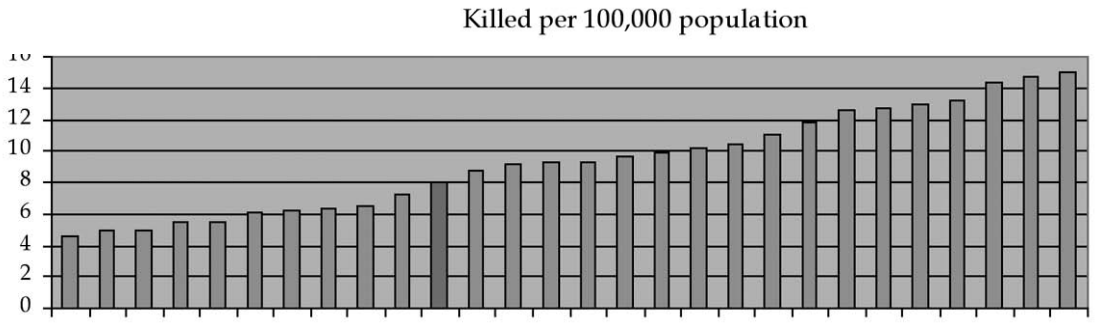
Introduction

Each year, some 600,000 road crashes are reported in Australia killing about 1,750 people and injuring in excess of 200,000. These road crashes cost the community more than $15 billion every year2. Worldwide, approximately 1.2 million people are killed and 50 million people are injured in road crashes each year. The global cost of road traffic injuries is estimated at US$518 billion each year3 .

International road death rates allow Australia's road safety performance to be compared with other OECD nations while taking into account the differing levels of population (a measure of the public health risk associated with road trauma), motorisation and distances travelled (measures of the risk associated with road travel).

Among OECD nations, Australia has the 11th lowest rate in road deaths per 100,000 population; the 9th lowest rate in road deaths per 10,000 registered vehicles and the 7th lowest rate in road deaths per 100 million vehicle kilometres travelled4. While these rates, and rankings, change every year, some countries have consistently displayed better road safety records than Australia. The NRMA-ACT Road Safety Trust Churchill Fellowship allowed me to travel to Sweden, UK, Norway, Japan and Denmark to examine the policies and measures in these countries in an attempt to understand the reasons behind their good performance.



2. Road Safety Towards 2010 (Australian College of Road Safety, 2004)
3. The global burden of disease (WHO)
4. International Road Safety Comparisons: The 2005 Report (Australian Transport Safety Bureau, May 2007)

Road Safety Policies

Road Safety in Sweden is based on Vision Zero, which aims that 'eventually no one will be killed or seriously injured within the road transport system'5. Zero is not a target to be achieved by a certain date. It is, however, a change from an emphasis on current problems to being guided by what the optimum state of the road system should be.

The vision is based on: Ethics (every human being is unique and irreplaceable) and Science (human physical and mental capabilities are known and should form the basis for road design. Knowledge of our limited ability and tolerance in a crash should guide the choice of solutions). Vision Zero changes the emphasis in responsibility from the road user alone to a shared responsibility by all those who have an effect on, or participate in, road traffic (politicians, designers, road managers, the police and others).

The Norwegian Government has also established that Vision Zero shall form the basis for road safety activities: "The vision means that the Government, in addition to conducting a policy with the goal of reducing the total number of accidents, will focus strongly on measures that can reduce the most serious accidents"6. The National Action Plan for Road Safety promotes cooperation between all those involved in road safety and developing the strength of each of these actors. It acknowledges the importance to secure the engagement of local politicians and the population at large.

The vision and central theme of the Danish road safety strategy 2002-2011 is "Every Accident is One too Many". The vision sets a course towards a future road system without any road crashes whatsoever and retains a focus on preventive measures. Road safety initiatives are based on five strategies7 amongst which:

- Road safety starts with you: acknowledging that if all drivers observed the speed limit, fastened their seatbelt and never drank and drove, the number of deaths in road crashes in Denmark would be reduced by at least 40%. More funds are being allocated to national campaigns to change road user behaviour in these areas.
- Four key areas: speeding, alcohol, cyclists, and junctions are the focus of the actions.
- Agreements between private and public enterprises, and transport service suppliers present great potential for crash prevention and should be fostered.

The responsibility of implementing the strategy 'Tomorrow's roads: safer for everyone 2000–2010 in the UK' is shared by many stakeholders, led by the Government's Department for Transport. The Government's framework for improving road safety8 acknowledges the need for new thinking and fresh ideas and not be afraid to challenge conventional wisdom.

The 'White paper on traffic safety in Japan' is produced each year and contains the status of traffic crashes, measures being implemented and plans for traffic safety measures. Expert panels develop Fundamental Traffic Safety Programs (FTSP) every five years. The Eighth FTSP (2006 to 2010) acknowledges the need to respond to declining birthrates and an aging society; establishing improved pedestrian safety and raising people's awareness. The common philosophy of the Eighth FTSP includes9:

- The aim is a crash-free society.
- Giving people precedence: a "people first" philosophy giving consideration for those who are weaker than others.
- Dealing with the issue of human error in public transportation by improving the organisational structures and systems of companies providing transport services.
- Encouraging participatory activities by enabling citizens to participate in the planning stages of traffic safety measures run by national and local authorities.

Measures to Improve the Road Traffic Environment

Apart from the traditional road safety measures such as fully controlled intersections, roundabouts, lighting, sealed shoulders, line marking and others, the countries visited have also deployed some specific measures. For example, investments are made in Sweden to reduce the risk of serious human injury on the road network:

- The cross sections of around 1000 km of undivided roads in Sweden have been rearranged to cater for two lanes in one direction, a wire rope guardrail in a painted median and a single lane in the opposite direction (2+1 roads). This arrangement is estimated to have reduced head-on collisions by about 90%.
- Speed limits on the road network have been reviewed to reflect the safety standard of the road. It is now unusual to find a road with a speed of 110 km/h without a median barrier. If barriers are not installed, the speed limit is reduced to 80 km/h.
- A 30km/h speed limit has been established in built-up areas emphasizing that this must be the limit if pedestrians and cyclists are to survive a collision.
- Guardrails have been erected, and trees and boulders have been cleared away from roadside areas to minimise the damage ensuing from cars veering off the road.

To improve traffic safety in Norway, long-term as well as short-

5. Vision Zero – an ethical approach to safety and Mobility (Claes Tingvall and Narelle Haworth, 1999)
6. Vision Strategy and Targets for Road Traffic Safety in Norway (Ministry of Transport and Communications, 2006)
7. Every Accident is one too many (The Danish Ministry of Transport, 2000)
8. Tomorrow's roads – safer for everyone (Department for Transport, UK, 2000)
9. White Paper on Traffic Safety in Japan (International Association of Traffic and Safety Sciences, 2006)

term measures are being implemented. Regular road safety inspections are undertaken and the Ministry of Transport and Communications is considering improvements to four-lane dual carriageways with median guardrails, or median rumble strips in some cases, to reduce the number of head-on collisions. Rumbled edge markings; straightening sharp curves; and improving visibility are also being implemented to reduce the number of single-vehicle crashes. To reduce their severity, roadside obstacles are being removed and forgiving utility poles are being used. Many of the above measures were applied to the national demonstration project for Vision Zero established in the Lillehammer district.

Nearly half of all road crashes in Denmark happen at intersections. The two typical factors involved are speeding and failure to observe priority rules. In that context, roundabouts are implemented at T and cross intersections to reduce speed and conflict points, Stop signs are replacing Give Way signs and traffic lights with refuge islands for pedestrians are also implemented. Apart from these priorities, measures to address "grey areas" (stretches of road with high crash rates) are also used. Because cycling achieves a staggering modal split of 36% of journeys to work in Copenhagen, facilities such as bicycle lanes and storage boxes at intersections are also a priority.

The UK acknowledges that simply building more new roads is not the answer. The emphasis is now on making the best use of the existing network, giving priority to treating the places with the worst safety, congestion and environmental records. The basic road markings, lighting, signs and crossings that help responsible motorists drive safely are now often supplemented with traffic calming features such as humps and chicanes. The old emphasis on curing crash hot spots is giving way to whole route and area treatments. Although the default speed limit in residential areas is 30 mph, home zones with 20 mph speed limit are quickly spreading in residential areas. The use of speed cameras is also being considered at entry/exit points to residential areas.

A safer road network is constantly expanding in Japan as a result of the following:

- The road network is targeted at three different levels by developing Routes for the coexistence of pedestrians and vehicles; creating Zones where pedestrians and bicycles have priority and by implementing Arterial Road Measures: including the placement of right-turn lanes; intersection improvements and other measures.
- "Safe Pedestrian Areas" are identified and have become the focus of area-wide crash prevention measures (to limit travel speeds and to demarcate sections to be used by traffic and by pedestrians). Wide footpaths are also developed along school routes, around train stations and other public facilities.
- Japan eliminates utility poles, constructs pedestrian overpasses with lifts and improves signs and markings to make them more visible to the elderly.

Other Notable Measures to Improve Road Safety

Although the objectives of this fellowship were to study road safety policies and engineering measures in five leading countries, discussions also lead to other road safety activities pursued in these countries that are worth noting:

- Automatic Speed Control using speed cameras has proven to have positive effects on road safety in Sweden (800 cameras). Fixed cameras are also used in the UK (700 in London) and in Norway (360) while mobile speed cameras are used in Denmark.
- The Home Office Review of Road Traffic Penalties in the UK and the Government in Norway are considering a range of offences with a view to render penalties more appropriate and proportionate to the seriousness of offences.
- The UK police developed schemes that offer retraining rather than prosecution to drivers who have committed careless errors. The 'National Driver Improvement Scheme' has been adopted by over 30 forces. For example, a PC based Speed Awareness Course has been developed. It is a 'hazard perception' exercise and speed offenders can attend the course to offset losing points off their license.
- Japan will implement the "Cross-generation Sharing Project," in which people from three generations meet to learn about traffic safety, and the "Seniors Home Visit Project," in which traffic safety guidance is provided at home to seniors unable to attend seminars. Traffic safety clubs are established within seniors' clubs and retirement homes. Classes for drivers between 65 and 70 years of age teach them the changes occurring in their physical functioning, their driving tendencies and the characteristics of crashes in which they are commonly involved.
- The 'Think' campaign in the UK has been very successful. The powerful drink-drive advertising has helped make drinking and driving socially unacceptable, and a substantial fall in drink-related casualties was achieved.
- Norway concentrates on the use of safety belts, speed reduction, cycling and walking to school in their awareness campaigns. Knowing that about 95% of drivers and passengers already wear seat belts, trying to reach the remaining 5% was a challenge. Instead, the campaign targeted those who already wear seat belts urging them to remind and encourage others to do the same. The 'speak Out' campaign targets 16 to 24 year olds about dangerous driving and asks people to speak to the driver about any dangerous habits and not to accept being in the same vehicle.

- Impressive market research takes place in Denmark to identify the target audience for each safety message and how to reach them (messages for young drivers are aired at movie theatres showing films that attract young people). A short video was produced using topless girls (speed bandits) to draw young people's attention to speed signs and speed limits. Given that young people forward all sorts of internet messages, this ad reached millions of people in a short time period.
- Japan has stepped up its calls to pedestrians to use reflective material as a means of preventing pedestrian crashes at night. Prefectural police distributed reflective material on street corners, on visits to seniors' homes and at educational events.
- The automotive industry can contribute to road safety by meeting demands set by their consumers (such as governments, municipalities and private businesses). The Swedish Government demands specific safety features in its fleet and is therefore indirectly able to affect manufacturers without the need to change vehicle standards.
- In Norway, studies show that if the person first arriving at the scene of the crash masters first aid, every fifth fatality could be avoided. More emphasis is therefore being put on improved preparedness in the health services.

Reasons for Success

The major findings of this study were not just about the measures deployed but rather about the overall approach to road safety and how the authorities manage it. Road Safety enjoys a high profile, in these countries, through political support at the highest levels. For example, the Prime Minister of Japan chairs the Central Committee on Traffic Safety Measures responsible for formulating the Fundamental Traffic Safety Programs. That political support is usually translated in funding provision.

Holistic approaches to road safety are becoming common including the Swedish 'Vision Zero' and the Dutch 'sustainable Mobility'. This holistic approach is being translated in organisational structures that attempt to consolidate all efforts (policy, engineering, awareness campaigns and education) in one group to allow the choice of treatment across these fields, and sometimes, their integration into a 'solution'. Specialist skills and continuous training are also pursued to develop the 'right' people for the task.

National coordination of road safety works is a strong aspect in these countries. Road safety is a 'strategic aim' and a 'culture' within their organisations. The holistic perspective of recent policies has resulted in closer cooperation between system designers and other players. Cooperation does not stop at Government organisations but also extends to the private sector. Many companies that procure or operate transport services (e.g. Ikea and Carlsberg) are assuming responsibility for their impacts on road safety. Road authorities develop agreements with them to promote road safety and may sponsor initial measures such as alcolocks for the company's fleet.

Road Safety Policies are, more and more, focusing on reducing casualties. A 'People First' philosophy is gaining popularity. Despite the fact that politicians do not generally support targets (as targets admit acceptance of a certain number of deaths), ambitious targets are set to provide the focus for the whole of Government effort. The importance of the availability and quality of data is strongly acknowledged since it informs the decision making process, especially in the common environment of limited budgets.

In depth studies of every death are used to examine whether it could have been prevented. These studies are not necessarily interested into why the crash happened but rather into why the consequences occurred (why did the person die?). System designers assemble stakeholders (e.g. truck operators for crashes involving heavy vehicles) to discuss possible solutions and develop measures for implementation, confirmed in a declaration of intent signed by each stakeholder. Such OLA (Objective data, List of solutions and Addressed action plans)" projects are conducted in Sweden.

Educational/training opportunities, offered as a substitute for prosecution in the UK, have been successful. Victims of traffic crashes (Road Peace in the UK, and Traffic Informers in Denmark) assist the Government in education efforts of school children or others and represent a powerful source of change.

General awareness campaigns to influence road user behaviour are not the norm anymore. Rather, a more targeted approach to specific groups is used. Analysis is undertaken to determine the details of the problem, details of the message; the target audience and how to ensure the target audience sees the message.

As well as the traditional 'blackspot' approach which examines single sites, more and more work is being done at other levels of analysis:

- Arterial Routes are examined either through a comparison of crash rates (reactive) or through risk assessments (pro-active) using a Road Safety Audit approach.
- Scattered crashes are dealt with by area treatments.
- Networks are analysed to identify crash trends and mass engineering, and other, treatments are implemented. Many successful examples exist:

- o One Thousand km of '2+1' roads with median barriers (Sweden).
- o Rumble markings at road edges/medians (Sweden and Norway).
- o Pedestrian facilities/sidewalks (Japan).
- o Physical separation of travel modes (cycling and walking from other modes).
- o Maintaining clear zones at road edges to create more forgiving environments.
- o Speed cameras across the network.
- o Lower residential speed limits (UK and Norway).
- o Lower blood alcohol limits to 0.02g/l (Norway and Sweden).

To stay amongst the leading nations in the field of road safety, these countries are keen to maintain high standards of road safety research and to develop new solutions:

- Japan's National Police Agency plans to introduce a road safety system that alerts drivers to potential hazards through audio and visual notifications. About 20 different subsystems, each designed to prevent a specific crash type (rear-end collisions, head-on collisions) are being studied. Some of these are expected to be rolled out in 2008 and are currently being tested in Tokyo.
- Intelligent Speed Adaptation (ISA) is a promising method for helping drivers keep to the speed limit. Using GPS technology the system registers the vehicle's speed and compares it with the permitted speed at the current location. The speed limit data is taken from a road database that contains information on all roads. If the speed limit is exceeded, systems issue a warning (a sound signal or accelerator counter-pressure). ISA has been promoted to private companies in Sweden. Government Departments have also installed it in their vehicles and consideration is being given to its use on taxis and buses as a first step of a wider implementation.

Many differences exist between countries including cultural influences, legislative requirements, the standard of the road network, the use of the various travel modes, the interactions between these modes and others. Importing and implementing 'foreign' solutions can only be successful after careful consideration of these matters. Having said that, some of the above findings are worthy of consideration. New projects have already been initiated in the ACT based on these findings.

Lastly, I am very grateful to the Winston Churchill Memorial Trust of Australia for awarding me the fellowship and the NRMA-ACT Road Safety Trust for sponsoring it. The support I received from senior officers in the ACT Department of Territory and Municipal Services is also much appreciated.