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SAFER JOURNEYS INTERIM EVALUATION

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EXECUTIVE SUMMARY AND RECOMMENDATIONS

"Safer Journeys New Zealand's Road Safety Strategy 2010-2020" was launched in March 2010, and has been supported by two subsequent action plans covering 2011-2012, and 2013-2015. The Ministry of Transport, in collaboration with the National Road Safety Committee, commissioned an interim evaluation of the strategy which provides an important opportunity to take stock of recent progress and lay the platform for further significant improvement. The evaluation framework focuses on management systems, interventions delivered and results achieved.

Safer Journeys is a professionally developed, well regarded, stable road safety strategy. It is based on the reputable and internationally recognised principles of the safe system appproach. The strategy has clearly had a significant positive impact upon the wider road safety partnership and some sections of the community.

Deaths and Serious Injuries in New Zealand

While the focus of *Safer Journeys* is sound, levels of fatalities and serious injuries have not continued their downward trend experienced to 2012 and have in essence plateaued since that time. ACC injury entitlement claims have reversed their strong downward trend since 2009, plateauing in 2011 – 2013 and rising since then.

In 2014, 295 people were killed while using New Zealand's roads, 2709 people were hospitalised for over one day as a result of road traffic injury, and 4607 new entitlement claims against the Motor Vehicle Account were registered by ACC on behalf of New Zealand road users. The social cost of crashes on New Zealand's roads in 2013 was estimated at $3.12 billion, which is likely to underestimate the willingness of New Zealanders to pay to reduce the risk of pain and suffering from road crashes.

Acting on Safer Journey's Priorities

The strategy set 12 priorities, and these are addressed in this analysis of interventions. The partner agencies of the National Road Safety Committee were asked to provide information regarding the use of the indicators and the activity that was delivered.

Five areas of high concern were nominated in Safer Journeys. They contain some significant successes, particularly in the area of alcohol related crashes and the safety of young people where targets have already been met and exceeded, and where new legislation can be expected to lock in the improvements which have been made. There is also progress in safer roads and roadsides but much more to be done, ideally in conjunction with work on safer speeds. Some progress has been made on motorcycle safety, and more is likely to be required before the targets are reached.

High Concern	Interim Evaluation	Potential Future
Increase the safety of young drivers	Excellent sustained progress	Age at which full license is available

Reduce alcohol/drug impaired driving	Excellent sustained progress	Further strengthening of standards for commercial drivers, motorcyclists and interlocks and of drug driving enforcement
Achieve safer roads and roadsides	Good sustained progress	Increased safety focussed investment developed in concert with Safer Speeds Programme to lift KiwiRAP safety star ratings
Achieve safer speeds	Limited progress	High potential from delivering "Safer Speeds Programme" and higher potential acceptance from associated measures such as road investment and traffic fine hypothecation
Increase the safety of motorcycling	Limited progress	Continue regulatory reforms and extend to vehicle and equipment safety

There have been a number of major infrastructure safety steps taken in New Zealand over the life of the strategy to date, and the roads area is one where the philosophical impact of *Safer Journeys* has been very high. By focusing attention on key crash types, the strategy appears to have supported a genuine safe system driven move towards intervention options which, in relation to roads, focus on the inherent safety quality of the road environment as the primary issue. That is, the interventions focus on providing primary protection for users, rather than expecting users to respond perfectly in all situations.

This area is well primed for and would respond well to additional investment, with very high safety potential in packaging up road investment and speed limits into a range of transformational projects. This will be important on both State Highways and local urban roads, as well as on local open roads where the rate of safety improvement has been lower.

Considerable development attention has also been given to the preparation of a Safer Speeds Programme which recognises the need to lead a change management process in the area, and now needs to be implemented. Safer speed limits will need to be managed in conjunction with road investment. New Zealand's overall speed enforcement programme needs major reform:

- The fines and demerit points applying to speeding offences detected by an officer are very low relative to the risk they impose, as illustrated by alcohol penalties

- Notwithstanding the very low penalties generally, demerit points are not applied to camera detected offences
- There is a very low level of speed camera deployment in New Zealand compared with Australian jurisdictions
- The standard enforcement tolerance of 10 kph is well above what can be considered good practice
- There appear to be major production constraints within the Police Infringement Bureau to process speeding offences.

The Motorcycle Safety Advisory Council was established in 2011 and has recently undertaken a strengthening programme. It will be a challenge to move into activity which promotes focused interventions which have a high potential for significantly reducing motorcycle trauma. This will inevitably involve leading motorcyclist safety perspectives as much as advocating motorcyclist safety interests. More will be required to achieve the target. Regulatory options include mandatory ABS on motorcycles, stronger controls on helmet standards, and (notwithstanding recent initiatives) addressing the highly elevated risks for motorcyclists through the licensing system and alcohol policy.

Five areas of medium concern were highlighted by *Safer Journeys*, and some progress can be reported across light and heavy vehicle safety, fatigue and distraction and high risk drivers. Change is also occurring in relation to cycle safety. Future attention appears to be most necessary in two areas for different reasons. The scale and pace of change in vehicle safety means this area needs sustained efforts to ensure New Zealand benefits fully from available technology. The much slower level of improvement for walking and cycling suggests that more effort in each of these areas is warranted, particularly pedestrians who comprised 1 in 8 of all fatalities over the three years 2012-14.

Medium Concern	Interim Evaluation	Potential Future
Improve the safety of the light vehicle fleet	Good sustained progress	Actively managing the forward regulatory agenda, and promoting organisations' occupational safety and health duties
Achieve safer walking and cycling	Insufficient progress	Greater and separate attention in urban areas including support for better delivery
Improve the safety of heavy vehicles	Limited progress	Improvements in the regulatory environment, and developing safety management systems
Reduce the impact of fatigue and address distraction	Good sustained progress	Continued integration of issues within road design, vehicle design and

		community promotion
Reduce the impact of high risk drivers	Good sustained progress	Consideration of wider community needs associated with repeat and serious offenders

Finally, two areas of ongoing and emerging concern were identified.

Ongoing and Emerging	Interim Evaluation	Potential Future
Increase the level of restraint use	Limited progress	Converting high use rate into high correct fitting rate, and further promoting booster seats
Increase the safety of older New Zealanders	Good progress	Comprehensive assessment of the safety of road and vehicle technology and licensing and transport options for ageing population

The First Action Plan included 108 work items to be completed, or substantially progressed, in 2011 and 2012. This was a very large work programme and clearly reflected a determination to set the strategy off on a strong positive footing. Almost all of the deliverables were achieved, and all of the most significant work items were addressed. The Second Action Plan is far more focused and ambitious, which was an important development. Good development progress now needs to be transformed into tangible action.

Managing the Safety of the Road Transport System

Critical management issues influencing road safety results in any country are:

- The strength of the focus by agencies, government and others on delivering improved road safety results, built upon a clearly stated and understood expectation for improvement set out in a strategy and action plan
- The effectiveness of the identified lead agency in supporting this focus on results
- The effectiveness of the management arrangements between and within institutions across government in supporting achievement of the desired results
- The extent to which this focus on results is brought to bear at the level of interventions.

A road safety management analysis was carried out based on the good practice road safety management guidelines published by the World Bank Global Road Safety

Facility. Interviews were held with National Road Safety Committee Chief Executives as well as a number of senior executives and staff in partner agencies, along with a range of user representatives to help assess a range of road safety management functions carried out by the New Zealand road safety agencies, including their impact upon interventions and results.

The aspiration in the Second Action Plan is commendable, but the shorter term operational focus of the road safety agencies may not be as effective as their longer term strategic focus. This requires early corrective action to be taken. One agency representative discussing the need for sustained effort referred to "bursts of courage followed by periods of antipathy." Another suggested that there was not a strong political champion for road safety. The overall impression is that there may be a tendency among decision makers to seek further analysis rather than acting on the evidence and information that is readily available. Senior executives and institutions may not consider they have the political mandate to undertake the detailed consultation, negotiation and persuasion to manage change in contentious safety areas.

Based on an understanding of international literature and practice, an examination of the interventions which are in place, and an analysis of the systems to drive improved performance, it is difficult to conclude anything else than that the lack of a set of national targets for significant reductions in road fatalities and serious injuries is having an effect on the safety experienced by road users in New Zealand.

While the Ministry has the direct support role for Ministers, and has significant capability across a range of disciplines, it may not be playing a strong enough leadership role in road safety with, for example, New Zealand Police and the NZ Transport Agency which bring considerable institutional strengths in their own right. There are well established agency accountability mechanisms within the transport sector, but the Ministry's outcome leadership role based on its Ministerial mandate needs to be seen as essential in improved road safety performance.

It was suggested that the National Road Safety Committee (NRSC) which is the high level governance group for road safety may not be receiving adequate nor regular insights into what is going on out on the road network in terms of road safety performance and barriers to implementation. They need to oversee strategic projects because they have been identified as being critical to longer term success, and engage on performance issues that have arisen which need to be addressed, and on opportunities which need to be taken. More than any other group of individuals they will determine the level of success of *Safer Journeys* and the responsiveness of government to emerging road safety issues.

The National Road Safety Management Group (NRSMG) which supports the NRSC needs to run the engine room for road safety strategy and action in New Zealand. A stronger and more direct road safety leadership role within and between the agencies may be needed from this group, and resourcing requirements may need to be considered to support this. This may require conversations between NRSC leaders and relevant NRSMG members on the mandate for this important leadership role. It may also require a more explicitly cross-agency resource to be deployed, such as occurred as *Safer Journeys* began to be implemented.

While the NRSC is considered to be a good practice model of cross government cooperation, there has not always been the same level of involvement or commitment from organisations or their representatives. Particular concern was expressed about the involvement of ACC which was regarded as running "hot and cold with their involvement which has been sporadic." Concerns were expressed about whether, given the Police Commissioner does not attend NRSC, the Police Minister is receiving adequate briefings on road safety.

More time and effort appears necessary at managing operational partnerships. Relationships appear to be good, but there is further potential – for example combining the Ministry's more direct relationship with Ministers, and NZ Transport Agency's independent capacity to act. There is also further potential in occupational safety. It is understood that ACC and Worksafe have developed a joint workplace injury prevention plan and work related road safety needs to play a newly prominent role in this. Consideration needs to be given to how pedestrian safety matters, which connect into the movement of some of the most vulnerable members of the community, are better addressed at a national partnership level.

ACC is a longstanding member of the NRSC but could be playing a far more significant role in road safety. One impression is that ACC pick and choose the activity they get involved in rather than looking first at the strategic needs of the partnership. Another impression is that they are regarded as simply the holders of potential additional funds. If either impression is close to the mark, it needs to be addressed. The decisions made at an overall account level impact directly upon the capacity to reduce serious road trauma in New Zealand. A recent decision was made to substantially reduce the average ACC motor vehicle levy including the annual licence levy and petrol levy from around $330 to $195 a year from 1 July 2015, and this is anticipated to fall to around $120 from 1 July 2016. Serious consideration should be given to significantly increasing investment in road injury prevention as a means of reinvesting in the long term sustainability of the motor vehicle account.

Road policing effectiveness at a local level is an ongoing challenge and it is likely that strong central guidance is necessary to offset to some degree the rapid turnover of road policing commanders. Regular turnover of Police in local road policing roles impacts knowledge and ongoing stability/commitment in a substantial way and needs to be addressed.

There are a large number of local and regional government entities with significant road safety responsibilities, and considerable effort is required to keep lines of communication and consultation and information exchange open. This is especially the case as linkages are needed not only with council technical staff but also with elected members. This goes beyond national engagement with Local Government New Zealand and into knowledge and capacity issues which can often restrict local government from being a strong road safety partner. Local government is reportedly very uneven in its use of road safety action planning at local and regional levels. Increased councillor awareness of, and support for, road safety will be necessary if it is to become a greater focus locally.

The investment approach across the partnership appears to be "spend what we have got in a better way", rather than a more direct assessment of what expenditure is

needed to keep significantly reducing the level of road death and serious injury. An essential component of New Zealand's shift to safe system thinking is to directly consider the financial implications of a targeted reduction in death and serious injury over the next five, ten and fifteen years. The scale of investment needed over that period should be incorporated into the Government Policy Statement, and associated with the expected performance improvement.

The review team were advised that many worthwhile road safety measures were available with good returns on investment, but they are not being implemented, as funding priority has not been allocated. Considerable thought and effort has gone into the successful development of the ONRC, including the integration of safety performance measures for the network and the relationship with speed limits. This is a major achievement and, if implemented, it will achieve results. It will take considerable effort to package up reforms in this area, and even more effort to implement them. The preparation of combined infrastructure funding and speed limit packages are potentially compelling in terms of safety performance, and it is important that substantive change is made in this area over the next few years.

Discussions suggested that some $150 milllion was required annually over 20 years for infrastructure improvements to safely maintain high speeds on the highest volume roads, but this would need to be verified. The annual safety allocation is currently some $35-50 million, and it is understood that this will rise to around $70 million beginning with the 2015-18 National Land Transport Programme. If there is a funding gap for an infrastructure safety programme, this needs to be identified. Options for funding the balance, and for shortening or lengthening the programme, need to be considered. The improvement of safety in the interim also needs to directly addressed.

Travel speeds (which are strongly influenced by speed limits) and road infrastructure and roadside safety continue to be the major factors in determining the serious casualty crash risk of each length of road in New Zealand. A programme to improve the safety contribution of both – separately or in concert – is required. The challenges here are significant, and the community needs to be engaged on well developed proposals for speed limit reductions. Firmer government leadership from senior public sector executives and Ministers will be necessary and some will need to put their stamp on pivotal actions for performance to substantially improve.

Enhance performance analysis and set national targets

New Zealand has sophisticated road safety data gathering and monitoring systems and this wealth of information now needs to be brought together in a much more focussed way to drive further performance improvement. Some indicators established under *Safer Journeys* are poorly aligned with the safe system approach some are not being given the prominence and attention they need, and some do not appear to be used for their primary, results focused, purpose.

> *It is recommended that a simple results management framework is prepared which highlights the critical intermediate outcome and output measures that will become the focus of NRSC attention through to 2020, and will serve as preparation for a more complete target setting exercise for the decade beyond.*

It is recommended that ambitious trauma reduction targets covering the period of the next action plan through to the end of the decade are set, that the targets are supported by actions and performance measures geared towards achieving them, and that the investment costs of achieving those targets are estimated.

It is also recommended that the value of statistical life is updated through a willingness to pay survey to ensure the current value the community places on road safety is reflected in the rational allocation of resources.

Strengthen road safety management capability

Coordination is essential to sustained improvements in road safety, and costly. More immediate and effective tactical and operational activity is required to create a climate for change, to avoid or limit the impact from the multitude of new ideas that have low strategic safety value and compete for valuable attention, and to take opportunities quickly to advance and implement an agenda with high strategic safety value. This may require the deployment of a different level of investment and balance of skills within the Ministry.

This need to strengthen road safety management capability at this time in the development of New Zealand's safe system approach and the delivery of *Safer Journeys* extends to other agencies and sectors as such as NZ Transport Agency, Police, ACC, Worksafe, the Health sector, and local government. The associate members including the Ministry of Justice, the Ministry of Health, the Ministry of Education, the Energy Efficiency and Conservation Authority, Local Government New Zealand and WorkSafe New Zealand need to be more fully involved for appropriate issues. As was pointed out to the review team, "the facts do not speak for themselves". They need to be spoken for, from a variety of perspectives. Deliberate and strategically aligned actions are needed from them all.

It is recommended that NRSC agencies individually and collectively assess their current road safety management capability and what will be required to significantly lift road safety performance over the next five years.

It is recommended that a specific programme of work is developed and implemented to significantly increase the road safety management capacity of Local Government, which is responsible for nearly 90% of the network upon which nearly two thirds of serious road trauma occurs.

Rejuvenate the wider NRSC partnership

There is a good reason that the National Road Safety Committee continues more than 20 years after its formation – it is a model structure for governments to focus on societal outcomes, and deliver improved performance for the community.

To build government awareness of the challenges and needs in road safety, it is recommended that the Ministers jointly responsible for the NRSC partner agencies meet with the NRSC at least twice a year.

The Ministry of Transport is a long standing arm of Government with a strong record of achievement, and this needs to be leveraged further in the interests of road

safety. Discussion with stakeholders outside government revealed the high regard for its bilateral consultation with individual industry and consumer interests.

> *It is recommended that a twice yearly multilateral forum is created that brings many different perspectives and efforts to bear on the road safety task and seeks their collective input and engagement on road safety improvement.*

Create alternative voices for road safety

A further step would be to extend the goal in the Second Action Plan to advance the safe system approach, and strengthen the conditions and climate for implementing a safe system approach.

> *It is recommended that a Safe System Taskforce is established with a timebound agenda to explore options for cooperation with other policy fields (planning, public health, environmental issues etc.) and step up the safe system dialogue with New Zealanders.*

The Taskforce would consist of recognised experts and respected individuals with strong leadership capabilities and links to the top levels of Government. They could articulate a clear picture of where the safe system approach will lead New Zealand, endorse the One Network Road Classification and associated safety transformation, endorse a framework for establishing safe speeds and credible speed limits, help integrate road safety into other areas, and consider and promote future safety technology.

Address delays in legislation

Given that legislative advances in driver licensing and drink driving have only just caught up with norms reached in better performing countries some twenty years ago or more, it appears that there is a bipartisan road safety problem in Parliament.

> *It is recommended that a Parliamentary road safety committee or a sub-committee of the Transport and Industrial Relations Committee is established for the remainder of this term of Parliament and the next.*

There is a backlog of legislative initiatives which Government and Parliament need to address. The MoT and the National Road Safety Committee will need to find a way to specify, explain and promote them. Examples on a simple list which represents catch-up with good practice are a zero drink driving limit for specifically licensed drivers of trucks buses and taxis; penalties for speeding which better reflect the risk of the behaviour, including but not limited to demerit points for camera detected offences; drug driving enforcement laws which allow technology to detect methamphetamine and cannabis use amongst drivers; an administrative alcohol interlocks program; the age at which a young person can graduate with a full license; speed limiters on heavy vehicles; and stronger chain of responsibility legislation.

The relative speed with which the decision to mandate electronic stability control was made, compared to the minimum driving age or the drink-driving limit suggests that more effort in vehicle safety regulation may be rewarded. While the flow on safety effect will take time, it may be quicker and less contentious to progress vehicle safety regulation, which is particularly important given the unique mix of new and used vehicle imports into New Zealand.

There is a great temptation to tinker with road transport regulations, and the net effect of this may be to reduce the significance of more substantial safety changes. A User and Operator Safety Standards map, aligned with good behaviour change and road safety management principles, would be useful to identify and prioritise future safety standards.

> *It is recommended that the Vehicle Standards Map is amended to set timeframes for regulatory analyses on key safety technology, and a companion User and Operator Safety Standards Map is prepared to provide a strategic picture of change in coming years.*

Develop and implement a safe system promotion plan

The strong cross sector resource for communications which was established to initiate *Safer Journeys* may need to be re-established to facilitate proactive, nimble, media savvy and cohesive safety communications across government.

> *It is recommended that a road safety promotion plan is prepared and implemented which recognises the importance of lifting the understanding of and commitment to sustained reduction in road trauma throughout national and local government and the private sector.*

This plan will also be important to building stronger commitment from major organisations to reforming their approach to addressing the number one occupational risk that the vast bulk of them face which is the risk of death on the road. The highly regarded NZ Transport Agency led safe system workshops should continue to support the ongoing cycle of professionals into road safety, but may also need to be adjusted as required to support this plan.

A joint MoT and NZ Transport Agency led effort is likely to be most effective. The Ministry needs to lead because it brings to bear the weight of a government department charged with the safety of all New Zealanders in their use of the transport system, in all the various dimensions of the system, being the roads, the vehicles, and the use thereof. The Agency also needs to lead because only it can articulate the single most powerful message – a responsibility to safely protect human use of the State Highway network.

Develop a programme to support safer workplaces

Work related road safety requires specific attention from Worksafe New Zealand as well as from ACC, MoT, NZ Transport Agency and Police. This needs to acknowledge the very high proportion of work related fatal injury arising from road crashes (estimated at 105 fatalities per annum over 2009-12), and set about specifying and implementing new measures to promote safe work vehicles, and safety management systems.

ISO 39001 Road Traffic Safety Management Systems provides a model for consideration, and there are other significant programme models for this, such as the National Road Safety Partnership Programme in Australia or Driving Better Business in the United Kingdom. The Fleet Safety Programme which has been heavily supported by ACC provides an important base for this work, and should be leveraged in any future work to develop the anticipated partnerships programme under *Safer Journeys*.

It is recommended that ACC and WorkSafe New Zealand lead the development of a significant and new programme to support employers to take substantial steps to comprehensively reduce the risk of work related road trauma, as required under occupational safety and health legislation.

Establish a cross-agency team to implement the safe roads and safe speeds agenda

Of the four intervention pillars in Safer Journeys, the safe roads and roadsides and the safe speeds pillars stand out as requiring the greatest attention.

It is recommended that a cross agency team is established structured around a Safer Roads Investment Programme linked directly to the ONRC and the Safer Speeds Programme.

The work programme would provide for decisive action to connect to the community about the key opportunity to improve the safety of high risk roads (for example eliminating two star State Highways). It would include:

- Proposals to reduce the number of unsafe road lengths (from x star to y star safety rating) in a planned manner, commencing with the most unsafe roads, through:
  - infrastructure safety upgrade works to maintain current travel speeds on busier roads
  - implementing lower speed limits on unsafe lower volume roads where investment will be unlikely in the next decade
  - implementing lower speed limits on unsafe busier roads where investment is more than two years away, with adjustment of limits upwards when it is safe to do so
- Detailed infrastructure safety investment funding decisions to be taken by government over a multi-year period, including some allocation of additional funding for local government
- Supporting New Zealanders to buy into safer speed changes before the conversation gets underway in earnest
- Ministerial and government briefings before commencing public discussions (at say local government levels) in order to ensure no surprises about any negative reactions
- Strengthening national capacity to deliver proactive media messaging and briefings and carry out intelligence gathering to enable material countering unhelpful claims to be quickly prepared
- A common communications and engagement strategy with the extended partners to present the basis for a safer more forgiving road network, which are shaped to reach and influence people in the community
- Initiate conversations with Local Government at the political level on proposed State Highway infrastructure and speed limit proposals for higher risk lengths
- Support for local government to rank their road network links by crash risk and to reduce the number of unsafe and unforgiving lengths through limited infrastructure safety investment and/or reduced speed limits.

Two major additional funding sources exist, directly attributable to users: reinvestment of any surpluses into road injury prevention from ACC's motor vehicle account, and redirection of additional speeding fines from an upgraded speed enforcement programme. Any additional investment should only be on the basis of robust business cases, and should be geared towards achievement of specific safety targets.

Preparing for a Safe Road Transport System

Three stakeholder workshops were held in order to support the future development of the third action plan. Each of the four intervention sets (safe roads and roadsides, speed, vehicles, use) were seen as needing continued specific attention. Several other areas of concern came through discussion.

> *It is recommended that consideration is given to the following concerns as the next action plan is developed:*
>
> - *The level of priority and safety afforded to cyclists and pedestrians, in cities and regional population centres*
> - *The need to recognise and account for social disadvantage in access to licensing services, and addressing cycles of traffic (re)offending*
> - *The value of strengthening the vision and targets, and the safe system responses by a variety of influencers and organisations*
> - *The creation of more explicit safety links between national and local planning and investment processes and systems.*

Participants also identified a large number of actions that could be taken. A literature review was conducted for the purpose of looking at promising new and emerging road safety initiatives that may be appropriate for consideration in New Zealand.

> *It is recommended, based on the analysis of the activity to date under Safer Journeys, the management of that activity, and stakeholder discussion about what potential action in the future, that the following six key areas are substantially addressed as the next action plan is developed:*
>
> - *Safe Roads and Roadsides*
> - *Safe Speeds*
> - *Workplaces*
> - *Local Government*
> - *Safety Management*
> - *Safety Regulation.*

The first two areas to address are the most pressing of the four pillars of *Safer Journeys*, and while they need to be considered in their own right, there is a good case for managing them together.

Safer Roads Investment Programme

Description	Develop and begin early implementation of a five to fifteen year program to deliver significantly safer State Highway and Local road networks

Accountability	NZ Transport Agency lead, in association with the Ministry of Transport and Local Government
Strategy	Link directly with the rollout of the One Network Road Classification and the Safer Speeds Programme, specifically the reduction of speed limits
Performance	Substantially improve the star ratings applied to the State Highway network, and substantially improve fatal and serious injury results on local networks

Safer Speeds Programme	
Description	Implement the programme which has been developed, and report publicly every six months on progress of key measures
Accountability	NZ Transport Agency lead, in association with the Ministry of Transport, NZ Police and Local Government
Strategy	Link directly with a programme of infrastructure works and the One Network Road Classification, and to hypothecation of revenue from speed enforcement
Performance	Substantially improve fatal and serious injury results the State Highway network and on local road networks

Two key areas to address are focussed on the organisational settings within which road trauma occurs – workplaces and local government.

Workplaces	
Description	Invest in a major workplace safety programme across public and private sectors to build commitment to road safety actions
Accountability	ACC and WorkSafe NZ, in association with other NRSC partners
Strategy	Establish work related road trauma as a high priority in employer's occupational safety considerations and WorkSafe NZ's responsibilities
Performance	Substantially reduce the risk of work related fatalities and serious injuries arising from road crashes

Local Government	
Description	Develop and implement a sustained safety partnership programme to strengthen the road safety management and leadership capacity within Local Government
Accountability	NZ Transport Agency, in association with Local Government New Zealand, Police, MoT
Strategy	Strengthen the integration of safety performance and principles into each aspect of local road management
Performance	Substantially reduce the risk of fatalities and serious injuries on local road networks

The final two areas to address focus on safety management and safety regulation.

Safety Management	
Description	Invest in management systems that will generate sustained safety improvements across all elements of the road transport system
Accountability	Ministry of Transport, in association with NRSC partner agencies
Strategy	Strengthen New Zealand' road safety management system, and management capacity across all NRSC partner agencies
Performance	Substantially reduced fatalities and serious injuries through to 2020
Safety Regulation	
Description	A programme of work to identify and then pursue significant road safety outcomes with the assistance of regulation
Accountability	Ministry of Transport, in association with NRSC partner agencies
Strategy	Establishing a base from which new regulatory issues can be assessed from a safety perspective and strategic issues can be pursued
Performance	Good practice regulation of user and operator safety standards, and acceleration of vehicle safety technology in imported vehicles

These areas are discussed in terms of their strategic intent, performance focus, and issues that need to be addressed. They are put forward for consideration and discussion as the wider NRSC partnership prepares a further action plan. They are likely to vary in their cost and effort to implement, and in the speed with which results will be achieved. They each present significant opportunities, and leverage off some significant capabilities within New Zealand.

INTRODUCTION

Road traffic injury continues to place a hefty burden on New Zealand society. The Global Burden of Disease Study estimates that, in 1990, road traffic injury was the leading cause of death for all New Zealanders aged 1–39 years old. The most recent estimate is little better. Road traffic injury was estimated to be the second leading cause of death for all New Zealanders aged 1–4 and aged 25–39 years old in 2010. It remained the leading cause of death for all New Zealanders aged 5–24 years old. (IHME, 2013)

This picture is not dissimilar to Australia, or many other developed countries, in which it is easy to reflect on the fact that much has improved, and more difficult to reflect on a level of complacency that is afflicting society in regards to road safety. One of the leading figures in road safety over the last quarter of a century, Professor Ian Johnston, writes

> "The public debate is at an impasse. Governments assure the public that we are winning and that there is no cause for concern. Because there seems no cause for concern the debate cannot go to a new level … The public demands nothing since they do not know that road use is among the major public health problems we face. While casualties per unit (of) road use are low, the sheer volume of what is an essential daily activity for all citizens means that the absolute numbers are very large." (Johnston, 2012)

In 2014, 295 people were killed while using New Zealand's roads, 2709 people were hospitalised for over one day as a result of road traffic injury, and 4607 new entitlement claims against the Motor Vehicle Account were registered by ACC on behalf of New Zealand road users. The social cost of crashes on New Zealand's roads in 2013 was $3.12 billion which is likely to underestimate the willingness of New Zealanders to pay to reduce the risk of pain and suffering from road crashes.

There is a strong road safety heritage in New Zealand which, over time, has significantly benefitted from several factors, beginning with New Zealand's highly regarded public sector management system. This empowers public agencies to find the best way of achieving the results that matter most to Ministers and the communities they represent. Road safety was an important transition model for a more results focussed management approach under the Managing for Outcomes programme, and also for a more outcomes focused level of coordination and collaboration between government agencies.

The establishment of the National Road Safety Committee (NRSC) in 1992 by the Secretary for Transport and the Commissioner of Police to ensure a strong road safety focus was retained during the 1992 incorporation of the Ministry of Transport's Traffic Safety Service into New Zealand Police is also significant. It is regularly referenced as a model governance structure for road safety in research literature. Road safety is a stubbornly multidisciplinary field of endeavour, and by bringing the various public agencies together into a single line of advice to Government, and assuming responsibility for the necessary coordination and leadership towards the Government's road safety goals, the NRSC has a vital role to play in the health and welfare of New Zealanders.

Significant improvements in road safety performance do not simply materialise however. They tend to arise from a determination to remain current in the generation and application of knowledge about how to best drive change towards the ultimate goal of what is termed globally as the "safe system" approach – expressed in New Zealand as *a safe road system increasingly free of death and serious injury,* the vision of "Safer Journeys New Zealand's Road Safety Strategy 2010-2020". *Safer Journeys* was launched in March 2010, and has been supported by two subsequent action plans covering 2011-2012, and 2013-2015.

The Ministry of Transport, in collaboration with the National Road Safety Committee, commissioned Martin Small Consulting to conduct an interim evaluation of the strategy. The terms of reference are attached in Annex 1, based upon which the following set of tasks were undertaken:

- A literature review of road safety practices in high performing countries with a focus on significantly different or new management and intervention approaches which may have applicability in the New Zealand context and inform the preparation of high value options.
- An intervention analysis, based on indicators documented in *Safer Journeys* and analysing the services which have been delivered, the likely reason for any change in the relevant indicator, the significance of the indicator to be identified, and the potential for future improvement.
- A road safety management analysis, using good practice guidelines published by the World Bank and addressing a range of road safety management functions, interventions and results.
- Stakeholder workshops in Auckland, Wellington and Christchurch to engage a cross section of the road safety partnership in early discussion about the preparation of a third action plan under Safer Journeys.

This evaluation report looks firstly at the overall results for deaths and serious injuries, then the interventions which have been developed, and the management systems which are in place. The report finishes by looking forward to areas for consideration, informed by the stakeholder workshops and literature review.

This interim evaluation of *Safer Journeys* provides an important opportunity to take stock of recent progress and lay the platform for further significant improvement. The evaluation framework that has been established is a modern, evidence-based framework which is consistent with the safe system approach adopted in New Zealand. By focusing on management systems, interventions delivered and results achieved the framework invites an insightful analysis of the underlying state of road safety in New Zealand.

It is important to state what the evaluation has not addressed. Specifically, it does not seek to directly attribute specific results to specific activity. A number of such investigations have taken place and add to the overall understanding of road safety progress. For example an established vehicle safety monitoring programme has estimated a 76% reduction in serious casualty risk over 25 years due to changes in the vehicle fleet (Newstead et al, 2014). Another analysis has attributed about 45% of the reduction over 20 years to vehicle factors, 19% to road factors, and the remaining 36% to advertising, alcohol and speed factors (Stroombergen 2013).

The technical analysis and knowledge of interventions and their impact is however only one aspect of what is required to sustainably improve road safety outcomes. If it were sufficient, then road travel would be far safer than it currently is. Many well justified interventions remain unimplemented in New Zealand and around the world. This evaluation focuses on key road safety issues to be addressed in New Zealand, but does not seek to estimate future benefits, or future costs, other than to highlight areas of high safety potential with typically cost effective treatments.

There is increasing recognition that more systemic issues need to be addressed. Given the maturity of New Zealand's road safety management system, this interim evaluation of *Safer Journeys* focuses on how effectively the various components of that system are delivering on the strategy. This is not to say that there is not a concrete analysis of what will be required, based on quite basic safety principles. Implementation is however critical and consideration is needed of what barriers exist to implementation and what may be done to reduce them.

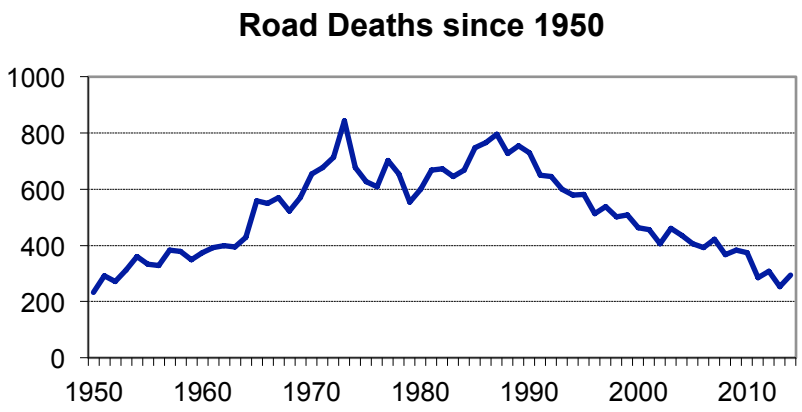
It is also necessary to comment initially on *Safer Journeys*, the strategy. It has clearly had a significant impact upon the wider road safety partnership and some sections of the community. In articulating some of the essential principles of the global safe system approach to road safety, and the very real challenges this brings, it is a worthy successor to New Zealand's "Road Safety Strategy 2010". This drew significant international acclaim, and itself traces its roots to the Storey Plan from the early 1990s which over delivered on early road safety targets and resulted in new, ambitious targets through to 2001.

Safer Journeys established a vision which was related to the elimination of fatalities and serious injuries (the central tenet of the safe system approach), but did not set any interim targets on this path. In an environment where performance improvement has clearly plateaued, and there are some indicators of deterioration, it will be necessary for a number of senior leaders within Government, the public service and the broader community to lead the societal change which is necessary.

Of course, many decision makers and institutions throughout New Zealand share responsibility for the safety that New Zealanders can expect on the road, and users have responsibility too. We now know that the vast bulk of all injuries and most fatalities on the road come from ordinary people doing ordinary things, and are not the result of bad people doing bad things. *Safer Journeys* articulates this understanding well. The challenge of implementation lies ahead.

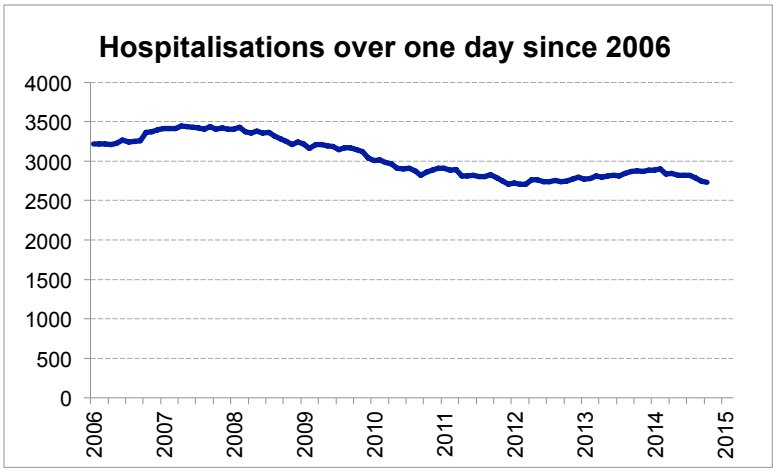
DEATHS AND SERIOUS INJURIES IN NEW ZEALAND

An assessment of overall results at the mid point of the strategy shows that some progress has been made in improving final outcome indicators (deaths and serious injuries) set within Safer Journeys. A plateau in performance appears to have been reached. Two of the four targets which were set have been exceeded already.



The historical trend is unmistakable – after two substantial peaks in 1973 and 1987, New Zealand is heading towards the elimination of road deaths.

Progress continues to be made over time. There are on average 100 fewer fatalities per annum in the last three years (2012-14) than in 2006-08, and 50 fewer than in 2009-11. But the average annual fatalities over the last three years has plateaued at around 285, and may be worsening.



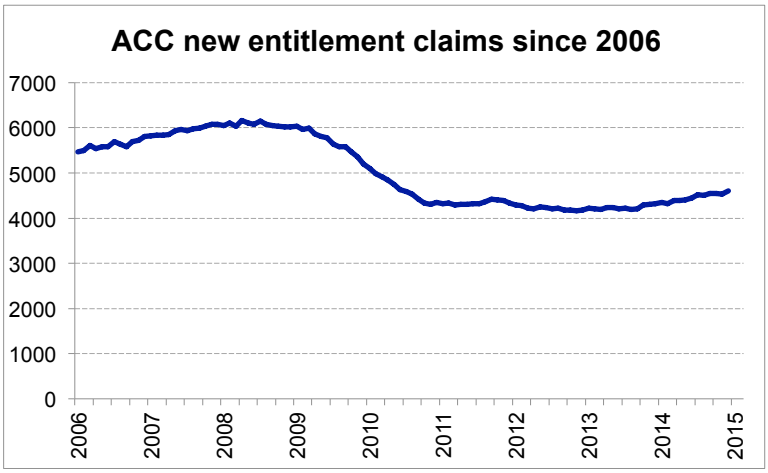
The overall picture for fatalities is replicated for various measures of non-fatal injuries. Good progress in reducing hospitalisations has been made, but the plateau in performance is clear. Average annual hospitalisations:

- 2006-08: 3348
- 2009-11: 2886
- 2012-14: 2805

There looks to be a good match between hospitalisations and Police reported serious casualties. Good improvement has been followed by a levelling out.

Average annual serious casualties:

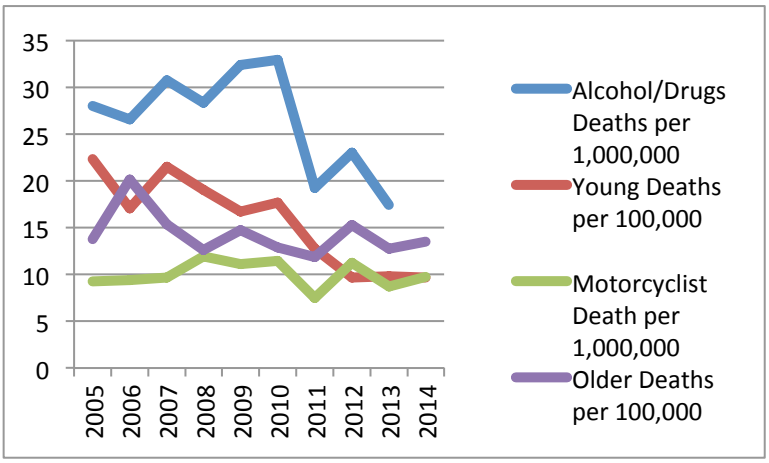
- 2006-08: 2665
- 2009-11: 2287
- 2012-14: 2061



The decline in ACC entitlement claims after the period 2006-08 was the most dramatic of all non-fatal injury indicators, and the most recent trend upwards in claims is the most concerning of the indicators.

Average annual entitlement claims:

- 2006-08: 5968
- 2009-11: 4626
- 2012-14: 4438

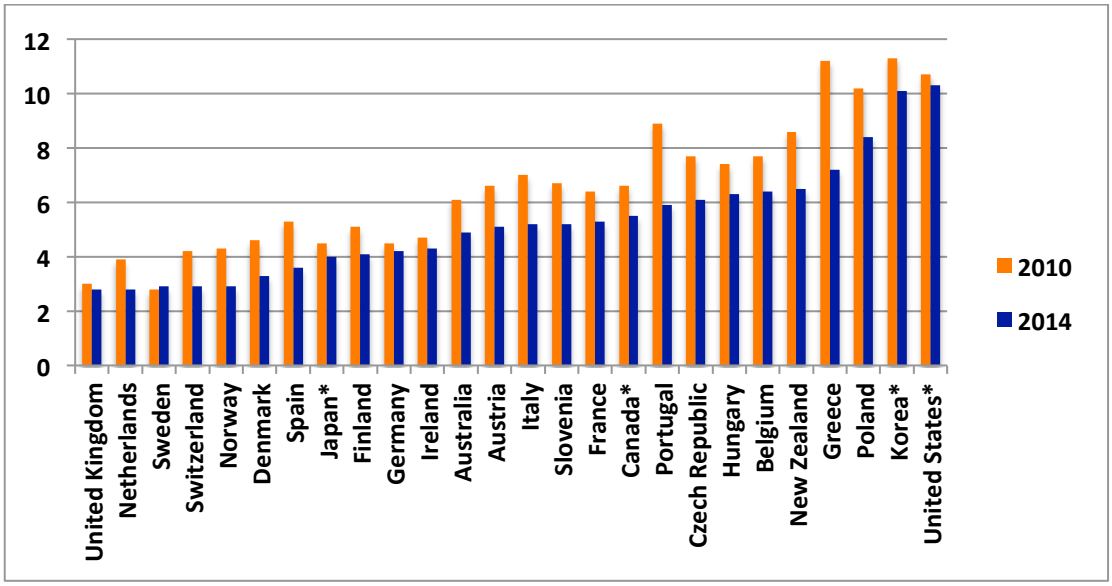


Four targets were set:

- Alcohol related fatalities per 1,000,000 population reduced to 22. Achieved.
- Deaths of young road users (15-24) per 100,000 population reduced to 13. Achieved.
- Motorcyclist deaths per 1,000,000 population reduced to 8. Not yet achieved.
- Deaths of older road users (75+) per 100,000 population reduced to 11. Not yet achieved.

An international snapshot of fatalities per 100,000 population, based on countries reported by the International Transport Federation (IRTAD, 2015), indicates New Zealand's performance has remained relatively static.

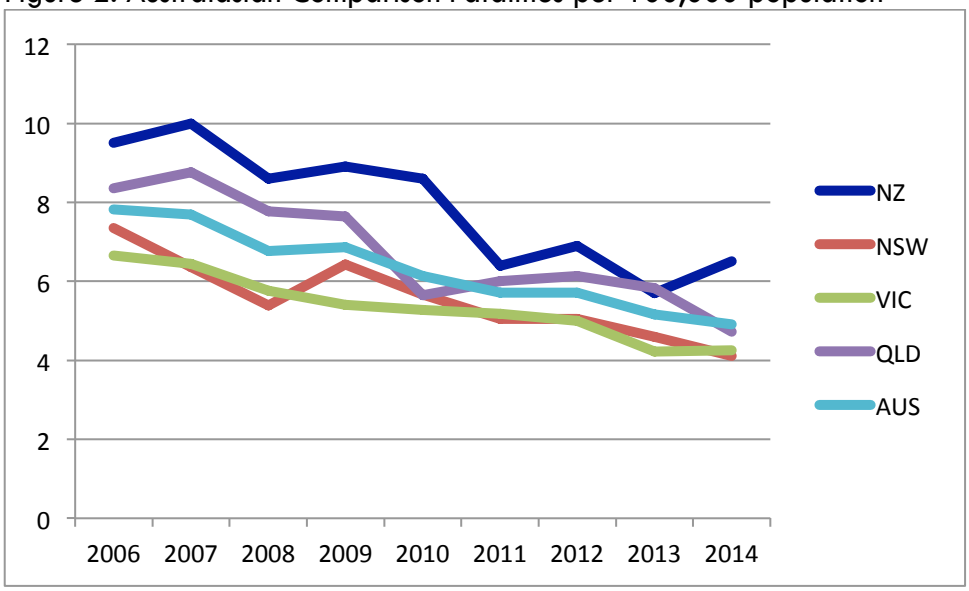
Figure 1: International Comparison Fatalities per 100,000 population



Source: IRTAD 2015, European Commission 2015.
* 2013

In the Australasian context, New Zealand got closer to the safest Australian jurisdictions over the same period.

Figure 2: Australasian Comparison Fatalities per 100,000 population



ACTING ON *SAFER JOURNEYS*' PRIORITIES

The impact of *Safer Journeys* needs to be felt on the ground, in the quality and quantity of activity which is delivered in order to achieve the strategic goals of the strategy. The strategy set 12 priorities, and these are addressed in this analysis of interventions. The partner agencies of the National Road Safety Committee were asked to provide information regarding the use of the indicators and the activity that was delivered.

Safer Journeys identified 12 areas of concern – five areas of high concern, five areas of medium concern, and two areas of ongoing and emerging concern. These are discussed in turn below, using as a starting point the indicators originally established in the First Action Plan 2011-12. This data set has been largely maintained over the length of the strategy, and includes the four year period immediately before the strategy was launched in 2010. It thus provides a relatively consistent picture of progress. The indicators themselves are discussed where relevant, along with major items of progress and delivery. Some indication is given to the potential scope for improvement, but this is addressed mostly in the final section of the report.

The delivery of each of the first two action plans is also briefly discussed, noting that considerable public reporting has been given on the first, and the second is still being completed.

Areas of High Concern

Five areas of high concern were nominated in Safer Journeys. They contain some significant successes, particularly in the area of alcohol related crashes and the safety of young people where targets have already been met and exceeded. There is also progress in safer roads and roadsides but much more to be done, ideally in conjunction with work on safer speeds where major reform is required. Some progress has been made on motorcycle safety, and more is likely to be required before the targets are reached.

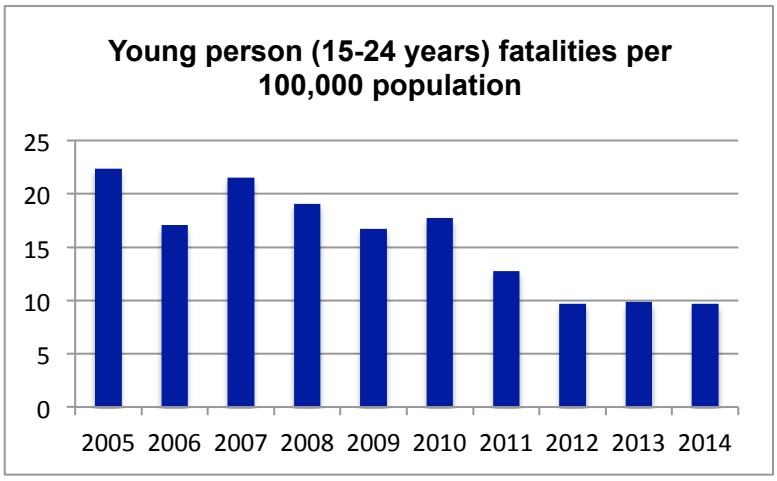
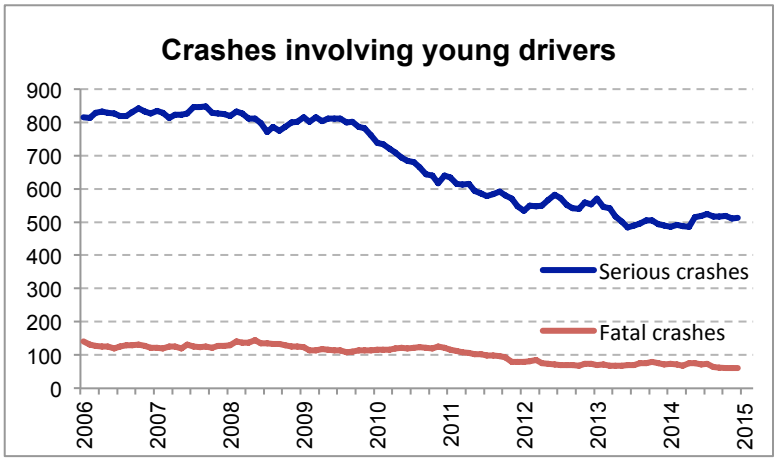
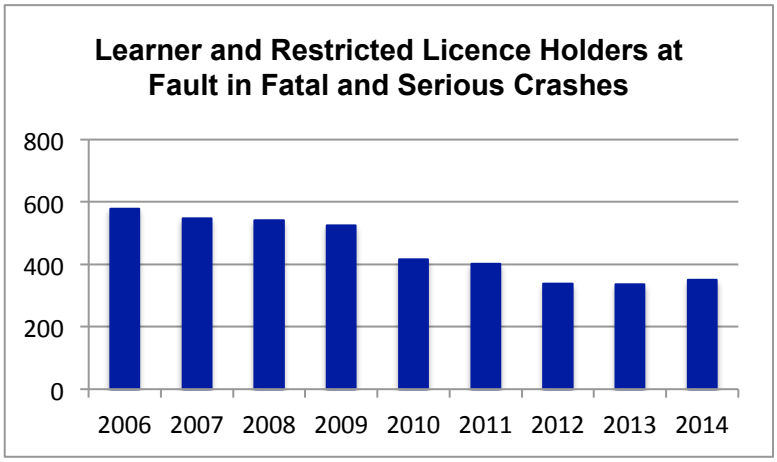
Increase the safety of young drivers

Interim Evaluation	Excellent sustained progress
Potential Future	Age at which full license is available

Young road users were the subject of a specific target, which is to "reduce the road fatality rate of our young people from 21 per 100,000 population to a rate similar to that of young Australians of 13 per 100,000." This target has been met and exceeded.

Four other indicators were also established:

- Fatal and serious injury crashes involving young drivers, per 100,000 population
- Fatal and serious injury crashes involving young people
- Drivers on learner or restricted licences at fault in fatal/serious injury crashes
- The number of supervised driving hours undertaken by learner drivers.

	The target of no more than 13 road fatalities of people aged 15-24 per 100,000 has been met and exceeded
	This significant improvement can be seen in significant reductions in absolute numbers of crashes involving young drivers
	There are fewer serious crashes involving learner and restricted drivers who were judged to be at fault (approximately one third of these drivers are aged over 25)

The number of supervised driving hours is not being monitored. It would be useful to know whether more or less attention is justified in this area given the goal of the tougher licensing test was to increase the volume of supervised driving. The use of indicators relating to whether a user is at fault or not is not advised. It is misaligned with the safe system approach which fundamentally rebalances safety responsibilities towards system designers (the wide range of professionals and institutions whose actions have a direct impact on the safety of others), and is inconsistent with the no fault approach to ACC's injury prevention treatment and management scheme.

A number of policy initiatives are likely to have contributed to an across the board reduction in fatalities and serious injuries for New Zealanders aged 15-24. The initiatives appear to have been aimed at reducing exposure (kms travelled by young drivers), and a reduction in risk (casualties for each km travelled) and include:

- In 2011, the minimum driving age was raised from 15 to 16, and a zero drink driving limit for drivers under 20 was introduced
- In 2012 a power to weight restriction and a competency based training and assessment option was introduced for novice motorcycle riders.
- A tougher licence test was introduced with the expectation that a young driver would need to complete 120 hours of supervised driving to pass.

The improvements to date have been significant, and should be seen as the start of a process for resetting expectations about what is required to gain and maintain a licence. The minimum driving age change was a significant early action when *Safer Journeys* was released and it would have created much impetus to the new approach set out in the strategy. However, it can also be seen as at best an entry level catch up with Australia, where jurisdictions have regularly moved over the last decade on extending the length of learner and restricted phases (reducing exposure), and extending stonger licensing controls (deterring risky behaviours).

The availability of a full unrestricted driver licence in New Zealand at the age of 18 is two years earlier than is standard in Australia, and four years earlier than in Victoria. The 18 year-old threshold for the full licence can be further discounted by six months if a training course is taken, for which there is no known safety justification in the research literature. Neurological research indicates that the human brain continues to develop in a person into the early twenties and can continue towards and past age 25, and the prefrontal cortex which controls reasoning, impulse control and long-term planning is one of the last areas of the brain to fully develop.

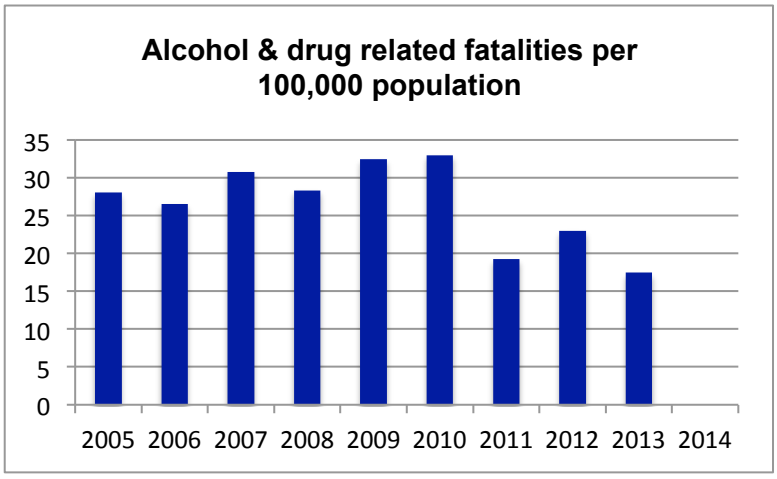
The safe system approach allows a more safety focused and less punitive focused discussion on the benefits of establishing appropriate licensing boundaries for the safety of all young people. It has been historically easy for young road user safety to be painted as a problem of targeting errant youth, but the change in the licensing age may reflect a changing climate. The comprehensive set of licensing reforms introduced in South Australia in 2012 certainly suggested this change – the most comprehensive set of peer passenger and night driving restrictions in Australia were widely accepted, with a simple evidence based discussion that focussed on promoting the safety of all young people, not punishing the poor behaviours of a few.

New Zealand's pioneering graduated driver licensing system established night-time and passenger restrictions at the outset, and there may be opportunities to leverage more safety value out of this by looking at compliance with these safety controls, and the potential for extending the period during which they apply. However, the focus may need to be on strengthening safety expectations by setting new standards for all young drivers rather than increasing punishments of a few. More broadly, the ongoing vulnerability of young people on the road needs continued attention, and could also be addressed by increasing use of public transport and newer vehicles.

Reduce alcohol/drug impaired driving

Interim Evaluation	Excellent sustained progress
Potential Future	Further strengthening of standards for commercial drivers, motorcyclists and interlocks and of drug driving enforcement

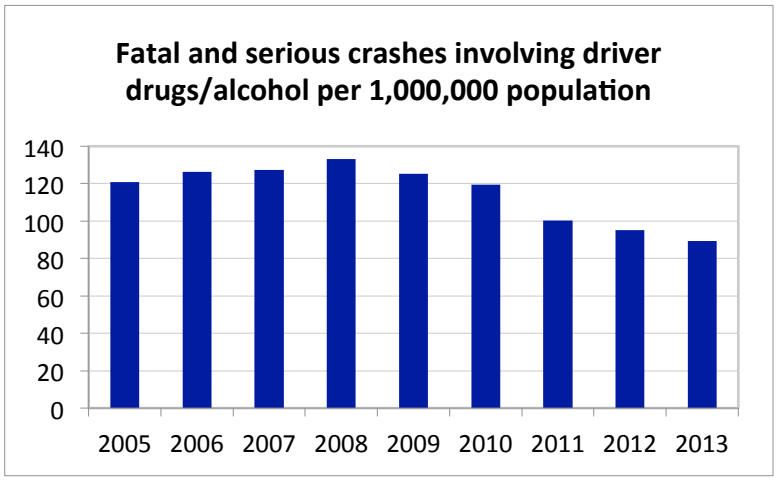
Alcohol and drug impaired driving was the subject of a specific target, which is to "reduce the level of fatalities caused by drink and/or drugged driving, currently 28 deaths per one million population, to a rate similar to that in Australia of 22 deaths per one million population." This target has been met and exceeded.



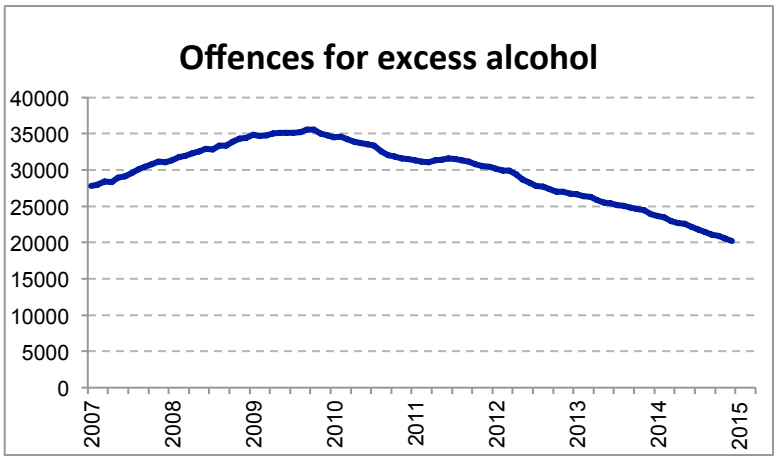
Substantial and sustained improvements have been made in the rate of driver drug/alcohol involvement in fatal and serious crashes

Three other indicators were also established:

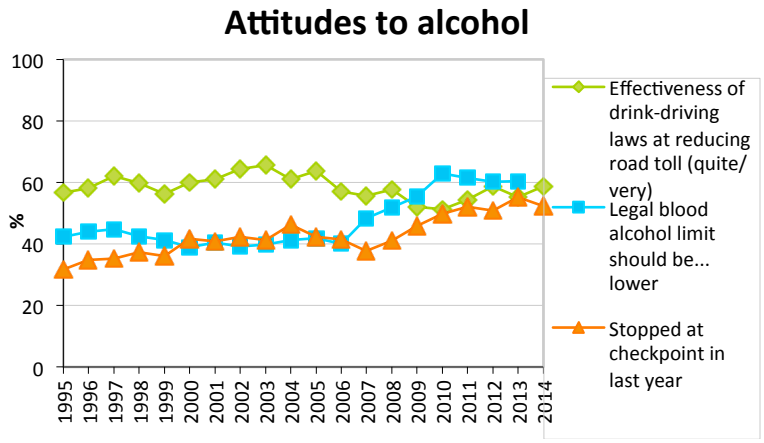
- Fatal and serious injury road crashes involving alcohol or drug impaired drivers, per 1,000,000 population
- The number of offences for excess breath/blood alcohol and drug impairment
- Public attitudes to alcohol and driving



Substantial and sustained improvements have been made in the rate of driver drug/alcohol involvement in fatal and serious crashes



The number of drink driving offences has significantly reduced which is consistent with the rate of involvement of driver alcohol in crashes, but is also dependent upon Police operations



The climate for action on alcohol is broadly positive, with a noticeable increase in self reporting of being stopped at a checkpoint, and a clear shift to supporting safer legislation

The considerable reduction in alcohol related road trauma appears to have been driven by operational activity with high levels of testing (2.95 million breath tests were conducted in 2012/13, and 3.02 million in 2013/14) and prosecutions being sustained while offences have reduced. The quality of policing operations, in terms of their use of intelligence and the application of a strong body of evidence in deterring drink driving, has a significant effect on results. The maintenance of high volumes of testing, combined with reduced offences suggest strategies in this area are working.

The stated national road policing aim of having every driver who is stopped being breath testing, regardless of the reason for stopping, reinforces this perception of a well managed enforcement program. The sustained support from the national advertising programme, community based promotions, and outspoken policy advocacy in the area from health and media groups have also played a significant role and provide a strong base from which to continue the reform process.

In legislative terms, the introduction of a zero limit for young drivers early in the life of the strategy, and the introduction of a lower general limit in December 2014 are important to lock in the improvements that have been made.

It is also anticipated that new legislative processes will improve service and productivity levels for roadside alcohol testing. It is understood that new roadside breath testing devices about to be launched by Police will enable a breath screening

test and evidential breath to be conducted at roadside on the same device, rather than the current process requiring an onsite booze bus or transfer to a Police Station. This generates significant efficiencies which if retained within road policing will allow for more direct enforcement contact. The devices also have officer identity and global positioning capability, which will provide better information for effective targeting and tasking to risk.

Given the current alcohol program, there may be some value in capturing strategic and operational lessons from the road policing activity and from the supporting advertising program. Despite improvements, alcohol and drugs were involved in over 30% of all fatalities from 2011 to 2013 meaning drink driving enforcement will continue to play a vital role as interlock technology becomes more widespread.

The introduction of an alcohol interlock program for drink drive offenders is likely to have little effect in its current form, due to its design as a voluntary scheme. This appears to have been in part due to an assessment that the cost to the offender should be considered as a cost to society. By contrast, the cost of the interlock is regarded in Australia as a penalty, although legislated schemes are often developed with lower prescribed costs for low income offenders. This economic analysis needs to be directly challenged by the National Road Safety Committee. If it is not, it may also effectively perpetuate the widespread speeding problem addressed later.

Legislative gaps remain which separate New Zealand from good practice in Australia and with a variety of European countries (ITF, 2015). One gap is a zero or reduced limit for all professional drivers. As work related fatalities are dominated by road crashes, and alcohol is a dominant cause of road trauma, this would be consistent with the Health and Safety in Employment Act which requires employers to take action to support the safety of their employees and other people associated with work related vehicle trips. The second is an alcohol interlock program which prevents convicted drink drivers from unsafe use of a motor vehicle – most Australian states now have mandatory systems in place to control this behavioural risk through technology, as do a number of European countries such as Sweden, Netherlands and France. Consideration could also be given reducing the legal alcohol limit for motorcycling, as any alcohol consumption will compound the already highly elevated risks of this means of transport.

Alcohol should remain the overwhelming focus of impaired driving enforcement activity. Drug driving enforcement needs attention however. On average 61 drug driving offences were detected per quarter for the two financial years 2012/13 and 2013/14, but despite being a key indicator for *Safer Journeys* this provides little insight into the matter given the current nature of the drug driving enforcement program. The current legislative structure does not support a population based deterrence model: Police currently have to have good reason to suspect a driver is drug impaired before testing, the testing procedure prescribed in law relies on officer judgement, and does not allow for the use of technology. Effectively deterring drug driving would be costly and require substantial legislative reform. Methamphetamine and cannabis testing technology which can be deployed on the roadside are both widely available.

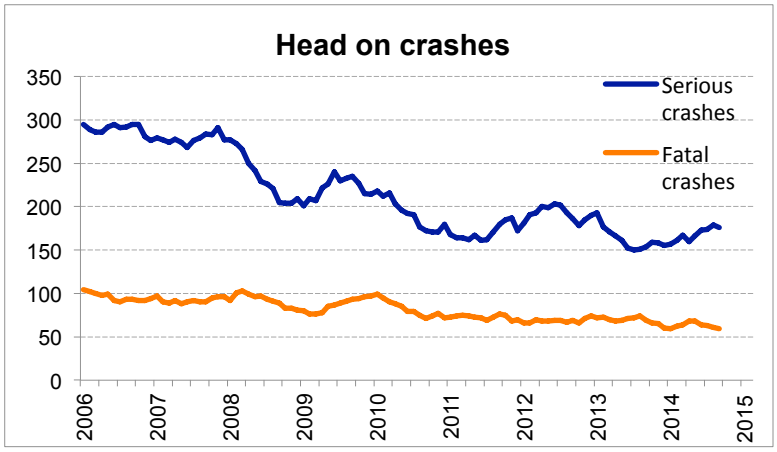
Achieve safer roads and roadsides

Interim Evaluation	Good sustained progress
Potential Future	Increased safety focussed investment developed in concert with Safer Speeds Programme to lift KiwiRAP safety star ratings

The overall goal is to "significantly reduce the crash risk on New Zealand's high risk routes." High risk roads has been defined for rural roads.[1]

Four indicators were established:

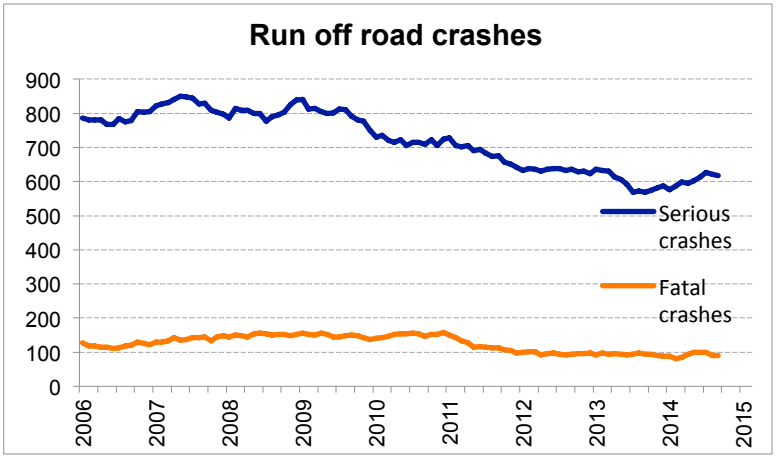
- The number of head-on road crashes (fatal and serious)
- The number of run-off-road crashes (fatal and serious)
- The number of intersection crashes (fatal and serious)
- Fatal and serious injury crash risk per kilometre on State highways, local urban and rural roads.



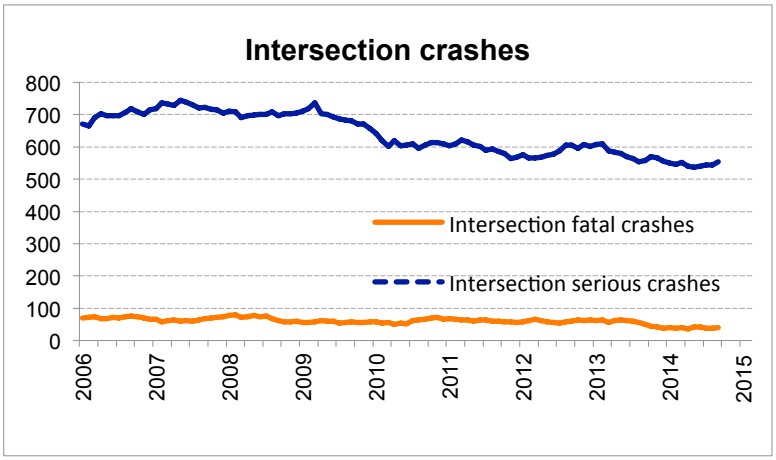
The overall pattern of fatal and serious crashes is illustrated in head on crashes

[1] A high risk rural road is defined in the *High Risk Rural Roads Guide* as:

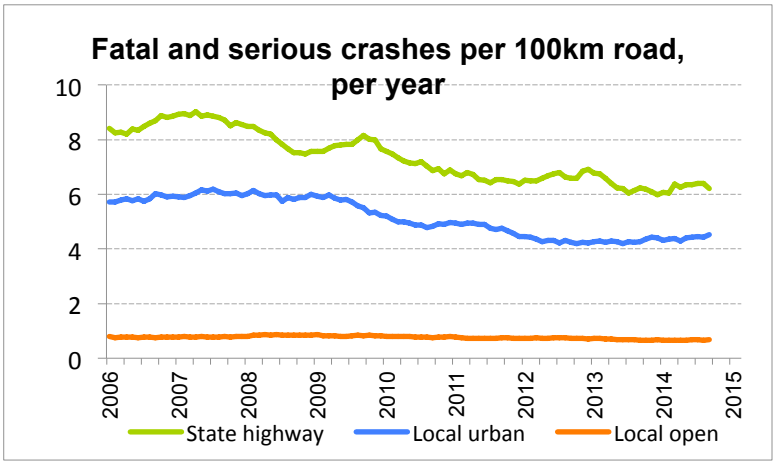
- a rural road where the fatal and serious crash rate (personal risk) or crash density (collective risk) is high or medium–high compared with other roads and/or
- a rural road with a high or medium-high collective risk; or a high or medium-high personal risk (as defined by KiwiRAP) and/or
- a rural road that has engineering features that have the potential for fatal or serious injury crashes to occur as determined by the KiwiRAP star rating or road protection score (RPS), eg a road with 1 or 2 stars or an RPS greater than 10 and/or
- a rural road that has a personal risk of greater than 2.5 identified as part of the Road Infrastructure Safety Assessment (RISA) process, and
- have an actual crash record of 3 or more fatal and serious crashes over 5 years or 5 or more fatal and serious crashes over 10 years or similar number of predicted high-severity crashes using KiwiRAP star rating, RPS and RISA models.



The same is the case for run off road crashes



The reductions in intersection crashes may be continuing



The density of fatal and serious crashes on both state highways and local urban roads has broadly moved in line with the overall picture for fatalities and serious injuries as a whole

The indicators used to monitor safer roads focus strongly on primary crash issues (run-off road, head-on, and intersection crashes) and on primary crash performance (how many crashes are occurring for every kilometre of road). However, for the level of knowledge New Zealand has about the nature and performance of its network, these could be regarded as relatively simple indicators which count crashes rather than moving towards an overall safety performance assessment. They do not themselves relate to high crash risk roads (however that is defined, and on whether on the State Highway or a local network).

There is a strong case to shift the primary performance indicators for the safety of the State Highway network to the star rating system embedded within KiwiRap which is now well established as a global best practice road assessment program. The star rating system provides the single best proxy for the safety of a road corridor and allows performance to be assessed on:

- the proportion of the State Highway network which is one, two, three, four and five star safety rated
- the proportion of State Highway traffic on one, two, three, four and five star safety rated highways.

The following results of the 2010 report are set out below.

Figure1: KiwiRAP Safety Assessment of the State Highway Network 2010

	1-star	2-stars	3-stars	4-stars	5-stars
Star Ratings	0%	39%	56%	5%	0%
Vehicle kilometres travelled for each Star Rating	0%	33%	40%	28%	0%

There is likely to be little change in the ratings from year to year, but over the life of *Safer Journeys*, it can be expected that there will be a much greater percentage of roads that are three and four star, and much more of the traffic on these roads. It would be timely to undertake this analysis again to sharpen the infrastructure safety improvement focus for the remainder of the decade, and then again at the end of the decade in preparation for the next strategy setting process.

The real value of KiwiRAP is that it both succinctly communicates the inherent safety quality of the infrastructure, and facilitates policy decision making. The decision that a 4-star safety KiwiRAP rating is now required of all Roads of National Significance has come to global attention as a demonstration of how Ministers and road users alike can assess the level of safety that is being provided by a road controlling authority. Highways England recently took the next major step forward in this area by stating that by the end of 2020 more than 90% of the travel on its network will be undertaken on roads with a EuroRAP 3 star safety rating or better. (Highways England, 2015)

There have been a number of major infrastructure safety steps taken in New Zealand over the life of the strategy to date, and the roads area is one where the philosophical impact of *Safer Journeys* has been very high. The publication of the strategy appears to have supported a much stronger safety analysis being developed and promoted in a variety of ways, starting with the publication of the flagship guides to high risk rural roads and high risk intersections. These appear to have been important in strengthening NZ Transport Agency's response, and also supporting local road controlling authorities to understand and address their own network issues. Safety audit procedures have also been adapted to the safe system approach and focus on reducing high severity crashes.

Further analytical tools to sharpen network safety performance are being developed, and explored for their capacity to manage the overall level of safety, not just the physical safety features of the road and roadside. The new version of the International Road Assessment Programme will provide an important opportunity to integrate speed limit setting into KiwiRAP's safety star rating system. One of the defining features of KiwiRAP is the close partnership model established originally between the New Zealand Automobile Association, the Ministry of Transport and Transit New Zealand. The KiwiRAP partnership now needs to step forward and use the available information to support a change in the conversation about realistic options to significantly improve the safety of the motoring public.

It is also important to note the development of an urban KiwiRAP programme, which is attracting attention internationally. This has been trialled in Auckland, Tauranga, Christchurch and Dunedin and is extending to cover all urban road networks in another 7 urban centres, by which time it is expected to cover approximately three quarters of urban casualties. Risk maps are generated first, and it is expected that approximately 10% of these urban networks will be safety star rated.

The deliberate expansion of these consumer and management oriented rating systems reflects the essence of *Safer Journeys*. Even though they do not yet cover all parts of the network, they can help articulate the future of a safe road transport network. By focusing attention on key crash types, the strategy appears to have supported a genuine safe system driven move towards intervention options which, in relation to roads, focus on the inherent safety quality of the road environment as the primary issue. That is, the interventions focus on providing primary protection for users, rather than expecting users to respond perfectly in all situations.

In terms of direct safety focused output, NZ Transport Agency has installed or programmed for instalment in the three years from 2012/13 to 2014/15 384 kilometres of wirerope barriers or guardrails and 647 kilometres of audio-tactile profile roadmarking. It also has approximately 250 kilometres of median barriers and 100 kilometres of roadside barrier scheduled for installation on Roads of National Significance through to 2022. These and other primary safety treatments are important output measures in their own right, and could be given greater prominence in the oversight of safety performance.

In terms of delivery, the more strategic focus of the second action plan has assisted. The establishment of a schedule of the 100 worst intersections is at once a simple, but effective way of driving improvement in the safety of the network. It also appears to have prompted some innovative analysis and practice about how to best protect users from death or serious injury on rural roads, such as the use of rural intersection active warning systems (RIAWS). Essentially, RIAWs detect vehicles approaching an intersection on a side road and trigger a temporary reduction in the main road speed limit through the intersection from 100 km/h right down to 70 km/h. Compliance has been extremely high, and preliminary crash outcomes very positive (Mackie et al, 2015).

Some simple means of assisting local government to address safety on local open roads may also be necessary. Nearly two thirds (64%) of all fatal and serious crashes over the last three years occurred on local roads managed by 67 territorial

authorities. Local road networks comprise nearly 90% of the total network length. The crash density is significantly lower than on the State Highway network, but the crash density on local urban roads are substantially higher than local open roads, making them more amenable to infrastructure safety works. Local government will innovative design, funding and implementation support to address this issue.

This area is well primed for and would respond well to additional investment, with very high safety potential in packaging up road investment and speed limits into a range of transformational projects. This will be important on both State Highways and local urban roads, as well as on local open roads where the rate of safety improvement has been lower. In this context, greater use of the KiwiRAP safety star rating system will support better safety management decisions and easier communication with the public about the safety they can expect on the road.

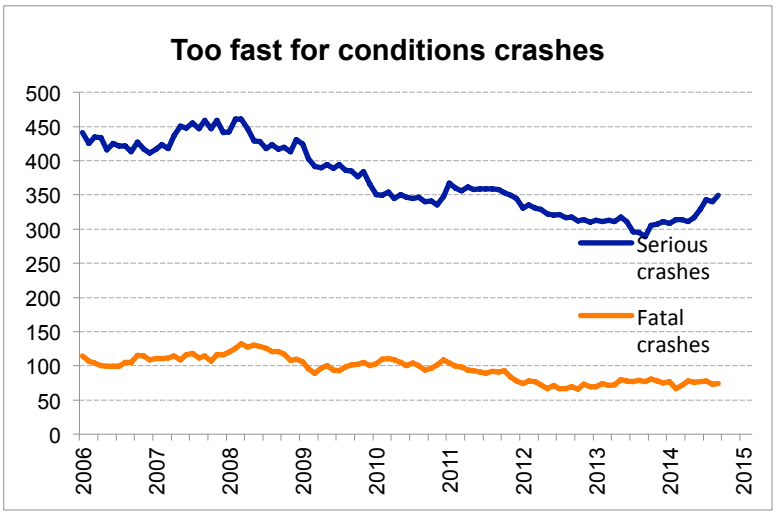
Achieve safer speeds

Interim Evaluation	Limited progress
Potential Future	High potential from delivering "Safer Speeds Programme" and higher potential acceptance from associated measures such as road investment and traffic fine hypothecation

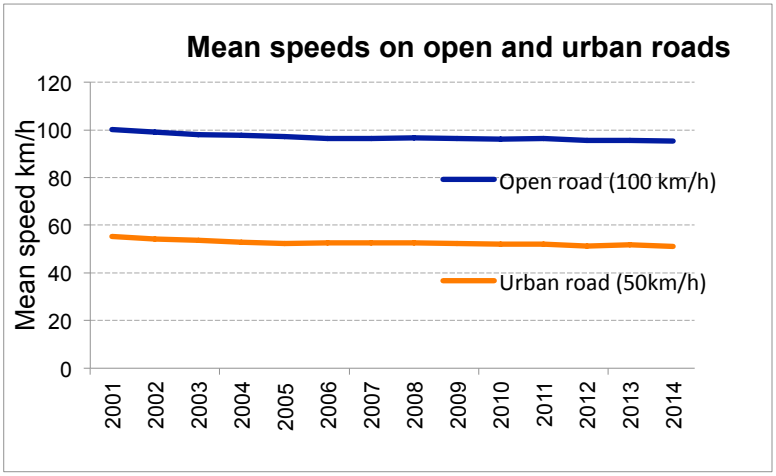
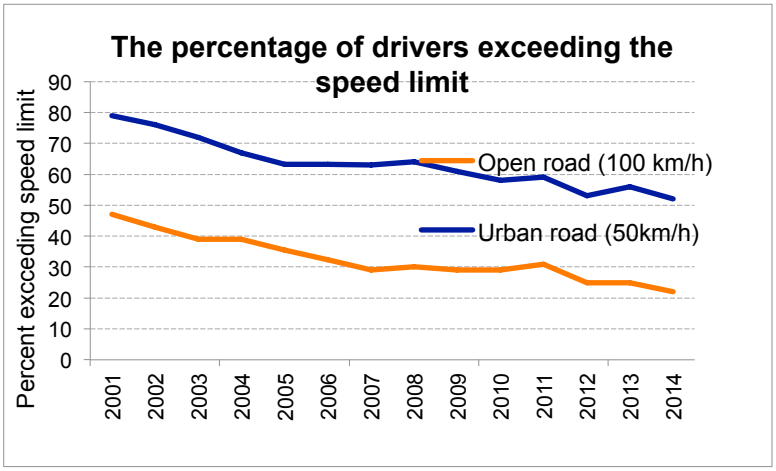
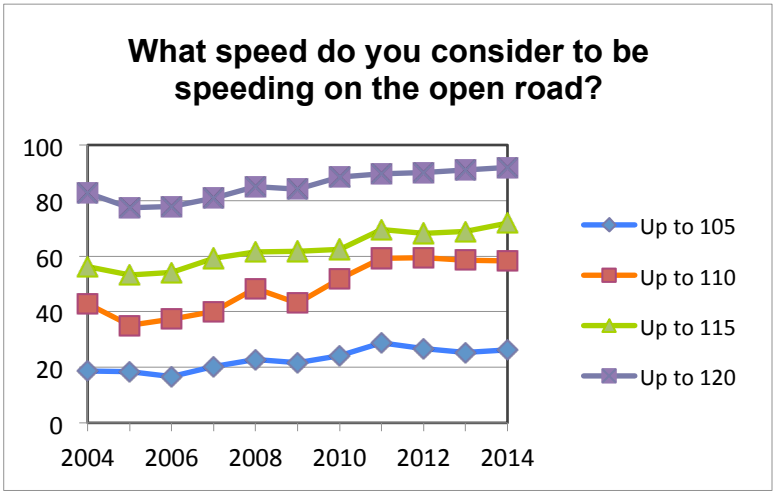
The overall goal is to "significantly reduce the impact of speed on crashes by reducing the number of crashes attributed to speeding and driving too fast for the conditions."

Four indicators were established:

- Fatal and serious injury crashes involving speed too fast for conditions
- Mean speeds on rural and urban roads
- The percentage of drivers exceeding the speed limit
- Public attitudes to speed and speed enforcement.



The data for fatal and serious crashes attended by Police and judged to have involved too fast for conditions broadly reflects the wider casualty picture of improvement followed by a plateau

	There are slow, steady declines over time in the mean free traffic speed on open and urban roads. A step change is likely to be required in speed management to significantly affect the safety of New Zealand's road network
	It appears that sustained progress is being made in reducing the number of drivers exceeding the speed limit, but one in five drivers on the open road and half the drivers on urban roads point to a substantial problem
	There has been a recent shift in regarding 110 kmh on the open road as being speeding, but this is off a low base. Less than a third of respondents consider breaking the legal speed limit by 5 kmh to be speeding

The use of "speeding" and "too fast for conditions" as means of judging whether there has been a significant reduction in the impact of speed on crashes is problematic, because they are overly reliant on the judgement of attending Police officers. The operational definition of speeding developed some years ago in New South Wales addresses this difficulty to some degree by considering the characteristics of crashes caused by speed, such as loss of control, but mean free

speed and vehicles exceeding the speed limit are much stronger performance measures.

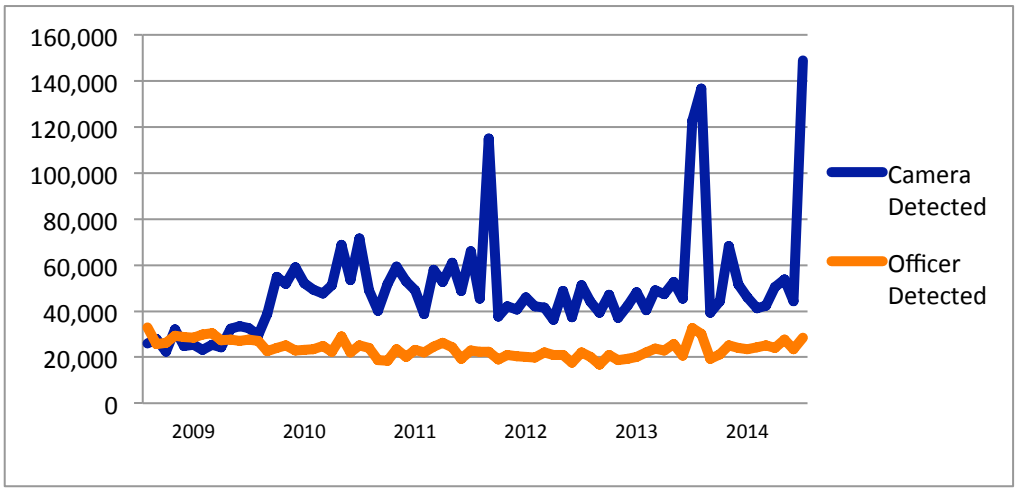
The new Safer Speeds Programme goes a long way to addressing these issues, and Figure 2 illustrates the speeds by road classification which have been set as safe and appropriate.

Figure 2: Speeds by road classification as set by Safer Speeds Programme

<table>
<tr><th>Open roads environments (including urban motorways)</th><th>Straight open roads/ urban motorways</th><th>Curved open</th><th>Winding open</th><th>Urban environments (not motorway)</th></tr>
<tr><td>Class 1
High volume national</td><td>Travel speed: 100–110km/h
Depends on safety (e.g. divided KiwiRAP 4 star, grade separated intersections, safety barriers), enforcement thresholds aligned.</td><td rowspan="3"></td><td rowspan="3">Travel speed: 60-80 km/h</td><td>Travel speed: 50km/h
60-80km/h where safety risk allows, e.g. fewer intersections, mode separation for active users.</td></tr>
<tr><td>Class 2
National, Regional, Arterial</td><td colspan="2" rowspan="2">Travel speed: 80-100km/h
Depends on safety risk and whether volumes justify investment to bring the road up to minimum 3 star equivalent.</td><td rowspan="2">Travel speed: 30-50km/h
Recognise access and place.
30km/h if high volumes of cyclists/ pedestrians.</td></tr>
<tr><td>Class 3
Primary and Secondary collector</td></tr>
<tr><td>Class 4
Access and Low volume access
All winding/ tortuous</td><td colspan="3">Travel speed: 60-80km/h
Depending on roadsides, development, pedestrian cyclist volumes, whether sealed or not.</td></tr>
</table>

Given the current speed environment in which over half of motor vehicles on 50 km/h roads and over a fifth of motor vehicles on 100 km/h roads are breaking the speed limit, it is worth looking at enforcement activity. Figure 3 below of monthly speed offences detected shows a static amount of offences detected by both officers and by cameras over the life of the strategy. Exceptions are one or two month spikes in camera detected offences associated with the implementation of a lower enforcement tolerance. These campaigns are reported to have achieved substantial reductions in speeding between 1-10 km/h over the limit and even greater reductions in speeding in excess of 10 km/h over the limits. (van Lamoen, 2014)

Figure 3: Camera and Officer Detected Speeding Offences 2009-2014



It appears that there are substantial constraints on the automated enforcement programme. Indeed, the briefest review highlights multiple issues in New Zealand's overall speed enforcement programme. Some risk related information appears not to be well understood, and so some further detail is provided.[2]

In simple offence, detection, penalty, and sanction terms the issues are:

- The fines and demerit points applying to speeding offences detected by an officer are very low relative to the risk they impose (see indicative table below, which has been provided to illustrate the risks and penalties involved and not to address all matters relating to current policy settings such as roadside action)

Offence of excess speed in a 60 km/h zone	Increased risk of a casualty crash relative to travelling at 60 km/h	Licence sanction	Fine
not more than 10 km/h	approximately 2-4 times	10 demerit points	$30
more than 10 km/h but not more than 20 km/h	approximately 4-16 times	20 demerit points	$80
more than 20 km/h but not more than 30 km/h	approximately 16-64 times	35 demerit points	$120
more than 30 km/h but not more than 35 km/h	approximately 64-128 times	40 demerit points	$170
more than 35 km/h	approximately 128+ times	50 demerit points	$400+

- Speeding penalties are very low relative to alcohol related penalties (see table below, which has been provided to illustrate the relative risks and penalties involved, and not to address all matters relating to current policy settings such as roadside action or imprisonment)

Excess alcohol	Increased risk of a casualty crash	Licence sanction	Fine
more than 250 mcg, but not more than 400 mcg	approximately 2-3 times	50 demerit points	$200
more than 400 mcg (first or second offence)	approximately 3+ times	At least 6 months suspension (court)	Up to $4500 (court)
more than 400 mcg (third or subsequent offence)	approximately 3+ times	At least 12 months suspension (court)	Up to $6000 (court)

- Notwithstanding the very low penalties generally, demerit points are not applied to camera detected offences

[2] Based on the original case control study of speed related crash risk by the Centre for Automotive Safety Research at the University of Adelaide (Kloeden CN, McLean AJ, Moore VM, Ponte G (1997) Travelling speed and the risk of crash involvement. Volumes 1 and 2 (CR172), Federal Office of Road Safety, Transport and Communications, Canberra).

- There is a very low level of speed camera deployment in New Zealand compared with Australian jurisdictions
- The standard enforcement tolerance of 10 km/h is well above what can be considered good practice
- There appear to be major production constraints within the Police Infringement Bureau to process speeding offences.

A major reform programme of New Zealand's speed enforcement system is needed. It may require more deliberate performance benchmarking of compliance systems by Police, or careful consideration by the Justice sector of how best to achieve the harm reduction focus set out in the Government's Infringement Guidelines. However, action on any of these issues can be expected to yield strong safety improvements for New Zealanders on the road.

Legislation and enforcement provides the most compelling and easily understood picture of the issues in New Zealand's speed management framework. The speed limits set by the New Zealand Transport Agency and local road controlling authorities present a much deeper set of safety issues. Similarly with Australian jurisdictions, speed limits are very high compared with best practice jurisdictions in Northern Europe (Fildes et al, 2005). They almost universally exceed what might be regarded as speed limits which are aligned to safe system analysis.

A large number of speed limits have been changed during the course of the strategy. On the State Highway network alone, approximately 230 changes have been made since September 2010. These speed limit reductions have been very limited in nature, typically addressing short lengths of highway where roadside development or community concern has seen lower limits extended out of an urban area. Changes are managed on a regional level, and the local NZ Transport Agency officers seek agreement for changes from local Police, the relevant Territorial Authority, the local Council of the Automobile Association and the local Road Transport Association.

Local road controlling authorities have also taken some steps to address speed limits during the life of Safer Journeys. Successful examples of this are the 30 km/h speed limits set by Wellington City Council in commercial centres, and the extensive deployment of 40 km/h limits in residential areas by Hamilton City Council, which received supportive funding from NZ Transport Agency. Hastings District Council also sought to respond appropriately to a change in limit on State Highway 2 between Hastings and Clive by similarly reducing speed limits in adjacent roads, but this action was subsequently reversed.

Based on current evidence, speed management is the most straightforward technical issue in road safety. Based on current practice, it is the most complex. It is highly likely that sustainable safety solutions lie in a change management approach and not in a technical approach. The National Road Safety Committee has published "The Safer Speeds Programme", which has five strategic actions:

- Deliver a Speed Management Guide
- Align the Setting of Speed Limits Rule to the ONRC
- Deliver a campaign to change the conversation on speed

- Encourage and support Police to reduce the current speed enforcement threshold
- Rebalance the penalty regime.

The Safer Speeds Programme is neither perfect, nor fully focused on safety – for example, it foresees an increase in speed limits on roads which would have only a four star safety rating, and cements in current default speed limits on rural and urban roads. However, it paints a comprehensive picture of the issues which, if addressed, would deliver a transformative improvement in the level of safety enjoyed by users on New Zealand's roads.

In broad terms, the challenges will be to:

- Build understanding of the impact of speed on the safety within the community, and acceptance of substantial changes to significantly reduce the number of fatalities and serious injuries
- Comprehensively align speed limits on rural and urban roads, managed by NZ Transport Agency and local road controlling authorities, to the function and design of the network such that road users do not suffer fatalities and serious injuries as the result of a mistake
- Target serious and repeat speeding offenders through a variety of automated and direct enforcement programmes that result in the withdrawal of driving privileges for drivers who threaten the safety of the community.

This is easier said than done, but New Zealand's outcomes focused public management system naturally drives the arms of government to meeting these challenges. Implementation by the National Road Safety Committee of the Safer Speeds Programme will be critical.

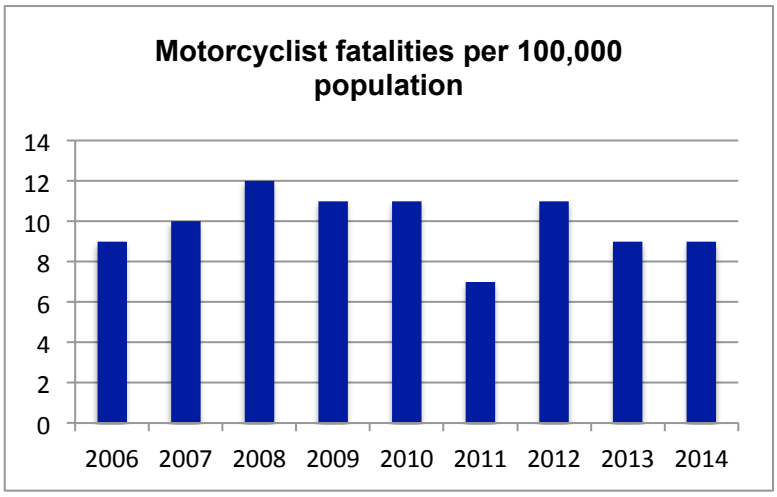
Increase the safety of motorcycling

Interim Evaluation	Limited progress
Potential Future	Continue regulatory reforms and extend to vehicle and equipment safety

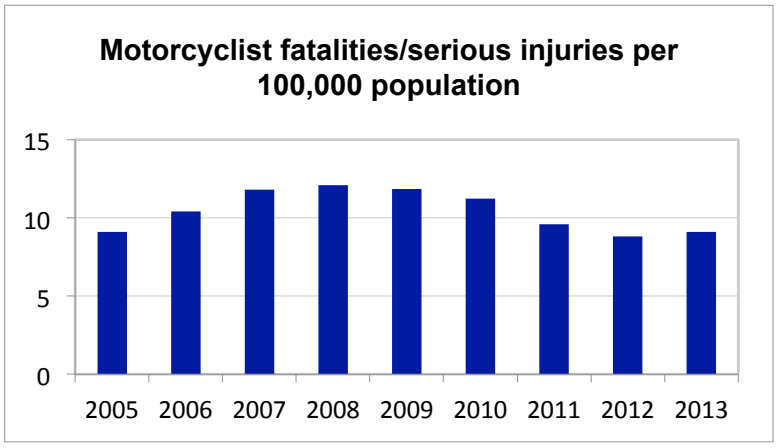
A specific target was set to "reduce the road fatality rate of motorcycle and moped riders from 12 per 100,000 population to a rate similar to that of the best performing Australian state, Victoria, which is 8 per 100,000."

Three other indicators were also established:

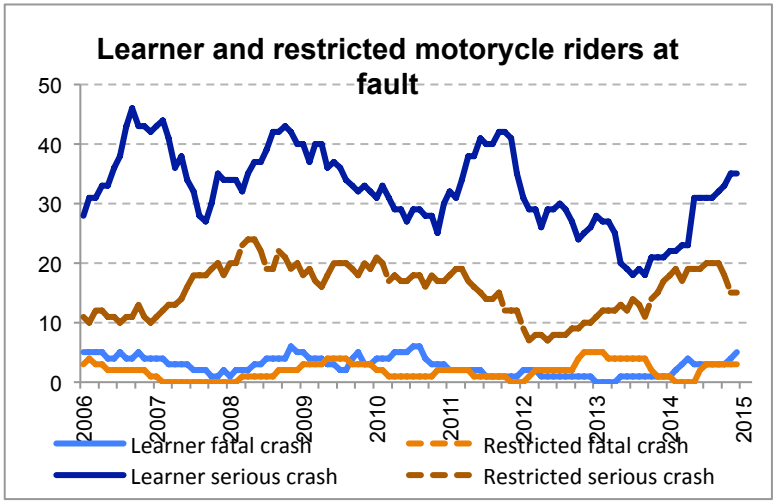
- Motorcycle and moped riders/pillions killed or seriously injured, per 100,000 population
- Motorcyclists and moped riders on learner or restricted licences at fault in fatal and serious injury crashes
- Motorcycle and moped riders/pillions killed or seriously injured, per million hours spent travelling.



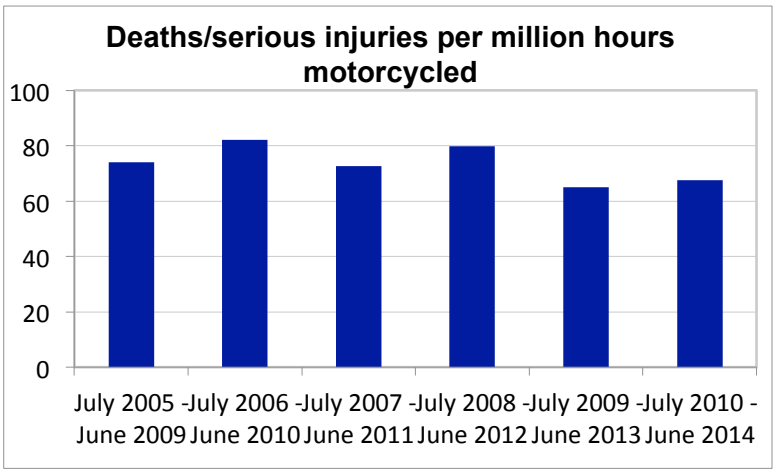
The headline target was reached in 2011, and may be achieved over the life of the strategy. In absolute terms, there were 131 fatalities in the three years 2006-08 and 2012-14



The inclusion of serious injuries illustrates a trauma picture for motorcyclists similar to that for all road users



There are some peaks and troughs in the number of learner and restricted motorcycle riders judged to be at fault



This 3 year rolling measure of trauma per motorcycling hour suggests some ongoing improvement in motorcycle safety rates, although the number of deaths is static

As noted above the attribution of fault is not consistent with the Safe System philosophy, and this is perhaps most obviously the case for motorcycling. Relatively easy access is provided to the road transport system for what remains by a very high factor the least safe means of transport. New Zealand's road transport system allows motorcycles to operate at high speeds with little protection and this means that errors on the part of either a motorcyclist or another motorist have very severe consequences. The matter of who is at fault for motorcycle crashes is one for debate. As one stakeholder commented more broadly "don't blame the user if you are getting the population level behaviour you don't want … they are responding to the settings of the system."

A large number of steps have been taken to improve the safety of the licensing systems, most directly by reducing some of the extreme exposure to risk, for young people in particular. The graduated licensing reforms in 2011 increased the minimum age for gaining a motorcycle licensing by one year, and the restricted licence phase was set at 18 months irrespective of the age of the learner. Completion of an advanced driving course certificate no longer provided a six month discount on gaining a full licence, and testing requirements were improved including a stronger handling skills test. A zero alcohol limit for young motorcycle riders was also applied. A competency based training and assessment based licensing system for motorcyclists was introduced, and based on Australian experience this may prove both more costly and relatively popular (compared to the one-off test) and so act as a brake on earlier entry to the system. Finally, a power to weight ratio restriction was put in place for novice motorcycle riders. ACC is currently supporting a heavily discounted training programme for motorcycle riders ranging from learner motorcyclists through to returning riders. It is not known whether or not this is inadvertently encouraging further motorcycling.

"Safer Journeys for Motorcycling on New Zealand's Roads" was one of the first infrastructure responses to *Safer Journeys* and a flagship demonstration project for the guide has recently been completed. This involved a comprehensive treatment of the 130km stretch of state highway known as the Southern Coromandel Loop on which 18 of 43 fatal and serious injury crashes over a recent five year period involved motorcyclists. Significant improvements to road markings, signage and surfacing specifically to improve the safety of motorcyclists as well as better hazard

management, and the installation of four new rescue helicopter landing pads areas, are all expected to significantly improve safety on this popular recreational ride. The evaluation of the improvements will be important, and could inform a similar project on urban roads.

Also of note in the motorcycling area is the additional charge levied on the annual licensing fee for motorcycles in 2010 to establish funds for specific motorcycle safety initiatives, and the establishment of a Motorcycle Safety Advisory Council (MSAC) in 2011. The Council is actively engaged in a number of motorcycle safety research projects addressing visibility, road hazards using an instrumented motorcycle, and barrier treatments.

The MSAC has recently undertaken a strengthening programme, and it will be a challenge to move into activity which promotes focused interventions which have a high potential for significantly reducing motorcycle trauma. This will inevitably involve leading motorcyclist safety perspectives as much as advocating motorcyclist safety interests. More will be required to achieve the target. Regulatory options include mandatory ABS on motorcycles, stronger controls on helmet standards, and (notwithstanding recent initiatives) addressing the highly elevated risks for motorcyclists through the licensing system and alcohol policy.

Areas of Medium Concern

Five areas of medium concern were highlighted by *Safer Journeys*, and some progress can be reported across light and heavy vehicle safety, fatigue and distraction and high risk drivers. Change is also occurring in relation to cycle safety. Future attention appears to be most necessary in two areas for different reasons. The scale and pace of change in vehicle safety means this area needs sustained efforts to ensure New Zealand benefits fully from available technology. The much slower level of improvement for walking and cycling suggests that more effort in each of these areas is warranted, particularly pedestrians who comprised 1 in 8 of all fatalities over the three years 2012-14.

Improve the safety of the light vehicle fleet

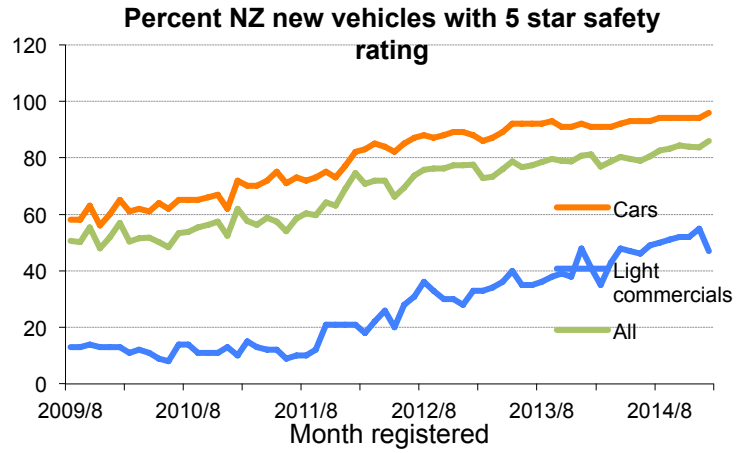
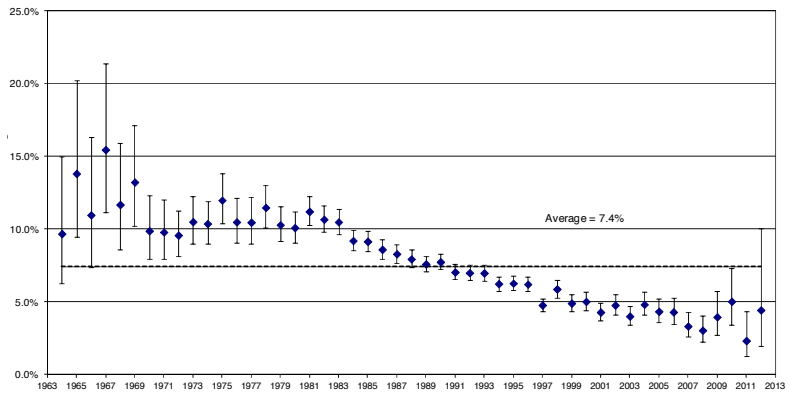
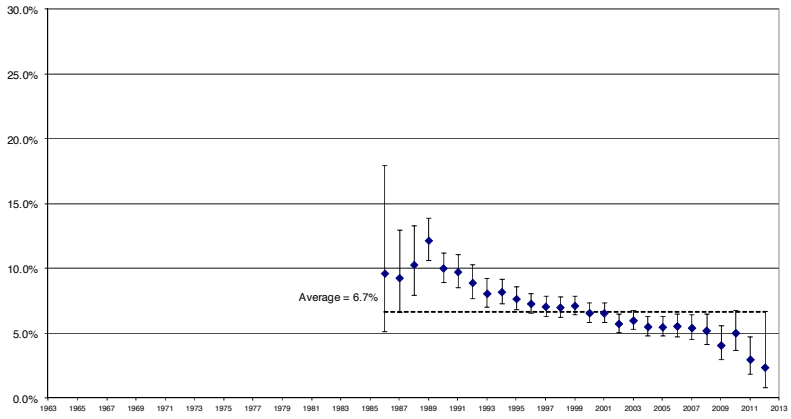
Interim Evaluation	Good sustained progress
Potential Future	Actively managing the forward regulatory agenda, and promoting organisations' occupational safety and health duties

The overall goal is to "have more new vehicles enter the country with the latest safety features; the average age of the New Zealand light vehicle fleet will also be reduced from over 12 years old to a level similar to that of Australia, which is 10 years."

Three indicators were established:

- The crashworthiness of the light vehicle fleet

- The star ratings of new vehicles entering the light vehicle fleet
- Consumer engagement with the Right Car website.

	Well over 90% of all New Zealand new cars have a five star safety rating, but the light commercial vehicle fleet is much less safe, with well under 60% holding the same safety rating
	Crashworthiness by year of manufacture (with 95% confidence limits) continues to improve over time (most recently reported for 2012).
	Crashworthiness by year of first registration in New Zealand (with 95% confidence limits) suggests a stronger effect.

The primary indicators for safer vehicles in New Zealand are strong and are relevant to the strategic safe system direction set out in *Safer Journeys*. The light fleet is ageing, but there are better signs in other indicators.

The regulatory and market conditions for New Zealand's fleet is unique amongst high income countries, although there is a similarity with Canada and the United States of America in the steady increase in the age of the fleet (Ministry of Transport 2014). The vehicle licensing reform which addressed the excessive inspection regime encourages the purchase of vehicles first registered anywhere before 2000. Recent confirmation in Australia that the greater market control over entry of used

vehicles into the Australian fleet suggests that the age of the Australian fleet is likely to remain static at around ten.

The focus for reducing the age of the fleet was on accelerating the exit of light vehicles manufactured in the 1990s with a one or two star used-car safety rating. However, significant Government intervention was not considered to be cost beneficial, and consideration is being given to providing consumers with information and advice on exiting less safe vehicles from the fleet.

Crashworthiness of vehicle fleets in Australasia is monitored through a Monash University research programme. Most recently, this has reported that while "the new vehicles entering the fleet in any particular year are more crashworthy than the cohort of second hand import brought into New Zealand in the same year … this gap in crashworthiness performance may have narrowed in the last three to four years." (Newstead et al 2014) This is encouraging. The gap in the ANCAP safety star rating between new cars and light commercial vehicles in New Zealand now needs to be closed.

It is important to note the safety signal sent by ACC changing the structure of motor vehicle account levies for light vehicles based on a combination of ANCAP safety star ratings, and real world crash performance, including injury performance for people who are both inside or outside the vehicle. The new levy structure applies to all cars, passenger vans, utes and sport utility vehicles that are less that 40 years old, and assigns all such vehicles to one of four levy bands. For example, a five star ANCAP safety rated vehicle is in the lowest levy band, and a four star vehicle is the next levy band. This undoubtedly sends a signal about the importance of vehicle safety, and it will be important to evaluate the effect of this change which takes effect on 1 July 2015.

Increasingly, vehicle safety attention is directed to accelerating the entry of significant new technology into the fleet, and efforts have been more successful in this regard. Electronic stability control (ESC) is now mandated for all new light passenger and goods vehicles certified for entry into service from 1 July 2015, and for all other light vehicles on a staged basis from 1 March 2016 to 1 March 2020. Another important step has been the preparation of a Vehicle Standards Map which shortlists emerging vehicle technologies and performance standards believed to have the greatest safety potential in New Zealand. These include technologies that the Government may wish to promote, encourage, or mandate.

It will be important to schedule regulatory analyses of the technologies for which the most significant opportunities may lie. These would appear to be side curtain airbags on light vehicles, anti-lock braking systems (ABS) on motorcycles, and ESC for heavy vehicles. A close review is needed of the current legislative action in Europe to mandate eCall from 2018, as this has been shown to cut emergency response times by 50% in rural areas and 60% in urban areas. Further consideration is also required of how to further encourage major fleet managers and owners in New Zealand to strengthen the safety focus of their fleet purchasing or leasing.

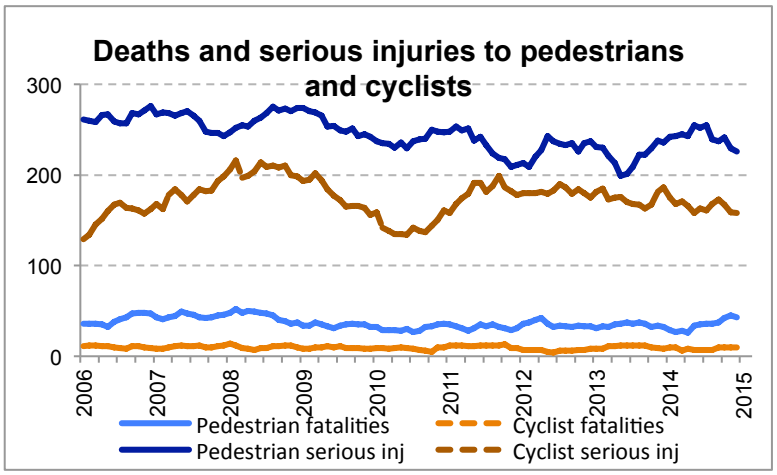
Achieve safer walking and cycling

Interim Evaluation	Insufficient progress
Potential Future	Greater and separate attention in urban areas including support for better delivery

The overall goal is to "achieve a reduction in the crash risk for pedestrians and particularly cyclists, while at the same time encouraging an increase in use of these modes through safer roading infrastructure."

Two indicators were established:

- People killed or seriously injured as pedestrians and cyclists
- People killed or seriously injured as pedestrians and cyclists, per million hours spent travelling.



There has been gradual reductions in absolute numbers of reductions in fatalities and serious injuries for both cyclists and pedestrians

This slow rate of improvement can also be seen when the cyclist and pedestrian trauma is considered as a rate for hour of travel

Active transport modes are desirable for a wide variety of social, economic, environmental, health and transport reasons, and the safety of the journey in promoting these modes is critical. While seeking to increase the activity, and monitoring the rate of trauma per unit of travel, a focus on the absolute number of fatalities and serious injuries needs to be retained – a lot of benefit is lost if greater activity simply results in additional trauma.

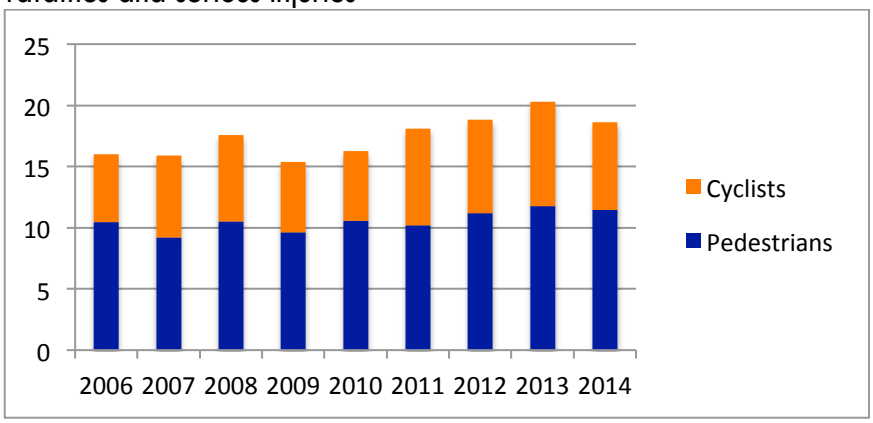
A major review of injury data in Australia concluded that, as for many developed countries, most of the safety benefits have been accruing to motor vehicle occupants and not vulnerable users (Lydon et al 2015, International Transport Federation 2014). This can also be seen in New Zealand, where pedestrians and cyclists have experienced the lowest levels of improvement in safety.

Table 1: Relative improvements in serious casualties for different users

User	Average Serious Casualties 2006-09	Average Serious Casualties 2012-14	Percentage Improvement
All Users	3058	2343	-23.38%
Occupants	2070	1487	-28.16%
Motorcyclists	484	406	-16.12%
Pedestrians	308	269	-12.66%
Cyclists	196	182	-7.14%

There also appears to be a gradual increase in the proportion of serious trauma for cyclists and pedestrians.

Figure 4: Pedestrian and cyclist fatalities and serious injuries as a percentage of all fatalties and serious injuries



Cycle skills training, the Official Road Code for Cyclists, share the road campaigns, and strengthening the learner licence test reference to pedestrians and cyclists, were all identified as walking and cycling safety actions in the first action plan. Any such activity will assist in raising awareness, but it is unlikely that they will have fundamentally improved safety performance.

Some additional funding priority is being given to pedestrians and cyclists. The 2012–15 National Land Transport Programme allocated $79m in the (dedicated) walking and cycling activity class, although the 2014 Annual Report of the National Land Transport Fund records that the first two years were significantly under-delivered. This has seen planning and implementation for a number of major improvements in cycling infrastructure.

The Government Policy Statement 2015/15-2024/25 increases the expected funding range for walking and cycling in the 2015-18 NLTF to $46-$103m. Subsequently, an additional Urban Cycleways Fund was announced with $100m allocated to new urban cycleways from the consolidated fund. A number of major projects are being prepared for arterial cycleways and connections in major cities, including a joint Auckland bid to the Urban Cycleways Fund by Auckland Transport and NZ Transport Agency for $82m. (Auckland Transport, 2015).

The dedicated allocation of Government funds to cycling infrastructure is a response to a 2013 coronial review into cycling safety in New Zealand, and the establishment of a New Zealand Cycling Safety Panel in 2014. The panel reported that "countries and cities that have made significant investments in improving cycling safety through managed speeds and well-designed infrastructure see both improvements in safety and increases in cycling at the same time" and identified three priorities "(1) continuous and connected networks, (2) safer speeds and (3) a cultural shift between road users." From a safe system perspective, it could be said that the focus needs to be on decision makers within the road transport system giving sustained priority to the first two items – the provision of safe facilities – from which a cultural response from users can be expected.

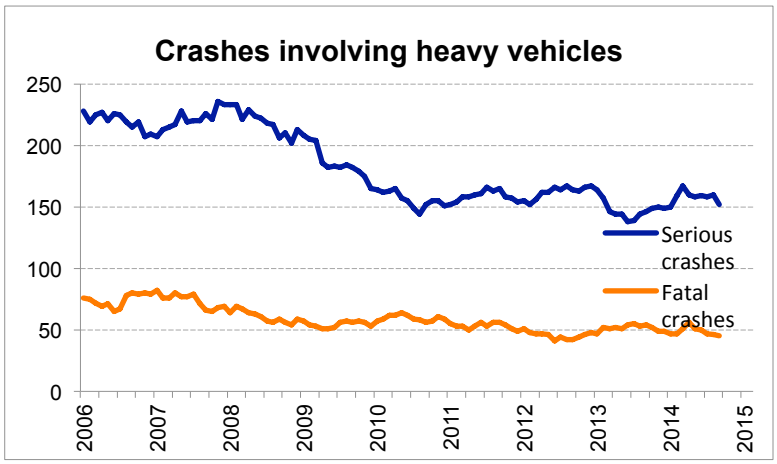
Specific attention is needed for each user type, but the cycling safety panel provides some clues in the attention required for both users at intersections. Aside from articulating the variety of speed management issues which impact upon cycling (and walking) safety, the panel reported that 60% of fatal and serious injury crashes occur at intersections, and another 14% at driveways. Crossing points in general and intersections in particular are likely to be a valuable point of attention for walking safety as well, including providing pedestrians with greater priority at signalised intersections.

The prioritisation of pedestrian safety in commercial centres throughout Wellington City by establishing 30 kph speed limits is an important pointer forward for areas of a local network with high pedestrian usage. Greater funding and management support is needed for pedestrian safety.

Improve the safety of heavy vehicles

Interim Evaluation	Limited progress
Potential Future	Improvements in the regulatory environment, and developing safety management systems

The goal is to reduce the number of serious crashes involving heavy vehicles.



Fatal and serious injury crashes involving heavy vehicles have declined and plateaued in line with all crashes

An Operator Rating System has recently been introduced which rates compliance with safety-based legislation for all or most goods service licence holders, vehicle recovery service operators, and passenger service licence holders, except taxi services. It is being used by the NZ Transport Agency and NZ Police to identify potentially higher-risk operators for further investigation and assistance to improve safety practices.

The factors which help determine an Operator Safety Rating are vehicle certificate of fitness results, roadside inspection results, and infringements and offences that affect safety. The rating programme applies different 'weightings' to each result, depending on the: amount of data that is available, the age of the event, fleet size and distance travelled, and the relative safety risk of each event. Rather than looking only at infringements a greater focus on the use of safety technology and systems would be of value – for example, the deployment of telematics, remote electronic monitoring and vehicle controls on speeding.

ACC has introduced a Fleet Saver programme which offers levy reductions to fleet owners who demonstrate a strong safety culture in their business and a commitment to the highest standards of safety among their employees. ACC Fleet Saver is offered to companies which operate five or more heavy goods service vehicles, and is modelled on ACC's Workplace Safety Management Practices programme. While not focused solely on heavy vehicles, it is also worth noting here the ACC led Fleet Safety Programme which became fully operational during the life of *Safer Journeys*, in partnership with Police, NZ Transport Agency and WorkSafe New Zealand. An early implementation review of the national programme concluded that the volume of work related road fatalities is significantly underestimated in New Zealand, and highlighted significant additional safety potential in this area.

Substantial investment in bridge strengthening has been made to allow for higher productivity trucks (with increased mass and dimension limits) on specific routes. It is expected that this will generate safety benefits through lower truck movements – this is understood to be occurring and the overall safety effects may now need to be formally evaluated. Further regulatory options include improving chain of responsibility legislation, mandatory ESC, speed limiters and under-run protection on heavy vehicles, and zero alcohol limits for (all commercial) drivers. A development

programme for safety management systems for all commercial transport operators, and organisations with large vehicle fleets, based on ISO 39001 Road Traffic Safety Management Systems would highlight non-regulatory opportunities.

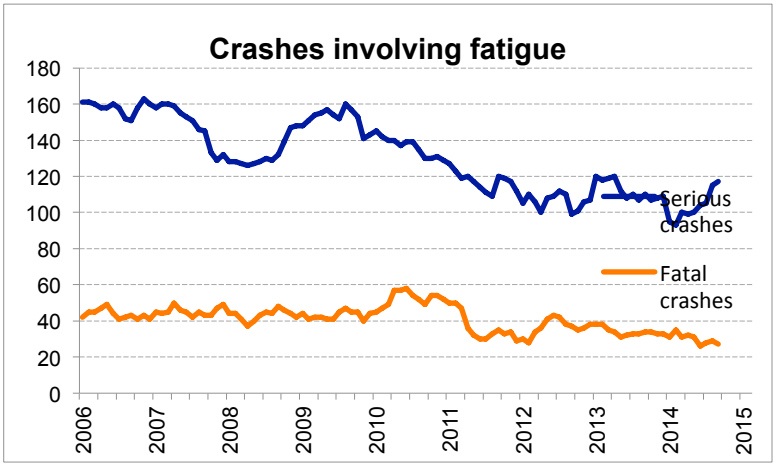
Reduce the impact of fatigue and address distraction

Interim Evaluation	Good sustained progress
Potential Future	Continued integration of issues within road design, vehicle design and community promotion

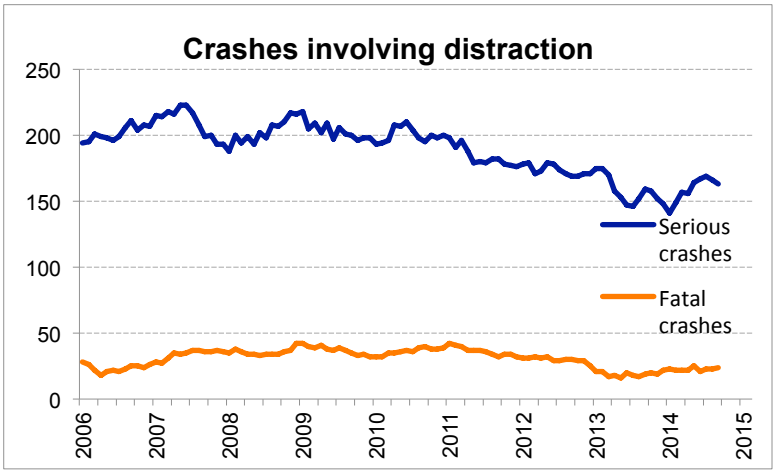
The overall goal is to "make New Zealanders' management of driver distraction and fatigue a habitual part of what it is to be a safe and competent driver."

Three indicators were established:

- Fatal and serious injury crashes where fatigue is a factor
- Fatal and serious injury crashes where distraction is a factor
- Public attitudes to fatigue and distraction.



The number of crashes involving fatigue as reported by Police attending the crash has declined over the period of the strategy.



The number of crashes involving distraction as reported by Police attending the crash has also declined over the course of the strategy.

Fatigue and distraction crashes have been reducing. Both issues have been the subject of mass communications, backed up in the case of distraction by

enforcement campaigns. Action has been taken by Police on an increasing number of mobile phone offences which have been detected, rising from 8232 in 2010 through to 12,393 in 2012 and 21,538 in 2014. Fatigue and distraction considerations have been included in the development of infrastructure, with countermeasures such as rumble strips included in the High Risk Rural Roads Guide and implemented on the State Highway network. They are also under consideration in relation to the signature project relating to overseas drivers.

As implied in the overall goal for this area, fatigue and distraction continue to be incorporated in general driver awareness and understanding efforts. Mobile phone laws could be strengthened and their enforcement maintained. A programme could be established in association with WorkSafe NZ to encourage all employers to mandate phones off by their staff while driving. Aside from this, improvements to the road environment and the vehicle appear most likely to be effective in managing these risks.

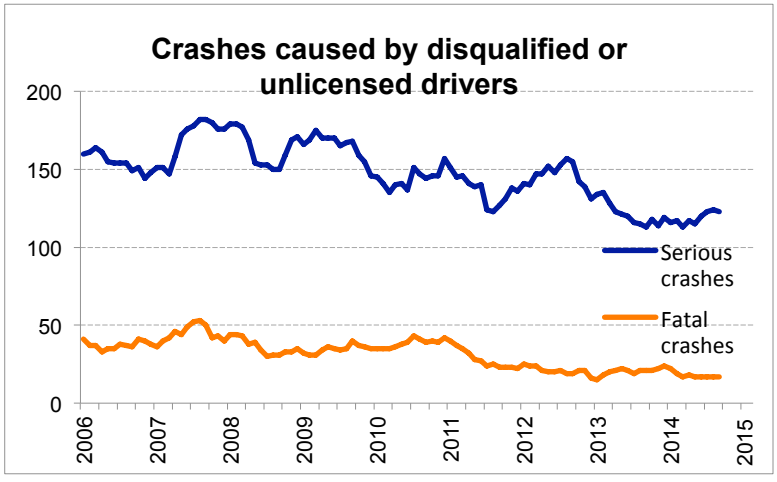
Reduce the impact of high risk drivers

Interim Evaluation	Good sustained progress
Potential Future	Consideration of wider community needs associated with repeat and serious offenders

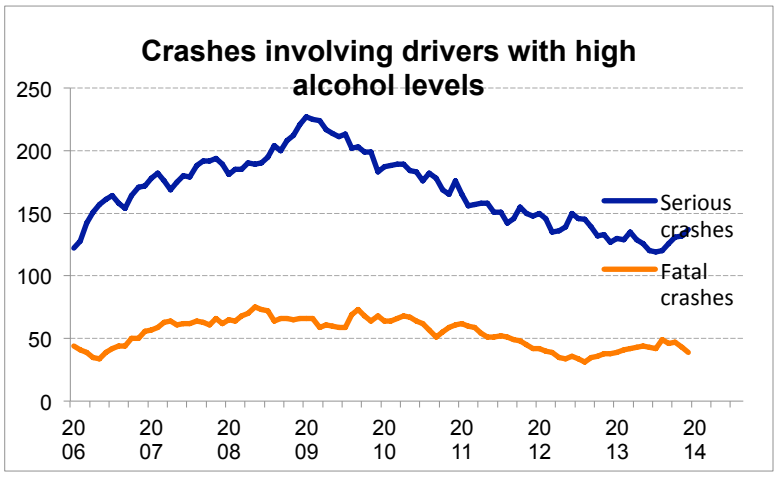
The goal expressed in Safer Journeys was to "reduce the number of repeat alcohol and speed offenders and incidents of illegal street racing." Two indicators were set:

- Fatal and serious injury crashes involving high-risk drivers
- Fatal and serious injury crashes involving repeat speed and alcohol offenders.

The definition of high risk drivers and the capture of licence information appears to have been more difficult than anticipated, and it has been agreed that these will be addressed on a project by project basis. Some related data continues to be gathered however, and are presented below.



There has been a sustained decrease in the number of crashes caused by disqualified or unlicensed drivers



This measure for drivers with a blood alcohol level of 120mg/100ml (50% over the previous general drink driving limit) has seen significant reductions along with the general improvement in alcohol related crashes

It is now much better understood that the vast bulk of fatal and serious injuries occur as the result of ordinary people doing ordinary things. A 2011 Australian study of a large number of crash investigations and coronial reports found that 90% of injury crashes and over 50% of fatal crashes were the result of what were defined as system errors – people acting largely within the boundaries of typical road user behaviour. This research finding strongly supports the overall direction of *Safer Journeys*, and has significant implications for where road safety attention should be focused. Changes to the minimum driving age, and the legal drink driving limit, suggest the debate in New Zealand may be slowly shifting towards addressing safety boundaries for all New Zealanders' use of the road rather than focusing on the extreme behaviours of a very few.

Notwithstanding this, there is likely to remain a very low level of tolerance for those very few who act well outside the expected norms on the road. In this regard, it should be noted that the automatic roadside licence suspension and vehicle impoundment laws initiated by the Land Transport Act 1998 remain one of the most comprehensive set of national laws to deter repeat and serious traffic offending. Penalties were increased for all dangerous driving (including drink and drug driving) causing death in 2011, and Police were given power to extend a 28 day licence suspension where inquiries into a driver's offending are ongoing. Illegal street racing legislation continued to be enforced, with some Police Districts establishing specific teams to target this behaviour, and Police are better able to conduct roadside checks on the vehicle and licence registers and on offender histories.

A $10m "Drivers of Crime" package was released in 2011 designed to reduce alcohol and drug related offending and victimisation and included $1m for locally accessible programmes for drink drivers. The goal was to achieve up to 9% reduction in repeat drink driving rates for 1400 drink drivers who receive treatment. Driver licence assistance courses for unlicensed drivers have also been delivered, with community driver mentoring pilots established in Waitomo and Porirua in a partnership between the Automobile Association, Police and councils.

Penalties which are designed to punish extreme traffic offenders and which are designed to deter extreme traffic offenders have been tightened over time. It is difficult to see how they may be usefully strengthened in a manner which will further deter the unsafe behaviour. The more pressing and valuable need in New

Zealand appears to be to focus on the full range of behaviour change techniques for the whole driving population. Technology systems such as alcohol interlocks would prove useful to prevent extreme traffic offenders from re-offending. Otherwise, it may be that consideration of this area needs to shift more directly to the criminal justice system and its interaction with society as a whole.

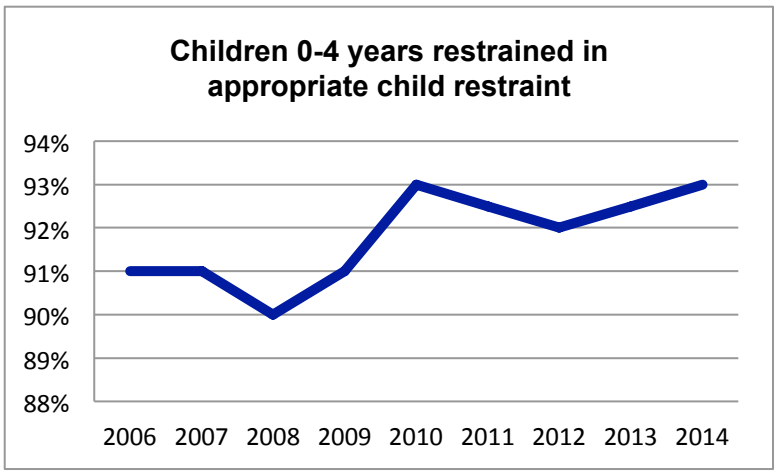
Areas of ongoing and emerging concern

Finally, two areas of ongoing and emerging concern were identified.

Increase the level of restraint use

Interim Evaluation	Limited progress
Potential Future	Converting high use rate into high correct fitting rate, and further promoting booster seats

A specific target was set to "achieve a correct use and fitting rate of 90 percent for child restraints and make the use of booster seats the norm for children aged 5 to 10."



The percentage of children in an appropriate restraint remains high, but the correct fitting has been estimated at approximately one in eight

A new rule was introduced in 2013 to extend the age for mandatory child restraints from the then age range of birth to four years old, to include children aged five and six years old, and to require children aged seven to use a restraint if one is available in the vehicle. This aligned New Zealand rules with those in Australia. However, New Zealand has the highest rate of fatalities over 2011-13 for 0-14 year old occupants in a survey of 26 members of the International Traffic Safety Data and Analysis Group (International Transport Federation, 2015), which is at least likely to be a function of relatively high levels of motorisation. Around one in five children aged five to nine years old are estimated to be in a child restraint or booster seat, and around one in twenty unrestrained.

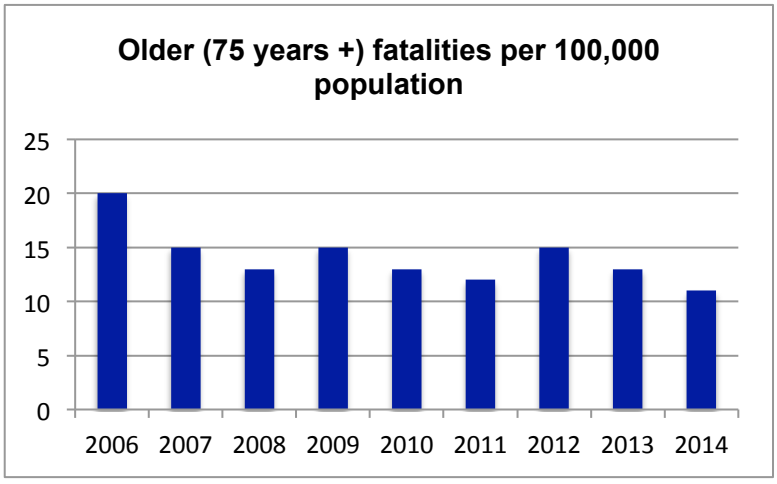
A national campaign was run by the NZ Transport Agency, and a number of community promotion programmes were run in support of the change in legislation, and while the restraint use as surveyed is very high, there is significant concern

about the correct fitting of the restraints. One Plunket survey of 329 restraints across the Auckland region is understood to have recorded 87% of child restraints to not be fitted correctly (in line with the manufacturer's instruction). Steps need to be taken to dramatically improve this situation.

Increase the safety of older New Zealanders

Interim Evaluation	Good progress
Potential Future	Comprehensive assessment of the safety of road and vehicle technology and licensing and transport options for ageing population

A specific target was set to "reduce the road fatality rate of older New Zealanders from 15 per 100,000 population to a rate similar to that of older Australians of 11 per 100,000."



The target fatality rate for older road users was achieved in 2014

While the rate of fatalities amongst older road users has declined slowly, it now needs to be maintained. Over time, this is likely to become more difficult with the current proportion of the population aged 75 years and over in New Zealand projected by Statistics New Zealand to increase from approximately 6% in 2014 to approximately 8% in 2023 and 9.5% in 2028. It is important to take the opportunity now to fully consider what will be specifically needed to safely manage this change.

There may be opportunities to examine fitness to drive issues. Older drivers tend more towards self regulation, but travel survey data suggests earlier age groups in New Zealand are travelling further and this may begin to flow through to 75+ year olds. Other opportunities relate to the potential benefits for older drivers from improved vehicle safety and the benefits for the wider driving population from changes in the road environment to support older drivers. Wider mobility issues, such as public transport and transition out of driving, also warrant consideration.

Delivery of Action Plans

The preceding analysis of interventions examined delivery and performance in the context of strategy priorities and key indicators.

First Action Plan 2011-12

The First Action Plan included 108 work items to be completed, or substantially progressed, in 2011 and 2012. This was a very large work programme and clearly reflected a determination to set the strategy off on a strong positive footing. Almost all of the deliverables were achieved (97 out of 108), and all were accounted for – such as being rolled into business as usual activity, being continued on in the Second Action Plan, or in some cases not progressed. All of the most significant work items were addressed.

Second Action Plan 2013-15

The Second Action Plan is far more focused and ambitious, which was an important development. Transformational improvements in road safety tend to arise from focused, intense, evidence backed initiatives tackling the root of the safety problems. The period covering the second action plan is coming to an end and so it is instructive to briefly review progress against the milestones.

Second Action Plan Milestones	Progress
Advance the Safe System Approach The Safe System programme will include projects that demonstrate how fatal and serious injuries for all road users and can be reduced by working collaboratively with new partners. The programme will: • By December 2013 the national signature programme will be launched with a minimum of four projects identified and communicated. • By June 2014 funding will be secured and implementation work started on all signature projects. • In 2013 a Safe System partnership programme will be developed and deliver at least two new initiatives with new partners in 2014.	***Some continued progress*** There is little doubt that Safer Journeys and the two action plans have significantly changed the way in which road safety is considered across the wider partnership, reinforced by the safe system workshops. The signature projects are expected to be important points of learning, although it will be challenging to ensure a safe system consistent approach to overseas drivers. The partnership programme is important and should carry over to the next action plan.
Safe Roads and Roadsides In 2013 a high-risk intersection programme will be developed and launched (100 highest risk intersections identified and communicated). Over 2014/15 the following will be delivered: • By September 2014 solutions will be developed for at least 30 high-risk intersections. • By June 2015 at least 20 high-risk intersections	***Delivered, more required*** Intersections are inherently high risk, and the commitments have been delivered. This programme should be intensified. Road safety is one of three priorities within the Government Policy Statement, and this now needs to be

will be improved as per agreed solutions. As part of the development of the next Government Policy Statement on Land Transport Funding and the NZ Transport Agency Investment and Revenue Strategy, investment in operations and maintenance will prioritise safety outcomes.	transformed into reality. The projected increase in national state highway safety investment should be considered a down-payment, not the final installment.
Safe Speeds In 2013 a speed management programme will be developed to deliver: • agreed positions on appropriate speed given the use, function, risk, and level of safety provided by the road, and the communication approach required to achieve this From 2014-15 likely actions include: • aligning current speed limits and travel speeds with appropriate speeds (including improving the speed limit rule and supporting processes) • implementing a communications strategy to change the road safety conversation about speed, including increasing system designers' and system users' understanding and acceptance of safer speeds • altering roads so drivers and riders receive clearer signals about the appropriate speed on a road In 2014 a separate working group will provide advice about how to improve enforcement including possible improvements to the ownership, operation, and funding of automated enforcement. This advice will identify opportunities to use technology to make enforcement more efficient and effective.	***Analysis complete, action required*** There has been considerable development progress, but the area can be contentious and difficult. The Safer Speeds Programme is an important step – it needs to move firmly into implementation by the NRSC acting as public agencies charged with protecting human use of the road network. The alignment of speed limits with safety has not advanced, although the integration with the One Network road classification has real potential. The communications strategy is under development. The clearest signal to a driver regarding speed is a posted speed limit sign and it is important that the onus is not placed on drivers to correctly read the "signals". A comprehensive reform of speed enforcement is required.
Safe Vehicles In 2013 a vehicle fleet programme that adopts a whole of vehicle lifecycle approach will be developed. The safer vehicles part of this programme will deliver: • options to exit old, less-safe vehicles, with consultation on these options to occur in 2014 • a vehicle standards map (indicating when safety technology could be mandated) that will provide certainty to the vehicle industry and allowing it to plan ahead • advice and options to improve the safety of vehicles in the fleet such as: improved maintenance and enforcement, promotion of the retrofitting of certain safety devices into the New	***Critical, and complex*** The lifecycle approach is important for connecting the extraordinary safety potential within vehicles to wider economic and environmental considerations, particularly vehicle scrappage. The regulation of electronic stability control highlights the need for regulation, the vehicle standards map now needs a timeframe for the preparation of regulatory impact statements, and the highest priority is likely to be

Zealand fleet (eg Intelligent Speed Adaptation) As part of the wider vehicle fleet programme propose a programme of work for 2014-15 covering actions to deliver: • standards as per vehicle map • options to accelerate the exit of less-safe vehicles	ABS on motorcycles. There is not currently a forward work programme directed to regulatory decisions which need to be guided not just by pure economics but by pragmatic leadership of the market.
Safe Road Use In 2013 actions that will be delivered are: • a proposal to government (based on research completed) on options to align BAC for drivers to reflect risk for adult, young, commercial, and high risk drivers and riders • increased uptake of voluntary policies by individuals and companies to reduce impaired driving, which could include zero alcohol/drugs policies and voluntary use of technology such as alcohol interlocks • taking opportunities to increase the use of alcohol interlocks for those who can benefit from them: advice on how alcohol interlocks are currently operating and how opportunities can be taken and/or barriers removed will be required. This action will enable New Zealand to make the best use of alcohol interlocks A programme of work for 2014–15 to reduce impaired driving will be proposed based on the results of the deliverables above and the work to develop advice on drug-driving based on international evidence, New Zealand experience and technological developments.	***Some limited progress*** There has been mixed progress in this area. Clearly, the stand-out is the lower general drink driving limit, but there is no progress on commercial drivers or motorcycle riders. No specific action appears to have been taken on voluntary uptake of alcohol measures, recognizing clear results from other jurisdictions that court based systems do not result in the widespread use of this proven harm prevention technology. Progress is required to strengthen New Zealand's drug driving enforcement programme.

MANAGING THE SAFETY OF THE ROAD TRANSPORT SYSTEM

A road safety management analysis of road safety activity in New Zealand was carried out based on the good practice road safety management guidelines published by the World Bank Global Road Safety Facility (Bliss and Breen, 2009). Interviews were held with National Road Safety Committee Chief Executives as well as a number of senior executives and staff in partner agencies, along with a range of user representatives. Follow up contacts were made with various staff to understand further detail. The purpose of the interviews were to help assess a range of road safety management functions carried out by the New Zealand road safety agencies, the National Road Safety Committee and National Road Safety Management Group, including their impact upon interventions and results.

Why management issues are important to road safety performance

One of the major learnings in road safety over the last ten to fifteen years is the importance of the institutional management functions which produce high quality interventions which in turn produce improved results. The institutional management functions derive from one overall function which is to drive improvement in results. Key to this is analysing crash risk issues, developing and implementing a strategy and action plan to address these risks, coordinating the activity of various parties, revising and renewing legislation and standards, obtaining adequate funding and allocating resources to safety, monitoring and evaluating safety results, and undertaking research and development and knowledge transfer programmes.

Critical management issues influencing road safety results in any country are:

- The strength of the focus by agencies, government and others on delivering improved road safety results, built upon a clearly stated and understood expectation for improvement set out in a strategy and action plan
- The effectiveness of the identified lead agency in supporting this focus on results
- The effectiveness of the management arrangements between and within institutions across government in supporting achievement of the desired results
- The extent to which this focus on results is brought to bear at the level of interventions.

The extent to which a country addresses these issues largely determines the quality of its road safety management system, and this is how the analysis is discussed here.

Strength of focus on delivering good road safety results

There are critical requirements for any country which determine its capacity to set meaningful road safety targets and achieve their delivery.

The availability of road death and serious injury data, the existence of the calculated value of the social cost of crashes and the identification of crash risks faced by road users on various parts of the network are necessary data to define the current road safety situation and trends and to enable an informed national vision and national

and regional road safety targets to be set. Based upon those targets and the agreed actions to achieve them, usually defined in a strategy and a series of action plans, clear responsibilities and accountabilities for delivering required performance would be set for the road safety agencies to meet those expectations. Industry and community performance responsibilities should also be clearly defined. This would constitute a strong *results focus.*

Effectiveness of the lead agency role

The road safety activities of Government involve a number of departments/agencies to varying degrees. It is vitally important that a government department or agency is identified as the lead agency and operates effectively in this role. The lead agency is expected to drive the focus on results of the country, through leading the establishment of a vision, the adoption of road safety targets and the associated national strategy and action plans. It is also necessary that it establishes mechanisms which clearly specify lead agency, partner agency and other stakeholder accountability for delivery of results and measure that perfromance over time.

The lead agency has the responsibility for both effective horizontal coordination of the road safety agencies and the stakeholders outside government, and effective vertical coordination with regional and local governments. It is also expected to coordinate specific delivery partnerships with government and non government stakeholders, and maintain effective relations with nationally and locally elected representatives.

An effective lead agency reviews the scope of existing road safety legislation looking for opportunities to strengthen existing laws and regulations. It leads the securing of adequate resources for necessary investment in safety management and interventions including the advocacy, promotion and negotiation with the community which are needed to achieve support for implementing the agreed road safety actions. It champions and promotes multi-sectoral shared responsibility and interventions among high level decision makers and influencers.

The lead agency measures final outcomes and specifies and measures intermediate outcomes at national level. It reviews national outcomes and its own performance while supporting other agencies to review their performance. It relies upon and fosters research, develops and implements demonstration projects, and ensures good practice road safety guidelines are developed and published by the agency and its partner agencies.

These are the critical concerns of a lead agency. The functions may not always be performed by the same organisational unit, but there is one organisational unit which is concerned with all of these matters and makes a business out of the necessary cajoling and coordination of various parties to deliver.

Effectiveness of management arrangements between and within road safety agencies across government to support achievement of results

While the lead agency has specific responsibilities, the other road safety agencies have their own responsibilities for performance in substantially contributing to overall improved outcomes. They need their own capability to perform the major

institutional management functions required for successful road safety performance, and to deliver effective interventions.

Invariably, the interventions delivered by one agency are enhanced through coordination with other agencies as they are advocated for, developed and delivered. This often requires both horizontal and vertical consultation, negotiation, incentivisation and persuasion, and may require robust partnerships with industry and communities.

Road safety needs to be regularly promoted. Classical public sector management mechanisms can be effectively used to build understanding of road safety within Government, across Parliament, and with the wider community. The better this understanding at the highest levels, the more straightforward it becomes to identify investment or policy changes which are needed.

Adequate funding and resource allocation are critical to successful road safety performance. Sustainable funding arrangements, formal resource allocation procedures, and a recognised Value of Statistical Life need to be in place, and used to make the best use of resources and enable the desired results to be achieved.

Regular monitoring and evaluation activity is required which relies on good practice crash data systems, and the availability of data on seatbelt use, helmet wearing and travel speeds on each category of road and the fatal and serious injury crash risk rating for each road to be in place. Availability of output data on the quantity and quality of engineering safety treatments, police operations, emergency medical services, promotional and campaign activities, vehicle safety ratings in the overall fleet, and on-road user surveys are also needed.

Research and development and knowledge transfer need to be sufficiently supported with a national research and development strategy. It should focus on necessary vehicle, highway infrastructure, human factors, and institutional factors required to deliver improved results. Pilot and demonstration projects need to be utilised as necessary to support implementation of change.

The focus on results in the development and implementation of interventions

The overall purpose of a road safety management system is to significantly improve results over time, and this requires safety standards and rules and associated performance targets to be in place and driving forward safe planning, design, operation and use of the road network. Speed limits on national and local roads need to be aligned with the function and use of the network and safe system principles to ensure the network as a whole is forgiving in nature. Compliance regimes need to be in place to effectively manage the presence of speed and alcohol, maximising use of seat belts and helmets, and limiting crashes involving fatigue and high risk road user groups.

Comprehensive standards and compliance regimes need to be in place for regulating the entry and exit of vehicles from network, as well as for drivers and riders, and for commercial transport operators. Each grouping needs to have standards and compliance specifications which reduce safety risks (for example relating to young and novice drivers) while maximising safety opportunities (such as better vehicle safety technology). Comprehensive arrangements are also needed for recovery and

rehabilitation of crash victims from the road network as well as for specific pre hospital, hospital and long term care.

What we found

Safer Journeys is a professionally developed, well regarded, stable road safety strategy with associated action plans in place. It is based on the reputable and internationally recognised principles of the safe system appproach. The current (Second) Action Plan 2013 to 2015 sets out a more tightly focused set of actions than the (First) Action Plan 2010 to 2012, and this has supported a more strategic approach.

Strength of focus on delivering good road safety results

The strategy is built upon a vision for "A safe road system increasingly free of death and serious injury". This vision is to be given expression by progressively applying a safe system approach to road safety in New Zealand. It is immediately notable that unlike most developed countries New Zealand has not adopted any national or regional outcome targets at levels for reductions in road deaths and serious injuries across the life of *Safer Journeys* (to 2020) in either the strategy document itself or in the two associated action plans prepared to date.

While not committing to any overall final outcome targets, four targeted rates of fatalities per 100,000 population were identified for specific road user groups as required target outcomes. They were:

- Alcohol related fatalities per 1,000,000 population to be reduced to 22, which has been met and exceeded
- Deaths of young road users (aged 15 to 24 years) per 100,000 population to be reduced to 13, which has been met and exceeded
- Motorcyclist deaths per 1,000,000 population to be reduced to 8, which was achieved in 2011 but not yet sustained
- Deaths of older road users (aged 75+ years) per 100,000 population to be reduced to 11, which was achieved in 2014 but needs to be sustained.

Delivery of the lower drink driving limit for all drivers and a zero limit for drivers under 20 years which have underpinned the achievement of the targeted reduction in alcohol related fatalities, and the increase in the minimum driving age from 15 to 16 which has underpinned the achievement of the targeted reduction in fatalities amongst young New Zealanders, are a substantial achievement.

However, the level of ambition for overall road safety performance improvement as set out in the strategy and the two action plans is compromised by the absence of a specific set of national or regional targets. A trendline starting from the year before the strategy was launched in 2010 through to 2020 would confirm that the Safer Journeys vision was on track even if the number of fatalities stayed at the 2014 level of 295 through to the end of the decade. This is clearly not the intention, but in the absence of a target it is not clear how it is decided what level of safety will be provided to the community. A wide range of evidence based and cost effective actions are available and can be adapted to suit the immediate level of ambition on the safe system path towards the elimination of fatalities and serious injuries.

Which countries have national road safety targets and which institutions recommend them?

The following countries have national road safety targets, as reported by the International Transport Federation: Argentina, Australia, Belgium, Cambodia, Chile, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Jamaica, Japan, Korea, Lithuania, Luxembourg, Malaysia, Netherlands, Nigeria, Norway, Poland, Portugal, Serbia, Slovenia, Spain, Sweden, United States of America. Canada, Switzerland and the United Kingdom do not have national road safety targets. The United Kingdom undertook a modelling exercise to assess the expected casualty reduction associated with its road safety strategy. The European Union has a road safety target.

The following institutions recommend the use of national road safety targets: Austroads, the International Transport Federation, the Organisation for Economic Cooperation and Development, the World Health Organisation. Setting national road safety targets is a recommended action under the *Global Plan for the Decade of Action for Road Safety 2011-2020* published by the United Nations Road Safety Collaboration.

While the focus of *Safer Journeys* is sound, levels of fatalities and serious injuries have not continued their downward trend experienced to 2012 and have in essence plateaued since that time. ACC injury entitlement claims have reversed their strong downward trend since 2009, plateauing in 2011 – 2013 and rising since then.

The *Safer Journeys (Second) Action Plan 2013 – 2015* contains the following aspiration.

> *The second action plan therefore includes a small number of transformational actions with a high level of ambition. These actions focus on advancing the Safe System approach, improving roads and roadsides, ensuring safer speeds, improving the vehicle fleet, and reducing the impact of alcohol and drug impaired driving.*
>
> *This action plan intends to address some of the most intractable road safety issues in New Zealand. Its success will depend on everyone doing their bit. Road controlling authorities, the vehicle industry, central and local governments, road users and employers all share responsibility for road safety.*
>
> *Strategic actions will address the greatest challenges to a Safe System and will be transformative. Areas for focus will include those where progress on Safer Journeys areas of concern has been slow, or where long standing barriers to creating a safe road system need to be removed. They are actions that require joint will, cross agency collaboration, reprioritisation of effort and investment, and wider partnerships to be successful. They will be directly sponsored by National Road Safety Committee members.*

The aspiration in the Action Plan is commendable, but the shorter term operational focus of the road safety agencies may not be as effective as their longer term strategic focus. This requires early corrective action to be taken. One agency representative discussing the need for sustained effort referred to "bursts of courage followed by periods of antipathy." Another suggested that there was not a strong political champion for road safety. The overall impression is that there may be a tendency among decision makers to seek further analysis rather than acting on the evidence and information that is readily available. Senior executives and

institutions may not consider they have the political mandate to undertake the detailed consultation, negotiation and persuasion to manage change in contentious safety areas.

Effectiveness of the lead agency role

The Ministry of Transport (MoT) is the lead agency for road safety in New Zealand, although it shares many responsibilities with the New Zealand Transport Agency. The commissioning of this comprehensive strategic review process by the MoT reflects a preparedness to be open and transparent about issues being encountered and to gain input on how these could be more effectively addressed. This review is expected to support the development of a fresh Action Plan for the remainder of the decade.

MoT appears to have a strong focus on legislative activity. This is an essential road safety task, but is highly resource demanding in its own right. The daily demands of this activity and the necessary support for Ministers may be restricting its wider outcome leadership capacity to engage in the aligning, cajoling, and brokering tasks related to the work of other agencies, to know what is occurring, and to ensure sufficient performance is delivered.

While the Ministry has the direct support role for Ministers, and has significant capability across a range of disciplines, it may not be playing a strong enough leadership role in road safety with, for example, New Zealand Police and the NZ Transport Agency which bring considerable institutional strengths in their own right. There are well established agency accountability mechanisms within the transport sector, but the Ministry's outcome leadership role based on its Ministerial mandate needs to be seen as essential in improved road safety performance.

The effectiveness of the lead agency role can be considered by looking at the wider partnership.

The governance and performance role of the National Road Safety Committee

The National Road Safety Comittee (NRSC) is the high level governance group for New Zealand road safety and provides advice on policy and delivery to government. Members are the Chief Executives of the MoT, NZ Transport Agency, Police and ACC. Associate members are senior executives of the Ministries of Justice, Health and Education, as well as Worksafe, the Energy Efficiency and Conservation Authority and Local Government New Zealand. The associate members can be invited to attend as required. A National Road Safety Management Group (NRSMG) of senior executives from the agencies (who report in their organisations to the members of the NRSC) meets regularly and reports and provides advice to the NRSC. The Ministry convenes meetings of the NRSC and NRSMG.

In general, these arrangements are good international practice, and can be improved through stronger collective relations between the public sector agencies and the political level. A joint ministerial discussion of road safety performance was restarted last year, and is occurring again this year, but many of the actions required cross portfolios at Ministerial level and this engagement needs to increase if Cabinet awareness and support for beneficial, if challenging, change is to increase. This is a key feature of road safety activity in, for example, Victoria, Australia. It fosters

political level awareness of current challenges, involvement in the development of interventions to tackle ongoing improvement, and political support at the Cabinet table for major policy or investment initiatives.

There is a significant resourcing demand for serving these necessary governance arrangements, providing insight on the overall road safety position and responding with strategically aligned proposals for action. It was suggested that the NRSC may not be receiving adequate nor regular insights into what is going on out on the road network in terms of road safety performance and barriers to implementation. They need to oversee strategic projects because they have been identified as being critical to longer term success, and engage on performance issues that have arisen which need to be addressed, and on opportunities which need to be taken.

All NRSC members have significant outcome responsibilities beyond road safety, but all need to be able to understand and communicate the essence of *Safer Journeys*, be made aware of emerging performance issues in a timely manner and lead responses which support the strategic intent of the strategy. As a collective they need to be singular and energetic in purpose, and committed and unrelenting in advocating for specific safety actions and ongoing safety improvement. In short they need to ensure the necessary momentum for planned change to deliver the action plan, is maintained.

More than any other group of individuals they will determine the level of success of *Safer Journeys* and the responsiveness of government to emerging road safety issues.

The management and coordination role of the National Road Safety Management Group

The NRSMG needs to run the engine room for road safety strategy and action in New Zealand – supporting and energising the NRSC and Ministers, as well as developing and implementing solutions without recourse to them wherever possible. A stronger and more direct road safety leadership role within and between the agencies may be needed from this group, and resourcing requirements may need to be considered to support this. The NRSMG chair and members need to act as a strong road safety advocacy group to the NRSC, the partner agencies and other stakeholders, taking relevant whole of community issues into account but always driving, unapologetically, a strong and aspirational safety improvement line.

The NRSMG on behalf of the NRSC needs to step in and give strong leadership to implement the identified measures and deliver the available annual savings in lives and injuries as a matter of urgency. This may require conversations between NRSC leaders and relevant NRSMG members on the mandate for this important leadership role. It may also require a more explicitly cross-agency resource to be deployed, such as occurred as *Safer Journeys* began to be implemented.

Sustained attention required to support core national partnership

While the NRSC is considered to be a good practice model of cross government cooperation, there has not always been the same level of involvement or commitment from organisations or their representatives. Particular concern was expressed about the involvement of ACC which was regarded as running “hot and cold with their involvement which has been sporadic.” All organisations go through

cycles, but each of the four primary partners need to be working effectively together if the best results are to be achieved. There was widespread agreement that the Health sector should be involved at the NRSC table, and efforts by the NRSC Chair to involve other sectors within the NRSC are fully endorsed. Concerns were expressed about whether, given the Police Commissioner does not attend NRSC, the Police Minister is receiving adequate briefings on road safety.

The vital role of local government

There are a large number of local and regional government entities with significant road safety responsibilities, and considerable effort is required to keep lines of communication and consultation and information exchange open. This is especially the case as linkages are needed not only with council technical staff but also with elected members. This goes beyond national engagement with Local Government New Zealand and into knowledge and capacity issues which can often restrict local government from being a strong road safety partner. A better balance may need to be struck between local accountability for the safety of local networks, and a national perspective to ensure safety issues on those networks are addressed.

Local government has major road network safety responsibilities, and wider community safety responsibilities. The depth of work associated with local government to develop the One Network Road Classification now needs to be replicated if the safety of local road networks is to be transformed. There appeared to the reviewers to be little recognition about the implications of the ONRC on local network speed limits for example. Regional Land Transport Committees and territorial authorities need to contribute to the new Action Plan as a step towards strengthening the local government focus on road safety.

Effectiveness of management arrangements between and within road safety agencies across government

The effectiveness of management arrangements is considered at both a strategic and an operational level. At a strategic level, the vital coordination activity across agencies is supported by personal relationships which are considered to be strong across most NRSC member organisational boundaries. Values, behaviours and machinery support effective joint business planning, and good communications coordination exists amongst agencies. Two issues emerged at a strategic level in the key cross agency management arrangements.

ACC needs to be more integrally involved in strategy and implementation

ACC's monopoly injury insurance role was established by a unanimous vote in Parliament in the 1970s. It holds a unique statutory and financial interest in preventing New Zealand road users from suffering motor vehicle injury. ACC has its own tests that it must meet for the cost effectiveness of any injury prevention investment. Similarly with any injury insurer, the cost structure for the motor vehicle account is quite different to the social cost of crashes used by all other agencies, and this means the relative cost of fatalities is much lower for the ACC scheme, and the relative cost of injuries is much higher.

Context is everything, and no two statutory injury insurance schemes are the same, but ACC has a close no-fault based cousin in Victoria, the Transport Accident

Commission, which invests much more heavily and strategically in road safety. It delivers the primary road safety advertising programme, and began capital investment into stronger Victoria Police enforcement programmes twenty years ago. This moved on to investment in blackspot programmes, and now commitment to a ten year $1 billion investment into the Safe Road Infrastructure Program. TAC make all investment decisions, based on projects which are developed and delivered by VicRoads.

ACC is a longstanding member of the NRSC but could be playing a far more significant role in road safety. Aside from looking at substantially inceasing the overall scale of investment, notwithstanding any comparison with injury prevention investment in other accounts, the mix of investment could also be considered based on business cases prepared by, for example, NZ Transport Agency or Police. One impression is that ACC pick and choose the activity they get involved in rather than looking first at the strategic needs of the partnership. Another impression is that they are regarded as simply the holders of potential additional funds. If either impression is close to the mark, it needs to be addressed.

The decisions made at an overall account level impact directly upon the capacity to reduce serious road trauma in New Zealand. A recent decision was made to substantially reduce the average ACC motor vehicle levy including the annual licence levy and petrol levy from around $330 to $195 a year from 1 July 2015, and this is anticipated to fall to around $120 from 1 July 2016. Serious consideration should be given to significantly increasing investment in road injury prevention as a means of reinvesting in the long term sustainability of the motor vehicle account. An explicit partnership discussion is needed regarding the strategic, commercial and technical requirements of this. If there are barriers to this consideration, they need to be addressed. The preparation of the next *Safer Journeys* action plan provides ACC and its injury prevention partners with the opportunity to develop a major, compelling, multi-year road safety investment programme.

Problems need to be addressed within a partnership context

In part, this matter of ACC's role and integration within the road safety partnership relates to the second broader issue of how much one agency's road safety issues were regarded as an issue for the partnership as a whole. One particular set of problems in this regard seems to be a disconnect in logic between actively pursuing the transformational issue of safer speeds – a key objective of the second Action Plan – and the restrictions on deterrence faced by NZ Police in seeking improved compliance.

Specifically, there appears to be a perception that NZ does not achieve value in its road policing. Questions were raised about the difficulty of linking the Police budget to measurable outcomes, about whether New Zealand is spending the right amount on road policing, and about potential for reducing expenditure in on-road enforcement to meet the costs of introducing more automated enforcement. Every agency needs to be able to articulate the outcomes it is responsible for and explain the link to delivery, but improved safety performance requires investment whether it is in relation to vehicle technology, road improvement or enforcement.

Certainly in relative terms internationally, the Road Policing Investment Programme agreed between NZ Transport Agency and Police, which specifies performance measures for measurement and review, provides a good insight into the delivery and performance of road policing services. Regular review of the level of actual performance against the agreed indicators and their associated costs is essential to determine the effectiveness of police services delivery. If this delivery as measured by the performance measures is determined to be satisfactory, the partnership discussion now needs to focus on facilitating an evidence based enforcement response to an entrenched culture of speeding. This will require additional investment, whether in widespread automated enforcement operations or in the capacity of the Police Infringement Bureau to issue more notices.

The concerns expressed about the capacity of local government to deliver sustained road safety improvements in their area of responsibility also need to be considered and addressed in a wider partnership light as well.

National safety partnerships need time and effort

More time and effort appears necessary at managing operational partnerships, which necessarily involves some overlap and relies on good working relationships at senior levels. These relationships appear to be good, but there is further potential – for example combining the Ministry's more direct relationship with Ministers, and NZ Transport Agency's independent capacity to act. There is also further potential in occupational safety. It is understood that ACC and Worksafe have developed a joint workplace injury prevention plan and work related road safety needs to play a newly prominent role in this.

Looking outside of government, the Automobile Association and the Road Transport Forum are significant safety partners and promote their issues. There were a variety of concerns expressed about mechanisms required to address cycling safety, motorcycling safety and pedestrian safety. The establishment and funding of the Motorcycle Safety Advisory Council provided an opportunity to elevate motorcycling safety at a national level. Recent work to strengthen the governance and direction of the Council has the potential to improve the quality of the focus on the safety of these users. There is an established Cycle Advocates Network, but it appears that an external action by the Coroner, with an appropriate response to establish the cycling safety panel, was necessary to significantly increase investment in cycling facilities. Living Streets Aotearoa advocates pedestrian issues, but consideration needs to be given to how pedestrian safety matters, which connect into the movement of some of the most vulnerable members of the community, are better addressed at a national partnership level.

Local safety partnerships also need to be strengthened

Resource demands for strengthening and maintaining safety relationships at a national level are multiplied at a local level. This is beginning to be addressed at a regional level in NZ Transport Agency, and there are signs that a Regional/District safety relationship is being developed between NZ Transport Agency and Police, which will need to extend to include ACC and local government. This challenge is compounded by what was described as a substantial changeover of road policing commanders at the District level every 18 months or so. Road policing effectiveness

at a local level is an ongoing challenge and it is likely that strong central guidance is necessary to offset to some degree the rapid turnover of road policing commanders. Regular turnover of Police in local road policing roles impacts knowledge and ongoing stability/commitment in a substantial way and needs to be addressed.

Increasing local government awareness and building their commitment to leading local safety improvement is a major challenge for the NRSC and its agencies. Local government is reportedly very uneven in its use of road safety action planning at local and regional levels. Increased councillor awareness of, and support for, road safety will be necessary if it is to become a greater focus locally. It should be recognised that local government technical staff do not in fact have a political mandate around introducing lower speed limits and extensive dialogue with councillors and Local Government New Zealand is necessary.

Safety funding systems should first consider what is required

The investment approach across the partnership appears to be "spend what we have got in a better way", rather than a more direct assessment of what expenditure is needed to keep significantly reducing the level of road death and serious injury. The Government Policy Statement (GPS) on Land Transport 2015/16-2024/25 outlines the funding ranges for each activity class for 2015/16 to 2020/21 and the forecast funding ranges for ranges for each activity class for 2021/22 to 2024/25. An essential component of New Zealand's shift to safe system thinking is to directly consider the financial implications of a targeted reduction in death and serious injury over the next five, ten and fifteen years.

The scale of investment needed over that period should be incorporated into the GPS, and associated with the expected performance improvement. Leaving aside the matter of targets, including safety as one of the primary results metrics for the road improvement activity classes within the GPS may help generate greater safety results or reinforce an overall performance measure such as improved safety star ratings on the State Highway network.

The review team were advised that many worthwhile road safety measures were available with good returns on investment, but they are not being implemented, as funding priority has not been allocated. One aspect of the funding prioritisation which needs to be considered is the value of statistical life that is used in project evaluation, which is based on a 1990 study by the Ministry of Transport. In 2010 Australian dollars, it is approximately half that of a comparable 2007 study by the Roads and Traffic Authority in New South Wales (Naude et al, 2015).

It was also put to the review team that if they received more central government funding for roads local government would be in a position to play their part in the broader road safety task. The One Network program seeks to set levels of service and safe speeds on the complete New Zealand road network. It appears to be well accepted by local government, but as the implications for One Network speed limits are identified, a pressure valve will be needed at the local levels.

New Zealand has a rational and well accepted funding system for land transport. It is to be expected that further efficiency improvements are possible through more safety focused planning and design of the network, and better policing and

promotional effort, but there is a limit to these possibilities. Additional safety investment will be needed to meet the safe system outcomes which *Safer Journeys* aspires to.

Promotional activity will be critical

A substantial task lies ahead in promoting the safe system basis for Safer Journeys and relevant priority actions. This entails many communication challenges. The strong cross sector resource for communications which was established to initiate *Safer Journeys* may need to be re-established to facilitate proactive, nimble, media savvy and cohesive safety communications across government.

The advertising programme appears to be continuing to provide good promotional support, with the "Mistakes" campaign a good illustration of the impact of *Safer Journeys* and the safe system approach. The Safer Speeds Programme represents the immediate promotion and advocacy challenge, and this is starting. A series of stakeholder engagements in 2014 are understood to have developed an essential understanding that "not all roads are equal", and NZ Transport Agency has commissioned a major new campaign to change the conversation about speed. For this to be effective, it will need a focus on communications and stakeholder engagement more than straight advertising – influencing national and local decision makers and communities, and building support for specific changes that are needed to significantly reduce road trauma.

The communications integration between the Ministry and NZ Transport Agency, and ACC and Police and the wider partnership will need to be "tactically brilliant" as one person has identified in relation to the Safer Speeds Programme as a whole. This will include the need to gain the mandate of Ministers to allow agencies to speak easily, professionally, respectfully and with a clear focus on the safety of the community. Agencies themselves will also need to be extremely disciplined with senior staff well versed in the many nuances of the conversation.

The focus on results in the development and implementation of interventions

Key initiatives and activities are needed to improve performance and overcome delays and difficulties in implementing actions. The combined potential for improvements in the safety of the infrastructure and of the travel speeds that are considered first in this section, before looking at some lessons learned in relation to regulatory and compliance achievements.

The ONRC and Safer Speeds Programme provide real potential

Considerable thought and effort has gone into the successful development of the ONRC, including the integration of safety performance measures for the network and the relationship with speed limits. This is a major achievement and, if implemented, it will achieve results. There is a clear performance expectation for example that National (High Volume) roads will have a 4 star KiwiRAP safety rating, National roads will have a 3-4 star KiwiRAP safety rating, and Regional roads will have a 3 star KiwiRAP safety rating. The elimination of 2 star KiwiRAP safety ratings on the State Highways network would be a good policy outcome.

Considerable reprioritisation of effort and investment into delivering safer roads by reducing speed limits and/or improving infrastructure safety standards on higher risk

roads will be necessary in order to realise the significant safety potential within the ONRC. It will take considerable effort to package up reforms in this area, and even more effort to implement them. The preparation of combined infrastructure funding and speed limit packages are potentially compelling in terms of safety performance, and it is important that substantive change is made in this area over the next few years.

It would be useful to understand the implications of implementing ONRC for safety performance over the next ten to twenty years, the necessary annual investment required in safer infrastructure over the next ten to twenty years to achieve this performance on various road types, and the changes in speed limit that will be required to address those road investments which are not economic or not possible because of resource constraints. Discussions suggested that some $150 milllion was required annually over 20 years for infrastructure improvements to safely maintain high speeds on the highest volume roads, but this would need to be verified. The annual safety allocation is currently some $35-50 million, and it is understood that this will rise to around $70 million beginning with the 2015-18 National Land Transport Programme.

If there is a funding gap for an infrastructure safety programme, this needs to be identified. Options for funding the balance, and for shortening or lengthening the programme, need to be considered. The improvement of safety in the interim also needs to directly addressed. A conversation with government is clearly needed, and a conversation with the community, about safety expectations and performance, infrastructure improvements, speed limits, and investment. There are many challenges in this, but two funding options standout. The first is that instead of returning ACC premiums for the benefit of individual consumers, the motor vehicle account funds are redirected into road injury prevention programmes for the benefit of the whole community. The second is that additional fine revenue from an upgraded speed enforcement programme which is in need of major reform could be allocated to this infrastructure safety task. Good benefit cost ratios are highly likely from the increased installation and deployment of fixed and mobile speed cameras and from lower speed limits on higher crash risk highways.

Travel speeds (which are strongly influenced by speed limits) and road infrastructure and roadside safety continue to be the major factors in determining the serious casualty crash risk of each length of road in New Zealand. A programme to improve the safety contribution of both – separately or in concert – is required. The challenges here are significant, and the community needs to be engaged on well developed proposals for speed limit reductions. Firmer government leadership from senior public sector executives and Ministers will be necessary and some will need to put their stamp on pivotal actions for performance to substantially improve.

Lessons from regulatory standards and compliance

Two possible lessons arise from looking at achievements in regulatory standards and compliance. The relative speed with which the decision to mandate electronic stability control was made, compared to the minimum driving age or the drink-driving limit suggests that more effort in vehicle safety regulation may be rewarded. While the flow on safety effect will take time, it may be quicker and less contentious

to progress vehicle safety regulation, which is particularly important given the unique mix of new and used vehicle imports into New Zealand.

Vehicle safety technology will be critical to ultimately realising New Zealand's safe system goals which makes the Vehicle Standards Map all the more important. The consumer and market-oriented approach using ANCAP and RightCar is effective in typical high-income countries as it leverages massive safety research and development investment by manufacturers. But engagement with industry on the ESC rule illustrates the responsiveness of business to good practice regulation. A continued and increased focus on the results that can be achieved by stronger regulation of motorcycles, light vehicles, and trucks will be important.

The primary task is to maintain and accelerate the entry of high value safety technology into the fleet and a bold agenda needs to be developed to support this. This may include the advance scheduling of regulatory analyses to bring forward technology. It may also include further more direct promotion of technologies to owners and operators of major light and light commercial fleets to encourage not just 5 star ANCAP safety rated fleet policies but fleet policies which use important new technologies such as autonomous emergency braking, or apply current technologies like alcohol interlocks or speed limiters to control known behavioural risks. The decision by ACC to risk rate vehicle premiums is a good example of how the vehicle safety technology area needs to be addressed combining as it does both regulatory and market mechanisms.

A second possible lesson is the importance of maintaining professional advice on safety issues over a sustained period of time – particularly as this related to the substantial research, evidence and knowledge about good practice in licensing and alcohol policy. A full range of analytical, advocacy, operational, and evaluative tools will be needed to support future changes in expectation about the safety of the road environment, travel speeds, and vehicle safety, and also about the role which road users must play. One challenge will be to ensure that the focus remains on those issues which have the highest potential to significantly improve safety. There is a great temptation to tinker with road transport regulations, and the net effect of this may be to reduce the perceived significance of more substantial safety changes.

A User and Operator Safety Standards map, aligned with good behaviour change and road safety management principles, would be useful to identify and prioritise future safety standards. Aside from creating a more strategic environment for regulatory analysis, this would make it much easier to address ad-hoc or low value proposals that regularly arise.

Road safety management priorities for New Zealand

There are a range of opportunities to strengthen the national road safety management system in New Zealand.

Enhance performance analysis and set national targets

Based on an understanding of international literature and practice, an examination of the interventions which are in place, and an analysis of the systems to drive improved performance, it is difficult to conclude anything else than that the lack of a

set of national targets for significant reductions in road fatalities and serious injuries is having an effect on the safety experienced by road users in New Zealand. This is inconsistent with the Better Public Services approach within New Zealand's public service, and with New Zealand's internationally recognised history in road safety.

New Zealand has sophisticated road safety data gathering and monitoring systems – from the testing of the advertising program, to the annual travel surveys, and the globally recognised KiwiRAP. There is very good quality data on deaths and serious injuries from road crashes to guide intervention selection and drive improved performance. Crash risks have been identified and quantified in a comprehensive good practice manner on the State Highway network, and progress is being made on local networks. It is understood that improvements are underway which would allow the Motor Vehicle Register to collect better information on vehicle safety features, which would provide a better link to crash results and assist future modelling of crash outcomes and setting of performance targets. Some improvements in regional data are also considered necessary.

Notwithstanding any future data improvements, this current wealth of information now needs to be brought together in a much more focussed way to drive further performance improvement. Some indicators established under *Safer Journeys* are poorly aligned with the safe system approach, some have been superceded, some are not being given the prominence and attention they need, and some do not appear to be used for their primary, results focused, purpose.

It is recommended that a simple results management framework is prepared which highlights the critical intermediate outcome and output measures that will become the focus of NRSC attention through to 2020, and will serve as preparation for a more complete target setting exercise for the decade beyond. This would complement the more focused attention of the second action plan through specific intermediate outcome and output measures.

It is recommended that ambitious trauma reduction targets covering the period of the next action plan through to the end of the decade are set, that the targets are supported by actions and performance measures geared towards achieving them, and that the investment costs of achieving those targets are estimated. It is also recommended that the value of statistical life is updated through a willingness to pay survey to ensure the current value the community places on road safety is reflected in the rational allocation of resources.

Strengthen road safety management capability

Coordination is essential to sustained improvements in road safety, and costly, even within a mature professional network within government, and the NRSC agencies need increased support from the MoT as the lead agency. This will require more immediate and effective tactical and operational activity to create a climate for change, to avoid or limit the impact from the multitude of new ideas that have low strategic safety value and compete for valuable attention, and to take opportunities quickly to advance and implement an agenda with high strategic safety value. This may require the deployment of a different level of investment and balance of skills within the Ministry.

This need to strengthen road safety management capability at this time in the development of New Zealand's safe system approach and the delivery of *Safer Journeys* extends to other agencies and sectors such as NZ Transport Agency, Police, ACC, Worksafe, the Health sector, and local government. One concern for example is that while the greater integration of road safety related functions in the NZTA with other functional activity may prove effective in embedding safety within all NZTA activities, it may also disperse the cross organisation safety focus. This has been very successful in getting *Safer Journeys* to this point, but more is needed to strengthen safety partnerships, and promote community understanding and acceptance of the safer speed limits/safer roads message.

The associate members including the Ministry of Justice, the Ministry of Health, the Ministry of Education, the Energy Efficiency and Conservation Authority, Local Government New Zealand and WorkSafe New Zealand need to be more fully involved for appropriate issues. As was pointed out to the review team, "the facts do not speak for themselves". They need to be spoken for, from a variety of perspectives. Deliberate and strategically aligned actions are needed from them all.

It is recommended that NRSC agencies individually and collectively assess their current road safety management capability and what will be required to significantly lift road safety performance over the next five years.

It is also recommended that a specific programme of work is developed and implemented to significantly increase the road safety management capacity of Local Government, which is responsible for nearly 90% of the network upon which nearly two thirds of serious road trauma occurs.

Rejuvenate the wider NRSC partnership

There is a good reason that the National Road Safety Committee continues to this day – it is a model structure for governments to focus on societal outcomes, and deliver improved performance for the community. Agency heads each hold substantial safety responsibilities by virtue of their position alone, and may need to take further steps to create the climate within which more political champions can emerge. To build government awareness of the challenges and needs in road safety, it is recommended that the Ministers jointly responsible for the NRSC partner agencies meet with the NRSC at least twice a year**.**

The Ministry of Transport is a long standing arm of Government with a strong record of achievement, and this needs to be leveraged further in the interests of road safety. Discussion with stakeholders outside government revealed the high regard for its bilateral consultation with individual industry and consumer interests. It is recommended that a twice yearly multilateral forum is created that brings many different perspectives and efforts to bear on the road safety task and seeks their collective input and engagement on road safety improvement. This may also assist in generating safety partnerships well outside of any government involvement.

Create alternative voices for road safety

A further step would be to extend the goal in the Second Action Plan to advance the safe system approach. To strengthen the conditions and climate for implementing a safe system approach, it is recommended that a Safe System Taskforce is established

with a timebound agenda to explore options for cooperation with other policy fields (planning, public health, environmental issues etc.) and step up the safe system dialogue with New Zealanders.

The Taskforce would consist of recognised experts and respected individuals with strong leadership capabilities and links to the top levels of Government. They could articulate a clear picture of where the safe system approach will lead New Zealand; endorse the One Network Road Classification and associated safety transformation, endorse a framework for establishing safe speeds and credible speed limits, help integrate road safety into other areas, and consider and promote future safety technology.

Address delays in legislation

Advances in raising the minimum driving age and reducing drink driving limits over the course of *Safer Journeys* will improve the safety of New Zealand road users. They represent catch up with norms reached in better performing countries some twenty years ago or more. Given the length of time it has taken for these quite basic safety laws to be introduced, it appears that there is a bipartisan road safety problem in Parliament. A bipartisan response is recommended, with the establishment of a Parliamentary road safety committee or a sub-committee of the Transport and Industrial Relations Committee for the remainder of this term of Parliament and the next. One way of reinforcing this approach would be to establish a multi year research programme from which an annual independent state of road safety report to Parliament is prepared.

There is a backlog of legislative initiatives which Government and Parliament need to address. The MoT and the National Road Safety Committee will need to find a way to specify, explain and promote them. Examples on a simple list which represents catch-up with good practice are a zero drink driving limit for specifically licensed drivers of trucks buses and taxis; penalties for speeding which better reflect the risk of the behaviour, including but not limited to demerit points for camera detected offences; drug driving enforcement laws which allow technology to detect methamphetamine and cannabis use amongst drivers; an administrative alcohol interlocks program; the age at which a young person can graduate with a full license; speed limiters on heavy vehicles; and stronger chain of responsibility legislation.

The legislative list gets longer if future progress is factored in, such as mandating ABS on motorbikes, or revising the speed limit setting rule. It is a substantial body of work, but even if they are not all advanced at once, the case needs to be made for consuming valuable deliberation and decision-making time from Government and Parliament. It is recommended that the Vehicle Standards Map is amended to set timeframes for regulatory analyses on key safety technology, and a companion User and Operator Safety Standards Map is prepared to provide a strategic picture of change in coming years.

Develop and implement a safe system promotion plan

The NZ Transport Agency's road safety advertising programme has been highly regarded for many years, and is now successfully building on user focused tactical support for New Zealand Police (which needs to continue and remain focused on

good behaviour change principles) and into much more strategic communications. The upcoming campaign to "change the conversation" on speed will carry a major burden in this regard, and will need to back up a comprehensive change management programme leading directly to widespread speed limit reductions and a reformed speed enforcement program.

It is recommended that a road safety promotion plan is prepared and implemented which recognises the importance of lifting the understanding of and commitment to sustained reduction in road trauma throughout national and local government and the private sector. This plan will also be important to building stronger commitment from major organisations to reforming their approach to addressing the number one occupational risk that the vast bulk of them face which is the risk of death on the road. The highly regarded NZ Transport Agency led safe system workshops should continue to support the ongoing cycle of professionals into road safety, but may also need to be adjusted as required to support this plan.

A joint MoT and NZ Transport Agency led effort is likely to be most effective. The Ministry needs to lead because it brings to bear the weight of a government department charged with the safety of all New Zealanders in their use of the transport system, in all the various dimensions of the system, being the roads, the vehicles, and the use thereof. The Agency also needs to lead because only it can articulate the single most powerful message – a responsibility to safely protect human use of the State Highway network. Other institutions have a vital role to play in promotion and advocacy, and must be involved in the development and implementation of the plan.

Develop a programme to support safer workplaces

The NRSC needs greater support and commitment from its member and associate member organisations. One area where this is needed is work related road safety which requires specific attention from Worksafe New Zealand as well as from ACC, MoT, NZ Transport Agency and Police. This needs to acknowledge the very high proportion of workplace injury (particularly fatal injury) arising from road crashes, and set about specifying and implementing new measures to promote safe work vehicles, and safety management systems.

ISO 39001 Road Traffic Safety Management Systems provides a model for consideration, and there are other significant programme models for this, such as the National Road Safety Partnership Programme in Australia or Driving Better Business in the United Kingdom. The Fleet Safety Programme which has been heavily supported by ACC provides an important base for this work, and should be leveraged in any future work to develop the anticipated partnerships programme under *Safer Journeys*.

It is recommended that ACC and WorkSafe New Zealand lead the development of a significant and new programme to support employers to take substantial steps to comprehensively reduce the risk of work related road trauma, as required under occupational safety and health legislation.

Establish a cross-agency team to implement the safe roads and safe speeds agenda

The MoT approach of setting up cross agency co-located project teams on major issues, casting the net widely to draw in a broader range of skills and experience for delivering challenging actions, as is understood to have occurred in the Vehicle Licensing Reform, is strongly endorsed for road safety. It is recommended that a cross agency team is established structured around a Safer Roads Investment Programme linked directly to the ONRC and the Safer Speeds Programme.

In this case, the work programme would provide for decisive action to connect to the community about the key opportunity to improve the safety of high risk roads (for example eliminating two star State Highways). It would include:

- Proposals to reduce the number of unsafe road lengths (from x star to y star safety rating) in a planned manner, commencing with the most unsafe roads, through:
  - infrastructure safety upgrade works to maintain current travel speeds on busier roads
  - implementing lower speed limits on unsafe lower volume roads where investment will be unlikely in the next decade
  - implementing lower speed limits on unsafe busier roads where investment is more than two years away, with adjustment of limits upwards when it is safe to do so
- Detailed infrastructure safety investment funding decisions to be taken by government over a multi-year period, including some allocation of additional funding for local government
- Supporting New Zealanders to buy into safer speed changes before the conversation gets underway in earnest
- Ministerial and government briefings before commencing public discussions (at say local government levels) in order to ensure no surprises about any negative reactions
- Strengthening national capacity to deliver proactive media messaging and briefings and carry out intelligence gathering to enable material countering unhelpful claims to be quickly prepared
- A common communications and engagement strategy with the extended partners to present the basis for a safer more forgiving road network, which are shaped to reach and influence people in the community
- Initiate conversations with Local Government at the political level on proposed State Highway infrastructure and speed limit proposals for higher risk lengths
- Support for local government to rank their road network links by crash risk and to reduce the number of unsafe and unforgiving lengths through limited infrastructure safety investment and/or reduced speed limits.

It is likely that much less is known about the estimated new investment required for local roads, but this planning and investment task needs to commence with guidance from NZ Transport Agency. As discussed above, if local government are to be a

partner in road safety, their specific safety investment issues warrant specific consideration within the partnership.

Two major funding sources have been noted above, and are directly attributable to users: investment into road safety from ACC's motor vehicle account, and redirection of speeding fines. Revenue could also be raised through motor vehicle and driver regulation systems. Any additional investment should only be on the basis of robust business cases, and should be geared towards achievement of specific safety targets.

PREPARING FOR A SAFE ROAD TRANSPORT SYSTEM

A final component to the interim evaluation project was to provide some high value options for consideration and further development in preparation of a third action plan. For the purposes of this exercise, it is has been assumed that the third action plan will cover the remainder of the strategy period, from 2016 to 2020. This would provide scope for programmes of work to be well advanced which can be safely predicted to contribute to a significant reduction in road trauma, or to prepare the analytical or societal ground for significant reductions in the future.

Stakeholder workshops

Three stakeholder workshops were held in order to support the future development of the third action plan. A report on these workshops is found in Attachment B. Participants were asked first to consider progress to date. In summary participants responded that:

- *Safer Journeys* itself and the safe system approach more generally were having a very positive impact on how safety issues were considered and addressed in New Zealand
- There have been some significant improvements in the safety of:
  - the road network through for example much greater use of wire rope median and roadside barriers
  - the debate initiated by limited reductions in the speed enforcement tolerance
  - the people using the network through legislative change and societal responses such as in relation to young people and alcohol, and
  - new and used vehicles through the mandatory introduction of ESC.

Participants were also asked about elements of the safe system framework that required more attention. Each of the four intervention sets (safe roads and roadsides, speed, vehicles, use) were seen as needing continued specific attention. Several other areas of concern came through discussion. It is recommended that consideration is given to the following concerns as the next action plan is developed:

- The level of priority and safety afforded to cyclists and pedestrians, in cities and regional population centres
- The need to recognise and account for social disadvantage in access to licensing services, and addressing cycles of traffic (re)offending
- The value of strengthening the vision and targets, and the safe system responses by a variety of influencers and organisations
- The creation of more explicit safety links between national and local planning and investment processes and systems.

Participants also listed a large number of actions that could be taken. Some of these were very specific, and some of these were very general. Some of them referred to issues directly to do with roads, speeds, vehicles, and people, and some referred to issues more generally about how safety was managed. Many referred directly back to the original twelve priorities set by *Safer Journeys* in 2010, and discussed in the intervention analysis.

Literature review

A literature review was conducted for the purpose of looking at promising new and emerging road safety initiatives that may be appropriate for consideration in New Zealand. The review is found in Attachment C. The authors examined road safety planning documents from high performing countries across the world, such as the Netherlands, Sweden, Norway, Germany, the United Kingdom, Australia as well as jurisdictions in the United States of America and Canada.

Research databases were used to identify evidence for key initiatives, and recent research was also reviewed from national research organisations and public agencies, as well as international organisations such as the International Transport Forum, and the European Commission. The research presented was not intended to be exhaustive, or to exclude initiatives already underway in New Zealand. It was intended to indicate areas which merit consideration for implementation or intensification in the New Zealand context.

Based on the literature review, the stakeholder workshops, and the analysis of the priority areas set out in *Safer Journeys*, the following outline of intervention sets are put forward here as being most likely to substantially improve the safety of New Zealanders on the road. They are consistent with the overall strategic direction set out in *Safer Journeys* and the safe system approach it promotes.

- Primary infrastructure safety measures most likely to shift star ratings upward such as median and roadside barriers, shoulder sealing, intersection treatments which reduce conflict speed and increase vehicle deflection, and physical treatments that directly slow traffic speed in urban areas
- The full range of speed management measures articulated in the Safer Speeds Programme – including reducing speed limits, increasing speed enforcement, and recalibrating penalties to risk and for the purposes of deterring speeding
- Acceleration of vehicle safety technology across the whole fleet – motorcycles, light passenger and commercial vehicles, trucks and buses – through a range of regulatory and market mechanisms, focusing on major crashworthiness and crash avoidance technologies, as well as measures to address behavioural issues
- Realignment of the licensing system to limit exposure to risk in motor vehicles and on motorcycles, realignment of the administrative penalties system to the relative risk, and continued momentum on alcohol policy for commercial and high risk drivers/riders.

In order to maximise the effectiveness and the socio-economic benefits of these intervention sets, a range of management functions need to be performed. For example, each policy or investment component requires an assessment of the relevant costs and benefits. It is important that this assessment is driven by safety leaders as it is not a separate technical excercise – rational allocation of resources must go hand in hand with a strategic vision of significant safety improvement and how to achieve it. This should assist in the primary safety focus of interventions

coming to the fore and the best decision options being sharpened by economic analysis.

Testing potential initiatives

New Zealand has a mature road safety management system. It can be strengthened, and results can significantly improve. One of the primary challenges is to continue to pursue a safe system philosophy, and in this light, two ways of looking at potential initiatives are put forward here.

The first takes four commonly applied safe system principles, and sets a question regarding alignment of potential initiatives.

Shared Responsibility (many contributions needed)	Is this initiative consistent with an expectation of shared responsibility for safe road transport?
Forgiving Systems (fix the system, not the operator)	Is this initiative a systemic no-blame response to an injury problem or risk?
Human Frailty (biomechanical rules rule)	Is it expected that this initiative will reduce the transfer of crash energy onto a person?
Human Factors (people make mistakes)	Does this initiative seek to accommodate human error rather than assume human perfection?

The second way of looking at potential initiatives uses the hierarchy of control which is widely applied in occupational safety. This is relevant because of the considerably more advanced safety systems within the workplace. This approach requires consideration to start with the first test (eliminate exposure), then the second test when all options in the first are exhausted, and so on until the last.

1. Can we *eliminate exposure* to the hazard (such as reducing travel)?
2. Can we *substitute the hazard* for one with a lower risk (such as shifting to a safer mode of travel)?
3. Can we use technology to establish a *safeguard* from the hazard (through safer road or vehicle design)?
4. Can we introduce *training* or *procedures* to mitigate the presence of the hazard (such as legislation)?
5. Can we provide *personal protective equipment* against the hazard (such as helmets or clothing)?

In road safety, this more directly recognizes the importance of public transport systems which are safer and reduce exposure, as well as managing exposure of the highest risk users such as young and novice drivers or motorcyclists or older drivers.

Key areas to address

It is recommended, based on the analysis of the activity to date under *Safer Journeys*, the management of that activity, and stakeholder discussion about what potential action in the future that the following six key areas are substantially addressed as the next action plan is developed:

- Safe Roads and Roadsides
- Safe Speeds
- Workplaces
- Local Government
- Safety Management
- Safety Regulation.

As some workshop participants commented, it is important that the third action plan continue what was started in the second which was a sharpening up of the focus of activity. This is likely to engender itself to a more strategic safety approach amidst the day to day delivery pressures that every public and private sector stakeholder faces. It may also be important for the strategic action planning process for road safety to be more directly timed to support the three year funding cycle which is so well established in New Zealand.

The items put forward here may be used as the focal point of the next action plan, but their primary purpose is to contribute to the thinking within the NRSC partnership about the focus of their activity to the end of the decade. They are likely to vary in their cost and effort to implement, and in the speed with which results will be achieved. They each present significant opportunities, leverage off some significant capabilities within New Zealand, and identify areas which need greater attention.

The first two areas to address are the most pressing of the four pillars of *Safer Journeys*, and while they need to be considered in their own right, there is a good case for managing them together.

Safer Roads Investment Programme

Description	Develop and begin early implementation of a five to fifteen year program to deliver significantly safer State Highway and Local road networks
Accountability	NZ Transport Agency lead, in association with the Ministry of Transport and Local Government
Strategy	Link directly with the rollout of the One Network Road Classification and the Safer Speeds Programme, specifically the reduction of speed limits
Performance	Substantially improve the star ratings applied to the State Highway network, and substantially improve fatal and serious injury results on local networks
Evidence	The evidence base in this area is relatively very strong. From its initiation in 2006, KiwiRAP is now a global leader in road assessment programmes and the safety star rating system provides elected officials and communities with the single best proxy for the safety outcome

	performance of road transport corridors. There is an excellent evidence base which can be applied to local road networks, and major progress has been made to develop Urban KiwiRAP.
Cost	The financial cost of road infrastructure improvements is relatively very high, but it is highly likely that an extensive programme of works can be developed which provide a good return on investment. The value of this investment would be enhanced if transformational change in the safety quality of highly trafficked parts of the network was managed in conjunction with reduced speed limits to match the protective qualities of the infrastructure. The financial cost of reducing speed limits is relatively extremely low.
Considerations	There are a wide variety of options for implementing a sustained programme of infrastructure safety works. Considerations include: • The initial focus of the rollout, which could be on the basis of particular elements of the network such as Regional roads, or on geographic areas such as Waikato or Manawatu-Wanganui regions • The expected performance requirements including the KiwiRAP 3, 3½-4, and 4 star levels of safety service for Regional, National and National (High Volume) roads • The investment required to achieve the desired levels of safety service, and how long it will take under current or elevated levels of funding to achieve that performance, and how this relates to using speed limit reductions to achieve that level of service • The focus on primary safety treatments which can create safe system outcomes (for example reducing crash impact forces to safe levels or separating users) rather than secondary treatments which still rely on perfect human responses • The improvement in safety enjoyed by all road users, particularly pedestrians and cyclists who are the most vulnerable and have not enjoyed the same safety benefits as motorised users to date • Linkages with Local Government needs, particularly considering that most casualty crashes occur on local networks, and the additional capacity demands associated with gaining agreement at both administrative and executive levels with Local Councils The development, packaging and finalisation of safety investment options should take into account that, broadly, stakeholders: • may be more likely to support increased costlier national investment in infrastructure than cheaper speed limit reductions • may have an unrealistically low impression of the infrastructure costs associated with achieving the same level of safety performance on a corridor as a speed limit reduction can achieve • may have an unrealistically low impression of the effectiveness of a speed limit reduction on the safety of a corridor. Given the costliness of infrastructure safety investment, consideration should be given to how any safety investment will be used to support change in speed limits, consistent with the ONRC, and the wider change management agenda within the Safer Speeds Programme.

Safer Speeds Programme	
Description	Implement the programme which has been developed, and report publicly every six months on progress of key measures
Accountability	NZ Transport Agency lead, in association with the Ministry of Transport, NZ Police and Local Government
Strategy	Link directly with a programme of infrastructure works and the One Network Road Classification, and to hypothecation of revenue from speed enforcement
Performance	Substantially improve fatal and serious injury results the State Highway network and on local road networks
Evidence	The evidence base in this area is relatively very strong. It supports a sustained focus on reducing mean traffic speeds on roads, for which the primary treatments are reducing speed limits and increasing enforcement (or more particularly the perceived risk of detection and the penalties applied). Evidence also supports: • the use of advertising and social marketing campaigns which are directed at enhancing the general deterrent effect of enforcement activity • changes in the road environment to physically slow motor vehicles down, and to encourage drivers to slow down through perceptual measures. More homogenous speeds (which can be beneficial) are typically achieved through evidence based strategies to reduce the mean speed such as deterring drivers from travelling just above the speed limit.
Cost	The financial cost of speed management improvements is relatively extremely low, although the relative costs do vary. Speed limit reductions tend to be extremely low cost and extremely effective. Speed enforcement tends to be extremely effective but needs constant expenditure: automation tends to provide significant efficiencies. The effectiveness of advertising is dependent in part on the enforcement activity and also needs constant expenditure. The highest cost activities such as physical and perceptual measures to slow motor vehicles and encourage slower driving tend to be the most expensive to apply across the network.
Considerations	As with the Safer Roads Investment Programme, there are many options for implementing the Safer Speeds Programme. It is likely that the best mix will rely on classic change management techniques and processes, including behaviour change techniques where appropriate. Considerations include: • The integration of any speed limit reduction activity, particularly on rural roads, with safe infrastructure investment and the ONRC – this will maximise the potential safety benefits from the ONRC • Setting any initial speed limit reductions at a scale and ambition which if repeated across the country geographically or across the hierarchy of

	roads will lead to substantial reductions in road trauma – this will be important to create a national effect within the life of the programme • Analysing, scoping and promoting the programme as addressing all crashes not just those crashes which have been judged by Police to have speeding as a factor – this ensures that the full benefits of the programme can be accurately portrayed • Developing a cadre of people across the agencies who can speak publicly, professionally and respectfully about speed management without inadvertently validating myths, misperceptions, or low value activity in speed management and undermining the programme • The importance of incorporating a strong focus on safe cyclist and pedestrian movements within urban areas, and the additional capacity demands associated with gaining agreement at both administrative and executive levels within Local Government Effective change leadership from senior public sector executives will require a political mandate which accepts that some members of the community will be very vocal about: • Their individual capacity to drive at speeds which if applied across the road network will lead to inevitable road trauma • Speed limit reductions being cheapskate responses and increased enforcement being revenue raising • Hitting law abiding citizens by enforcing speeding just above the limit rather than targeting "extreme" speedsters. Specific consideration will be required about how to address the significant under-deployment of automated enforcement systems, the lack of demerit points on camera detected offences, the low level of penalties generally, and the high enforcement tolerance of speeding. Options to hypothecate traffic fines to safety investment should be developed and decided upon to address the likely response from some elements of the community to strictly enforcing safety critical traffic law for the purposes of reducing road trauma.

Two key areas to address are focussed on the organisational settings within which road trauma occurs – workplaces and local government.

Workplaces	
Description	Invest in a major workplace safety programme across public and private sectors to build commitment to road safety actions
Accountability	ACC and WorkSafe NZ, in association with other NRSC partners
Strategy	Establish work related road trauma as a high priority in employer's occupational safety considerations and WorkSafe NZ's responsibilities
Performance	Substantially reduce the risk of work related fatalities and serious injuries arising from road crashes
Evidence	There are significant data problems in New Zealand, but a 2014 review of the Fleet Safety Programme (a joint agency programme involving ACC, NZ Police, NZ Transport Agency and WorkSafe NZ) highlighted that work

	related road trauma is a major road safety problem, and an even greater occupational safety problem. The only substantial study of work related road trauma in New Zealand covered the period 1985 to 1998. The method was broadly similar to those studies which are now regularly reported by SafeWork Australia and estimate that approximately 50% of work related fatalities occur on the road. The New Zealand study estimated that work related road trauma comprised 29% of all work related injury fatalities, but when "bystanders" (a person who died in the process of another person's work activity on a public road) are included (as in Australia) this figure rises to 64%. WorkSafe NZ reports that for the four years (2009-12) there were on average 60 fatalities per annum notified under the HSE Act 1992, which excludes all maritime and aviation fatalities and all work related fatalities on the road. If the earlier analysis of fatal workplace injuries in New Zealand is still the case, this suggests that there were on average approximately 105 work related road fatalities during these years. This is substantially more than the number of young people killed (approximately 85 fatalities), and the combined number of motorcyclists, pedestrians and cyclists killed (approximately 90 fatalities), and close to the number of fatalities involving alcohol or drugs (approximately 115 fatalities). There is a growing body of case studies through the Driving for Better Business programme in the United Kingdom and the National Road Safety Partnership Program in Australia which highlight the value for various organisations from addressing work related road safety.
Cost	Some initial investment has been made through ACC and the other Fleet Safety Programme partners, but this is against a background of occupational safety and health priorities being directed away from work related road safety. There would therefore be some significant project costs to Government from establishing the case for employers to recognise that it is likely to be their primary fatal injury risk, either for their own staff or for their contractors who use the road, and certainly for bystanders to their work on the road. There would also be costs to publicly and privately owned organisations from responding to this new information.
Considerations	Significantly reducing the risk of work related road trauma requires attention to four primary areas: • Safety management, by developing and improving safety management systems that focus on key results and processes, and are appropriate to the scale and nature of the enterprise • Journey management, by setting journey policies that reduce exposure to risk on the road network, and putting in place compliance practices which actually control the exposure to risk • Vehicle safety, by using vehicle safety technology that reduces the risk of involvement in crashes and reduces the casualty impacts of crashes that occur • Driver behaviour, by ensuring that drivers understand the risks associated with use of the road network, and use operational controls

	to limit those risks to the greatest extent possible. The vehicle is part of the workplace, and work related travel falls under a comprehensive set of strict legislative controls, a legalistic approach is unlikely to be considered reasonable. However, the Fleet Safety Programme provides an important connection through infringement information with organisations operating fleets comprising at least five vehicles and provides a starting point for significant strengthening in this area. Employers need to put appropriate levels of management systems in place to control the exposure of employees and other road users to hazards in road traffic. However, given the societal tendency (over many decades in developed countries) to blame road users for the injuries they suffer, it is likely that many employers first need to receive better and more specific and consistent support and direction in the area. Demonstration projects (with regional, national or industry client groupings) that are capable of highlighting and replicating the very best practice in work related road safety in New Zealand could provide lasting societal benefits. This could be particularly important for increasing private investment in vehicle safety technology, including technology which helps control fatigue, speeding, alcohol and restraint wearing. This programme could be a means for significantly increasing the deployment of alcohol interlocks on a voluntary commercial basis, which has been very successfully achieved in Sweden. *ISO 39001 Road Traffic Safety Management Systems* provides a best practice template to guide organisational responses to road trauma, and can support organisations assuming greater responsibility for road safety.

Local Government	
Description	Develop and implement a sustained safety partnership programme to strengthen the road safety management and leadership capacity within Local Government
Accountability	NZ Transport Agency, in association with Local Government New Zealand, Police, MoT
Strategy	Strengthen the integration of safety performance and principles into each aspect of local road management
Performance	Substantially reduce the risk of fatalities and serious injuries on local road networks
Evidence	Nearly two thirds (64%) of all fatal and serious crashes over the last three years occurred on local roads managed by 67 territorial authorities. Local road networks comprise nearly 90% of the total network length. The crash density is significantly lower than on the State Highway network, but the crash density on local urban roads are substantially higher than local open roads, making them more amenable to infrastructure safety works. Significant advances have been made in developing Urban KiwiRAP which can be expected to provide further insight into cost effective options on local roads.

Cost	The safety of local roads is funded by a mix of central and local government systems, and consideration needs to be given as to how contributions will be made to a sustained safety partnership programme. The primary focus for additional expenditure should in the first instance be on generating better safety responses from current or future investment.
Considerations	Aside from wider community leadership responsibilities, the safety of local communities is heavily dependent upon the capacity of local government to deliver a safe environment. The sheer number of local road controlling authorities provides safety management challenges due to dissipation in safety expertise and leadership. Territorial authorities' responsibility for providing and managing safe road networks involves: • implementing a mix of infrastructure safety improvements and reduced speed limits where this is not possible • engaging directly with Police to ensure that safety deficiencies in network management are alleviated as far as possible through enforcement • engaging directly with the community about local safety issues. They also have a significant responsibility as Regional Land Transport Plans are developed by Regional Transport Committees, and fed into the national planning and investment process. A brief scan of road safety management at a local government level reinforces stakeholder concerns regarding the capacity of local government to respond to their safety responsibilities. The implication is not of a lack of concern or interest, but a sense that much more needs to be done to generate further safety out of RLTPs and other activity at a regional level, and road safety action planning within territorial authorities. There appears to be significant opportunity for considering how effectively the road safety value chain is connecting the safety requirements on local roads with the regional development and prioritisation of road transport investment with national planning and investment processes, and with *Safer Journeys*. A stronger safety capacity at the local level may assist in generating additional investment in infrastructure safety, but it may also assist in ensuring that local safety services such as road policing are being delivered as well as possible. A stronger road safety action planning process is likely to be critical in this. Reinvestment into safety management systems at a local road level are also likely to be critical in lifting safety management capacity. An upcoming Austroads report provides significantly upgraded guidance for road controlling authorities in this area, based on *ISO 39001 Road Traffic Safety Management Systems*. Relatively simple templates could be prepared and adjusted for practical ongoing use by predominantly rural or urban authorities, or bigger or smaller authorities. The safety opportunity in developing a stronger set of safety partnerships between central and local government is heightened by the ONRC. A specific suggestion made at the stakeholder workshops was that each local road controlling authority should develop a speed management

	plan, setting out the path they intend to follow to match and manage the safety of the infrastructure with the safety of travel speeds. This would benefit the rollout of the ONRC considerably. Specific knowledge transfer programmes for elected representatives as well as for professional staff also need to be considered.

The final two areas to address focus on safety management and safety regulation.

Safety Management	
Description	Invest in management systems that will generate sustained safety improvements across all elements of the road transport system
Accountability	Ministry of Transport, in association with NRSC partner agencies
Strategy	Strengthen New Zealand' road safety management system, and management capacity across all NRSC partner agencies
Performance	Substantially reduced fatalities and serious injuries through to 2020
Evidence	Road safety management is Pillar One of the United Nations Decade of Action for Road Safety and is widely recognised internationally as being the lead discipline for significantly and sustainably reducing the risk of road trauma.
Cost	There may be personnel costs. These can be managed down by, for example, increasing the decision rights provided to the nominated safety leader in the organisation. There may also be system costs for gathering and processing performance data. As with anything, management systems are ideally strengthened in such a way that keeps ongoing costs down while at the same time improving the quality of the management output.
Considerations	Organisationally, each of the NRSC partner agencies need to maintain and nourish their capacity to eliminate serious road trauma. This also extends to each arm of local government, and each public or private sector entity which is exposed to or exposes others to safety risks on the road. Specific proposals are to: • Develop a results management framework including a more formal structure of final outcome, intermediate outcome and output indicators at a national level. • Specify national fatality and serious injury targets for 2020, along with a small number of key intermediate outcome measures which will be used to drive activity across NRSC partners. • Update the value of statistical life used to evaluate safety projects in New Zealand • Initiate an open national forum for road safety which promotes a wider set of safety partnerships • Establish a Safe System taskforce To explore options for cooperation with other policy fields and step up the safe system dialogue with New Zealanders • Establish a Parliamentary committee for road safety to 2020 to prepare

	for upcoming legislation, and receive and consider an annual independent state of road safety report • Prepare and implement a safe system promotional plan which leverages the significant advances in professional road safety knowledge under Safer Journeys • Develop programmes to support a much stronger integration of road safety into workplace occupational safety considerations and local government responsibilities • Establish a cross-agency team to implement the safe roads and safe speeds agenda. Consideration could also be given to identifying specific needs in post-crash care, other than those addressed through eCall vehicle technology.

Safety Regulation	
Description	A programme of work to identify and then pursue significant road safety outcomes with the assistance of regulation
Accountability	Ministry of Transport, in association with NRSC partner agencies
Strategy	Establishing a base from which new regulatory issues can be assessed from a safety perspective and strategic issues can be pursued
Performance	Good practice regulation of user and operator safety standards, and acceleration of vehicle safety technology in imported vehicles
Evidence	An evidence base is required for each regulatory initiative, some of which will be directly associated with the initiative and some of which will relate to evidence based safety principles which are relevant to the initiative
Cost	Regulation can be very effective in achieving results at a relatively low cost to Government. The cost to society needs to be considered alongside the benefits. Perceptions about the acceptability of these costs can be improved by building the case for change.
Considerations	Good practice regulation needs to be considered as part of an overall management framework involving the provision of information, effective compliance systems, and a clear outcome which is being sought. A range of strategic level actions are often required to build support for effective regulation. Potentially high value and good practice regulatory options include: • Revising speed limit setting rules to allow for more widespread application of safe system principles • Penalties for speeding which at least better reflect the fact that lowest level speeding imposes a similar risk as lowest level drink driving • A broader review of administrative penalties to better align the range and severity of penalties to risk • Zero drink driving limits for regulated commercial drivers (of trucks, buses and taxis), and for motorcyclists (as the most at risk licence holders) • Technology to detect methamphetamine and cannabis use amongst drivers at the roadside

	• Mandatory administrative (no Court involvement) alcohol interlocks program for serious/repeat drink drivers • Increased age at which a young person can graduate with a full driver license, and mandatory hours of supervised learner driving • Speed limiters, ESC, and under-run protection on heavy vehicles • Mandating ABS on motorbikes and side curtain airbags on light passenger vehicles, as well as eCall technology • Improved chain of responsibility legislation • Scheduling regulatory impact analyses of major safety features within the Vehicle Standards Map, and developing a companion User and Operator Safety Standards Map. In road safety, regulation also needs to be considered in terms of wider societal impact of controls on users, particularly those from lower socio-economic communities. These users are likely to suffer disproportionately from road trauma, but also from becoming entangled with the criminal justice system through the road transport system. It has been suggested previously that a more forgiving road transport system involves communities as well as roads. A more comprehensive assessment of how safety and justice are managed within these communities may be timely.

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ATTACHMENT A TERMS OF REFERENCE

The Ministry of Transport is seeking a suitably qualified consultant(s) to evaluate New Zealand's Safer Journeys road safety strategy for the purposes of informing both:

- Ministers on the effect of the strategy to date
- the development of a future action plan.

Safer Journeys was launched in March 2010, and has been supported by two subsequent action plans covering 2011-2012, and 2013-2015.

Evaluation Framework for Safer Journeys

The framework for evaluating Safer Journeys comprises three aspects, which need to be considered with reference to the vision and principles which have been established:

1. The management systems in place to:

   - Set performance expectations and oversee their achievement
   - Promote road safety and the systems based approach to improvement
   - Allocate funds necessary to achieve performance expectations
   - Coordinate the development and delivery of agreed actions
   - Develop and maintain legislative frameworks to support improved safety
   - Monitor and evaluate the management system and critical interventions
   - Invest in research and development and the transfer of knowledge.

2. The interventions which have been delivered and opportunities for the future, in regards to the safe system approach, safe roads and roadsides, safe speeds, safe vehicles and safe road use, with specific reference to the priority areas identified in Safer Journeys, and the initial deliverables and milestones in the current Action Plan.

3. The results that have been achieved and insights for future actions and results. The results to be considered include deliverables and milestones set in the current Action Plan, the indicators set in the first Action Plan, and particularly the following aims of Safer Journeys:

   - increase the safety of young drivers
   - reduce alcohol/drug impaired driving
   - achieve safer roads and roadsides
   - achieve safer speeds
   - increase the safety of motorcycling
   - improve the safety of the light vehicle fleet
   - achieve safer walking and cycling
   - improve the safety of heavy vehicles
   - reduce the impact of fatigue and address distraction
   - reduce the impact of high risk drivers
   - increase the level of restraint use
   - increase the safety of older New Zealanders.

The progress that has been made will be analysed using a combination of time-series data, where available, documented actions which were delivered for the purpose of having a positive impact on the indicators, and known external factors which are likely to have had either a positive or negative impact on the indicators. It will also take into consideration further work that could be done to improve road safety.

Tasks

The following tasks have been identified, but the successful consultant(s) may put forward other proposals for consideration.

Literature review

A literature review of road safety practices in high performing countries that may have applicability in the New Zealand context, in terms of either generating significant new road safety interventions or substantially refining the type and nature of existing interventions.

Intervention analysis

Work with National Road Safety Committee (NRSC) agencies (and major stakeholders as appropriate) to agree the key indicators and interventions for investigation, document what services have been delivered, and analyse the likely reason for any change in the relevant indicator, the significance of the indicator to the final casualty outcomes targeted by Safer Journeys, and the potential for future improvement in the indicator.

Management analysis

Draw upon the literature review to analyse New Zealand's road safety management system, specifically the systems that are in place to:

- lead the implementation of and promote the Safer Journeys strategy
- fund and coordinate the delivery of action plans
- increase the effectiveness of interventions targeting the safety of roads, vehicles and people
- undertake the necessary monitoring, evaluation, research and knowledge transfer tasks to sustain continued investment and improvement in results.

High value option generation

Identify high value options for inclusion in a subsequent action plan through to 2020. This task would draw upon:

- the literature review
- findings of the intervention and management analyses
- ideas generated through discussion with NRSC partner agencies, and major stakeholders as appropriate.

The options would be briefly documented to the extent that they can be assessed by the National Road Safety Committee to determine which will be subject to further analysis and subsequent inclusion in a new Safer Journeys action plan.

Specific consideration will also be given to the equitable distribution of road safety benefits to various user groups – for example, active as well as motorised users, and Maori as well as non-Maori users.

Deliverable

A full report on the evaluation of the Safer Journeys strategy, addressing each aspect of the evaluation framework sufficiently to advise Ministers on the effect of the strategy to date and to support the development of a future action plan.

Process and Timeframe

The following process has been developed for a period covering 16 weeks and to be completed by 30 May 2014, with a draft report provided a month prior to the completion date. The successful consultant(s) may put forward other proposals for consideration.

- Ministry establishes evaluation group comprising NRSC agencies, with contacts for the consultant to liaise during data gathering and analysis
- Consultant uses Ministry data to prepare intervention analysis sheets, and circulates these to contacts to collate agency data
- Consultant interviews NRSC members, relevant agency and partner managers to assess road safety management system
- Consultant runs national and regional stakeholder workshops to receive further input on intervention delivery, and ideas for high value options
- Consultant presents interim evaluation findings to meeting of NRSC
- Consultant circulates draft evaluation report to Ministry and NRSC agencies for review and comment
- Consultant receives and responds to agency comment and provides final evaluation report to Ministry.

Expertise Required

Extensive experience in road safety strategy development, implementation and evaluation

Demonstrable knowledge of international good practice in road safety management systems and interventions.

ATTACHMENT B STAKEHOLDER WORKSHOPS

As part of the interim evaluation process, the opportunity was taken to look forward to a third action plan covering 2016-2020. The Ministry of Transport invited a range of stakeholders to half day workshops in Auckland on Tuesday 28 April, Christchurch on Wednesday 29 April, and Wellington on Thursday 30 April.

The purpose of the workshops was to start generating ideas about what is going to have the most impact to achieve significant further improvements over the remainder of the decade, and to lay the basis for significant improvements beyond 2020.

The workshops were opened by Mike James (General Manager Road and Rail, MoT, and Chair National Road Safety Management Group), Leo Mortimer (Manager Land Transport Safety, MoT), and Ernst Zollner (Director Road Safety, NZ Transport Agency). They commented briefly on road safety in New Zealand, the interim evaluation that was underway, and the importance attached to discussion with stakeholders as the third action plan for *Safer Journeys* was developed. Martin Small made some brief observations about the evaluation to date, and then facilitated discussion on four items on the agenda:

- Most Substantial Improvements in Road Safety
- Key Elements of the Safe System Approach
- Most Significant Potential Interventions
- Specific Management Actions.

These had been introduced in a brief set of notes that were circulated ahead of the workshop, and are attached below. They form the structure of this report, which summarises discussion on the first two items. Sometimes the points raised were repeated over the three workshops, and the report attempts to capture this. It should also be noted that some points were only raised once. The intention is not provide a blow by blow account of the vibrant discussion in small groups and as items were reported back, but to illustrate key ideas and themes and issues as people considered the progress to date and the challenges ahead.

The last two sections provide a much more direct bullet point list of ideas that were put forward for consideration, either as interventions that were needed in order to achieve specific results such as safer roads, or actions that were needed in order to facilitate subsequent interventions. The bullet points have been very lightly edited to focus on action, and were almost exclusively written originally as notes by the participants in small groups. On a small number of occasions, the facilitator notes taken down on whiteboards and flipcharts were much more direct, and these were used as necessary to supplement the bullet points.

Most Substanial Improvements in Road Safety

Thinking about road safety in New Zealand over the last four calendar years, please note down what you think are the two or three most substantial changes that have been made to improve the safety of road users in New Zealand

The preparation and publication of *Safer Journeys* was nominated as one of the most substantial changes. In itself, the strategy is seen to have created value, acting as a reference point for the adoption of the safe system approach, and being supported by successive action plans. More broadly, the safe system approach to road safety was regarded as working its way through New Zealand's road transport environment, with more systems thinking about safety, and how to approach specific safety issues.

A more coordinated whole system approach to road safety was regarded as increasing social pressure and greater public acceptance of road safety as a problem. A progressive cultural shift was commented upon, with better media, interpersonal and professional conversations. Legislation changes in driver licensing, drink driving, and child restraints and changes in the speed enforcement threshold were seen as positively affecting a culture of safety.

Collaboration was regarded as being stronger than in the past, with better engagement between government agencies, and with industry. More and better access to information, data and analysis was seen as being important, and across all safety dimensions, such as safer roads and vehicles and behavioural issues such as speed, drugs and alcohol.

Targeted improvements in the safety of the road network were regularly referenced as a key change, particularly increased kilometres of wire-rope median and roadside barriers being installed. More passing lanes and better signage to highlight high risk areas for motorists were also referenced, as were school zones, audio tactile and other linemarkings, and increased facilities for cyclists and pedestrians separated from the roadway. The series of high risk road management guides, addressing motorcycling, rural roads and intersections were also referenced. Increasingly safer road infrastructure treatments were regarded as business as usual, which was considered positive.

Participants referred to an apparent culture shift occurring on speeding, with the speed enforcement tolerance changes at holiday times regarded as particularly important for helping initiate and change social and public conversations. Open road speed compliance was seen as improving. Speed limit reviews were also supporting discussions about the need for roading improvements to maintain higher speeds, and for lower speeds where no improvements can be made.

There was considered to be much greater awareness about vehicle safety features, and much greater deployment of safety technology in both light and heavy vehicles. The mandating of electronic stability control with cooperation from industry, as well as side curtain air bags were referenced as well as better braking and stability required in trucks to support new heavy vehicle routes.

Participants typically referenced the range of regulatory actions regarding drink driving limits and the safety of young New Zealanders including improved testing, Increased driving age, and better motorcycle controls as key changes. These actions were regarded as positively contributing towards a climate of change for road safety within the community.

More enforcement of cell phones, the introduction of an alcohol interlock scheme, changes to child restraint laws, and the change to the give way rule were also regularly referenced. Police enforcement and NZ Transport Agency advertising and promotion campaigns were regarded as being effective, and supporting a growing public intolerance of high risk behaviours. A greater influencing focus within promotional activity – "people make mistakes" – was seen as contributing to behaviour change.

For specific road users, a greater commitment to cycleways and the Coromandel loop motorcyclist project were regarded favourably. The Coromandel project was also heavily referenced for incorporating support for rescue helicopter pads. More broadly, it was considered that medical care is likely to be improving injury results.

Key Elements of the Safe System Approach

Looking forward over the remainder of this decade, please note down two or three elements of this overall framework in which you think greater attention is needed

All elements of the framework were considered to require attention, but there was considerably more discussion on "management" and "people" elements.

Safe road use by people was seen as a way of strengthening the Safer Journeys brand, with the notion of errors suggesting more positive than punative points of conversation and education with the public. Continued support from the advertising programme was seen as important, as was setting an expectation that behavioural change (with ongoing education backed up with enforcement) can happen faster.

A significant theme in relation to people was the range of issues around vulnerable and/or active road users. Consideration about what was needed to keep older drivers safe, how they should stop driving, access to other forms of mobility (but also some concerns these such as scooters) came under a range of safe mobility issues for older New Zealanders. A focus on cyclists and pedestrians was also seen as important, including separating cyclists and pedestrians from motorized transport and each other. Local government planning and investment for vulnerable or active road users was referenced regularly, and "share the road". This discussion often centred on the need for a system designed for all road users and their safe accessibility to it, and included recognition of public transport as the safest mode of travel.

It was considered that more could be done in driver education and licensing, not only for youth but also for experienced drivers, and also for visiting or overseas drivers. More practical and targeted in schools was referenced. There was also common concern about unlicensed driving which was considered to be due at least in part to issues in rural/remote communities and costs of service. The connections with the justice system – thinking around family/social system/ education – were also a concern, as were a need to identify ethnic/socioeconomic barriers to safer use and take appropriate action. Tougher licensing rules may be needed, but people need to be kept involved in the road transport system.

Of the range of behavioural issues raised, drug driving (both illicit and prescription) was regularly raised alongside continued concern with alcohol. Recidivist alcohol

and drug offenders were a particular concern, with a need expressed to address underlying issues, developing/identifying programmes and getting offenders to attend. Distraction and mobile phone use were also concerns.

Stronger leadership and capability, including the need for both a political safety champion and an independent safety champion, was seen as important, as well as strengthening the vision, and establishing national targets. Continuing to pursue and promote the safe system approach featured strongly, including as one participant group put it, ensuring all road system thinking should include "swallowing the safe system pill."

Funding, and safety funding models were seen to be areas requiring attention, and the connection with local planning and funding cycles. Local roads and footpaths need funding, and there was a view that much better alignment of a national road safety action plan was needed with local annual plans, regional land transport plans and associated funding cycles.

Better alignment with other organisations (such as health and education entities within the public sector), and with other transport components such as public transport, and social systems was promoted. Continuing to break down institutional barriers, and bridging coordination gaps including for local councils was regarded as important for removing impediments to preventive action. A sector wide capability review was considered important, and clarifying accountabilities between agencies and where leadership lies for different aspects of Safer Journeys. More broadly, it was considered that a greater focus on organizational safety matters was needed, with many different organisations needing a safe system plan.

More data, better data (including regional data) and collaboration on data was considered important, and required commitment. Distinguishing between soft and hard data, and using research and data in decision making was also seen an important.

Different views were expressed also emphasizing the need to account for demographic changes, with comment on the need for an urban safety focus, as this is where 86% of people live, at the same time as significant concern was expressed about issues for rural and remote communities.

The need for greater investment in safer roads and roadsides – for wire rope median and roadside barriers, wide centerlines, removal of culverts, improved rail level crossings, safer intersections – was regularly referenced. It was considered that corridor safety retrofitting based on KiwiRAP and the One Network Road Classification should be based on continuing the funding stream from Roads of National Significance.

More account was considered to be needed of the mix of uses and increased volume on roads, and concern about safety on mixed use urban arterial roads reflected a generalized concern about the safety of cyclists and pedestrians. The level of service for pedestrians (for example, crossing times) was regarded as important in this. There was considered to be insufficient progress on lower volume local roads for which the funding mechanisms were difficult. Self explaining roads, and better directional indicators for older drivers, were referenced.

New road and vehicle technology, including enabling technology that connects satellites roads and vehicles within the road transport system was regarded as important. More specifically, incentivising the acceleration of safer vehicle technology into the fleet was seen as critical, particularly for light passenger vehicles and in fleets. Smarter vehicles that give instant feedback to drivers and that take the driver out of the system were being looked forward to. Regulatory control was also seen as very important, in relation to motorcycles, cars and trucks.

Compulsory third party property insurance was raised, but insurance mechanisms more broadly through ACC and others was seen as an important area to improve the safety of high risk users and vehicles. Post crash care was regarded as an area which should be considered further.

Speed management was regarded as critical, across the four intervention pillars, and work on the Safer Speeds Programme needed to keep progressing. Addressing community expectations regarding efficiency and speed, and increasing understanding of speed limits and the suitability of driving speed was important. There was seen to be a disconnect between survivability and travel speed, with interest in behavior change work going faster and pushing harder regarding the unacceptability of speeding. The conversation needed to be about big changes being required, in many different respects, including technology in the car.

The future of automated enforcement and the enforcement tolerance were seen as important issues to address, as well as whether NZ Transport Agency should be involved in speed enforcement. Speed limits were often regarded as too high, and needed to be credible, homogeneous, simplified.

Most Significant Potential Interventions

Thinking about the next action plan for Safer Journeys, covering up to a four-year period, please note down what you think are the two or three most significant actions that could be taken, and who would take those actions. These actions could be entirely new, or represent significant change or scaling up in a current activity.

Safe Roads & Roadsides

- Road safety action plans in road controlling authorities need to include high risk rural roads and urban arterials
- Increase investment in safer roads and roadsides for both State Highway and Local networks
- There needs to be greater investment in local roading networks, and a dual carriageway for the length of SH1
- Focus on high risk rural roads and urban arterials with protection for all road users
- Address 1 and 2 star rating roads (low collective / high personal risk roads)
- Incorporate KiwiRAP star ratings into One Network Road Classification
- A big picture vision of safer road infrastructure is needed, along with empowering people to enter into conversations with RCAs
- Install more wire-rope barriers on higher traffic volume rural roads, or reduce speed

- Work with utility providers to reduce poles as a roadside hazard
- Remove utility poles as a roadside hazard
- Ensure properly cambered roundabouts and drainage support heavy vehicle movements
- Use road hierarchy to encourage safe system design – for example, lower speeds on subdivision roads and removing ribbon development
- Continue to use top 100 methodology to eliminate design and behavior problems at intersections

Safe Speeds

- Achieve simplified speed limits (50 – 80 – 100 kmh), credible speed limits, homogenous speeds and appropriate speeds for the road
- Introduce one speed for all motor vehicles on rural roads with 90 kmh limit, and 100 kmh on multilane roads
- Make a call on 30 km/h for urban speed management
- Increase support for variable speed zones, for example around schools
- Change speed rules so that we have more consistency, including consistency between posted speed limit and driving environment
- Set safer speed limits that match the road
- Increase public acceptance of new speed limits (compared with what happened in Hastings)
- Increase public understanding of speed ranges suitable for a road
- Continue and speed up implementation of the Safer Speeds programme, and link the programme with investment levers and the One Network Road Classification
- A multifaceted engagement on speed to get the community wanting speed limits, using advertising, community meetings, signage, explanations for why limits are as they are, and technology vehicle activated signs
- A comprehensive approach with a literature review on what works and what doesn't; outcomes and associated options for extra funding which address capital versus operating funding issues; stronger enforcement with reduced tolerance; increased camera technology (speed, red light/speed, point to point); stronger penalties; changing the conversation
- Speed management should be a mandatory focus of performance measures for road controlling authorities
- Focus speed management attention on vulnerable road users (old, cyclists, pedestrians etc
- Get back to the legislated limit, not an enforcement tolerance

Safe Vehicles

- Reduce the lag between safe vehicles and other safety elements
- Explore safer vehicle technology where there is a big opportunity for gains, particularly as autonomous features become more available
- More actions to speed up safety technology including C-ITS
- Work with insurance industry to reward safer vehicles and to use safer technology

- Encourage a better safety attitude amongst fleet managers, encourage attrition of old technology, and use of ACC and other insurance mechanisms for this
- Promote the value of buying and maintaining the safest vehicle that can be afforded
- Incentivise purchase of newer cars so the average age of fleet comes down
- Regulate safer vehicles through ANCAP ratings, which will be easier for keeping current with technology
- Heavy vehicle safety standards need a focus with improved visibility of trucks, and underrun protection
- Require speed limiters on trucks
- Mandate star rating system of used imported vehicles
- Stop importation of 1 and 2 star rated vehicles
- Establish a clear policy on end of life, with a progressive age limit
- Educate drivers on maintenance
- Continue to push for the safety of all vehicles and trailer units

Safe Road Use

- More effective legislation and enforcement
- Keep the foot on the accelerator in terms of business as usual and investment on alcohol
- Initiate discussion over the next four years about a zero tolerance for alcohol, leading to legislative change
- Initiate discussion over the next four years about tolerance and testing for drug driving, leading to legislative change
- Mandate 120 hours with the graduated driver licensing system
- Support Traffic Alcohol Groups with Police
- Provide wrap around support service for repeat drink drivers through health, justice, police and family services and programs in the community
- Introduce “constructive justice” for traffic offenders, with evaluation and assessment of traffic offenders, and diversion schemes to address the underlying issues
- Consider introducing the South Dakota 24/7 Sobriety Program
- Toughen penalties
- Introduce a random drug testing regime
- Recognise New Zealand’s responsibility for overseas drivers
- Generate a culture change regarding the speed environment on rural roads, starting at junior school level with 20 kmh speed around school buses
- Increase awareness programmes regarding school buses
- Reduce tolerance to speeding and drink driving
- Develop tools to support cultural shift in addition to publicity
- More education on lower alcohol limits
- Provide general education on known crash factors attributed to driver, such as fatigue
- Increase booster seats for seven year olds
- Extend professional development requirements for drivers and contractors

- Get 16-24 year olds fully licensed to support disadvantaged communities and address rural poverty
- Provide mobile licence testing at schools, and get industry involved in training
- Address the needs of people without a drivers licence to access facilities and services in their communities
- Improve practice for young drivers through simulators and defensive driving training
- Incorporate driver licensing into the school curriculum, and use the student loan system for vocational learning
- Improve equity in the delivery of and access to full driver licence for various rural, cultural, refugee & migrant and vulnerable youth communities
- Establish unit standards as an incentive to use the road code as a literacy tool
- Foster shared responsibility, sharing the road, and respecting active users
- Fix the alcohol interlock system
- Increase alcohol interlocks
- Assess potential limits to education and knowledge
- Improve higher order skills by addressing cognition factors rather than skills
- Change people's perception of their driving behavior through self monitoring smartphone applications, insurance linkages between incentives and technology, and mentoring and coaching
- Reinvent the way driver education is delivered with coaching and teaching, and reinvent context of driving – for example in a shared space, "drive social" – so people want to actively improve their driving
- Lower insurance premiums, ACC premiums, and registration fees as incentives for safe drivers
- Introduce a safety lottery for safe drivers, paid for out of speeding fines
- Change attitudes through education, through link education to industry and employers, and starting young in schools
- Engage with industry regarding the management of driver impairment issues such as alcohol, drugs and fatigue in a workplace health and safety setting
- Make changes to legislation that supercedes employment agreement so industry are more compelled to act in workplace driver safety and fitness
- Introduce mandatory sleep apnoea testing, and remove the threat to the drivers licence from diagnosis to encourage testing (especially for heavy vehicle drivers as they age), also for other medical conditions such as eyesight
- Improve health testing for commercial drivers, by building this into workplace health and safety requirements, and encouraging ACC to include this in premium ratings of a particular workplace

Safe Vulnerable and Active Road Users

- Achieve fatality reductions for pedestrians, cyclists, motorcyclists, older road users by getting more people out of cars into active modes and public transport

- Comprehensively address the safety of active road users, by changing design manuals and standards for road design and then using the standards, ensure collaborative planning processes, and land use planning for all modes
- Provide greater separation of road users for roads, with new roads built to accommodate all road user needs, and main arterials retrofitted
- Provide more data for decision making to enable safe pedestrian journeys
- Include elements such as demographics of pedestrian catchments when deciding on road crossing facilities
- Eliminate the flashing red man traffic signal which is considered responsible for about 40% of pedestrian-vehicle crashes at signals
- Include cycle safety in road safety education in primary schools
- Require evidence of cyclist experience to gain a drivers licence
- Prepare for the ageing population with a focus on infrastructure and public transport
- Address issues regarding older people's mobility, such as costs of testing and using doctors as enforcers
- Review driver licensing and assessment for older drivers
- Create an approach to motorcycles that recognises they are part of the transport network, and makes them safer
- Introduce moped licences
- Require anti-lock braking systems on all 250cc+ motorcycles
- Create incentives for motorcycle safety gear with subsidies
- Ensure speed cameras capture motorcycles
- Improve messaging and signage for all visitors and languages
- Make New Zealanders more mindful and tolerant of overseas drivers

Specific Management Actions

Thinking about what will be needed to support and drive significant improvement in road safety in New Zealand over the remainder of the decade, and what may be important to prepare ahead for the following decade, please note down two or three elements which you think are critical and specific actions that might be taken.

- Increase safety leadership across all organisations – Chief Executives, corporates, non government organisations
- Make road safety a Government and cross-party public health issue
- Have government and NGO Chief Executives take safe system training
- Establish a Parliamentary Commissioner for road safety
- Introduce safe system education for public with a nationally coordinated approach
- Spend time on the big picture – lets pause and fix what is in place
- Continue investment in safe system understanding, developing safety management systems, promoting safe system thinking
- Get buy-in and understanding by public and government to safe system
- Increase effort across all organisations into safer journeys (health, transport, police, NGOs)

- Crowd sourcing road safety by giving the public more opportunity to input into road safety at a policy level, and also to give feedback on unsafe roads, roadsides, signage etc
- Create multi-sector education to raise the profile, inform about statistics, understand funding
- Get people to understand safe system which changes language and nature of discussion around interventions and helps to deal with myths
- Improve interaction with other societal systems and a wider transport goal
- Focus third action plan on a small number of actions
- Fix what has recently been put in place, and do not just put in new stuff – for example address the poor uptake in alcohol interlocks due to design of system, and funding issues in local areas
- Increase the safety contribution and funding of local councils
- Amp up planning processes at the local level through road safety action plans, better coordination, interface with industry, incorporating safer journeys planning, including focus on vulnerable road users, and a speed management plan (with safety performance measures for roads)
- Develop a joint NZ Transport Agency/RCA/NZP approach with national guidance and accountability mechanisms through Regional Land Transport Committees, and give road safety a political profile, incorporate potential ACC role
- Mandate joint road safety planning with local government as local road controlling authority action planning is not working
- Remove 73 road controlling authorities and have just one big one
- Ensure that safety and not just environment is integrated into district plans, land use and consents
- Increase local government road safety activity with evidence based programmes, local oversight role of safe system, involving road safety coordinators, council and road managers
- Prioritise workplace health and safety on the road with a real focus on using legislation to identify and manage work related risk on the road addressing users, vehicles, journeys, and management
- Strengthen the Fleet Safety Programme
- Increase investment in the Fleet Safety Programme
- Ensure new occupational safety and health legislation and priorities take into account safer journey planning
- Strengthen chain of responsibility legislation
- Implement learning from four signature projects
- Assign safety star ratings to motorcycles / cyclists
- Set a national target for deaths and serious injuries
- Delete “increasingly” from vision – a safe road system free of death and serious injury – we need a goal
- Set more defined targets based on facts and data
- Establish a specific target or goal – less than the OECD average, or best in Australasia
- Align NZ Transport Agency’s investment tools with priorities

- Increase public transport and reduce number of cars
- Address the funding disconnect between national versus local/regional needs which sees local/regions struggling for funding to get work done
- Establish a dedicated road safety fund, with hypothecated fine revenue
- Hypothecate infringement fines into road safety technology, such as vehicle feedback technology and intelligent speed adaptation
- Make best use of resources – for example through Fleet Safety Programme and Practice
- Fund a social marketing campaign to change the safety conversation
- Support a cultural shift towards safe system
- Establish a legislative environment to support/enable self-drive cars – an ITS strategy for smart vehicles
- Look for ways to achieve road safety gains as secondary effects of other activities (for example, fuel economy)
- Break down barriers between police/engineers/planners etc, and future proof liaison work
- Promote national data collection and safety analysis between NZ Transport Agency, Police and ACC
- Make good use of data – for example, KiwiRAP, urban KiwiRAP, high risk intersections, NZ Transport Agency research
- Assess the safety impact of long-term trends regarding older population, health and licensing
- Improve interrogation of data, quality of information gathered and research activity
- Share information under the Privacy Act where it will support life saving interventions
- Increase research funding and leadership
- Develop a faster link between crashes occurring and this being reflected in traffic intelligence outputs
- Establish incentives at the procurement level to create benefits for buying a safe car and designing a safe road
- Establish incentivised performance systems amongst road controlling authorities with target safety metrics
- Use technology to incentivize safety through financial reward, by using GPS measurement to reduce insurance premiums for example

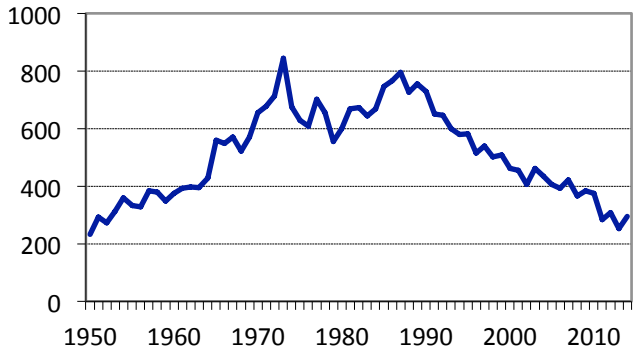
Safer Journeys Workshop

Notes and Requests for Participants

These notes have been prepared to provide workshop participants with the opportunity to prepare their own thoughts for input during the workshop.

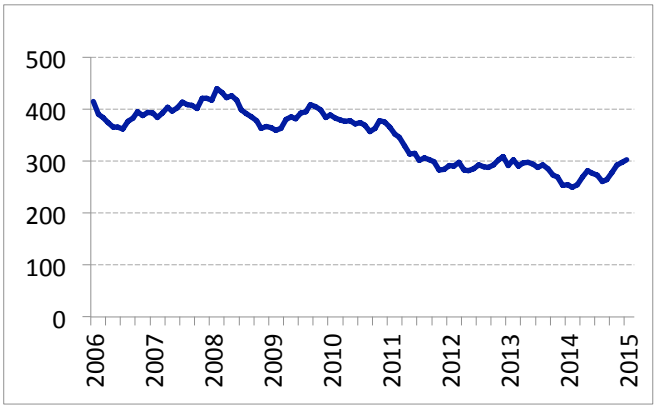
Road Safety Performance

New Zealand's overall level of road safety performance is very broadly summarised in the following three graphs.



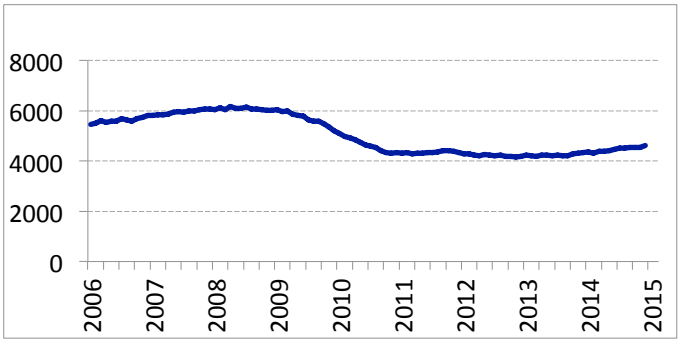
Road Deaths Historical

The historical trend is unmistakable – after two substantial peaks in 1973 and 1987, New Zealand is heading towards the elimination of road deaths. A question is what is an acceptable period within which this will be achieved.



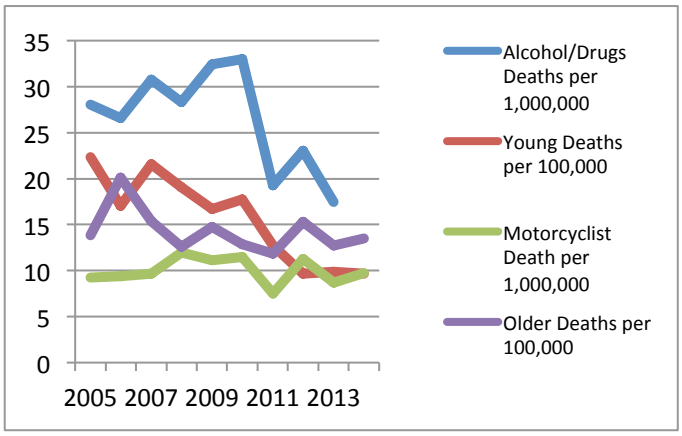
Road Deaths Current

Progress continues to be made over time. There are on average about 100 fewer fatalities per annum in the last three years (2012-14) than in 2006-08, and 50 fewer than in 2009-11. But the average annual fatalities over the last three years has plateaued at around 285, and is currently worsening.



ACC Entitlement Claims

Non-fatal injuries show a similar picture. A significant decline in ACC entitlement claims for example has subsequently levelled off and been followed most recently by a steady rise in claims. A question is what would be needed to shift this current plateau in performance.



Targets

No overall fatality or injury targets were set in Safer Journeys, but four intermediate targets were set:

- Alcohol related fatalities per 1,000,000 population reduced to 22. Achieved.
- Deaths of young road users (15-24) per 100,000 population reduced to 13. Achieved.
- Motorcyclist deaths per 1,000,000 population reduced to 8. Not yet achieved.
- Deaths of older road users (75+) per 100,000 population reduced to 11. Not yet achieved.

Thinking about road safety in New Zealand over the last four calendar years, please note down what you think are the two or three most substantial changes that have been made to improve the safety of road users in New Zealand.

The Safe System Approach

Safer Journeys explicitly aligns itself to the "safe system" approach to road safety, an innovative and evidence based approach which focuses attention on the ultimate goal of eliminating fatal and serious injury on the road. It is now well entrenched internationally as the best practice framework for leading injury prevention efforts on the road.

The safe system approach is described in a variety of ways, and in New Zealand is summarised in the following graphic which contains the following elements:

- A vision at the core of the approach
- An overriding principle related to that vision
- Four intervention areas to focus activity
- Six management functions to shape delivery

Each element can have a significant impact on the implementation and success of a road safety strategy:

- A vision can set the degree of ambition and a clear direction
- The application of a principle in decision making can significantly alter what is done
- The intervention areas can provide important definition to the areas that are the focus of delivery

- The management functions can provide the essential drive that shapes the quality and effectiveness interventions.

Looking forward over the remainder of this decade, please note down two or three elements of this overall framework in which you think greater attention is needed.

Safety Interventions

There are a thousand and one things that can be done to improve the safety of road users, and there is an extensive body of research and evidence both in New Zealand and internationally about what is effective.

A significant task is often not just determining what interventions would be effective and cost-effective in the New Zealand context, but also prioritising interventions and putting enough resources in to have a substantial effect. The most effective and successful action plans often have a smaller schedule of high priority actions which it is agreed will have a significant impact on results.

Safer Journeys identified the following areas of concern:

- increase the safety of young drivers
- reduce alcohol/drug impaired driving
- achieve safer roads and roadsides
- achieve safer speeds
- increase the safety of motorcycling
- improve the safety of the light vehicle fleet
- achieve safer walking and cycling
- improve the safety of heavy vehicles
- reduce the impact of fatigue and address distraction
- reduce the impact of high risk drivers
- increase the level of restraint use
- increase the safety of older New Zealanders.

There are a number of different ways of thinking about interventions. Some trends in best practice countries are:

- Focusing infrastructure safety activity on intersections, median and roadside protection on high speed roads, and protection of cyclists and pedestrians
- Focusing vehicle safety initiatives on accelerating the entry of significant new vehicle safety technologies to avoid truck, car and motorcycle crashes
- Taking a change management approach to addressing the legacy of promoting increased motor vehicle speed over safe mobility
- Increasing the use of vehicle based technology to address ongoing road user behaviour issues.

A significant task is often not just determining what interventions would be effective and cost-effective in the New Zealand context, but also prioritising interventions and putting enough resources in to have a substantial effect. The most effective and

successful action plans often have a smaller schedule of high priority actions which it is agreed will have a significant impact on results.

Thinking about the next action plan for Safer Journeys, covering up to a four-year period, please note down what you think are the two or three most significant actions that could be taken, and who would take those actions. These actions could be entirely new, or represent significant change or scaling up in a current activity.

Safety Management

One of the biggest international lessons in road safety over the last 10-15 years has been appreciating the significance of various management functions and systems to the achievement of results. This includes not just the internal systems which an organisation may have in place, but also the interaction of those management systems with other major stakeholders or clients.

Safer Journeys identifies six such management elements:

- Legislation and enforcement
- Leadership and capability
- Education and information
- Admission to the system
- Understanding of crashes and risks
- Innovation

This is broadly consistent with how these have been described in good practice environments internationally, with one such framework identifying the following key management elements: focus on results; coordination; legislation; promotion; funding and resource allocation; monitoring and evaluation; and research and development and knowledge transfer.

Thinking about what will be needed to support and drive significant improvement in road safety in New Zealand over the remainder of the decade, and what may be important to prepare ahead for the following decade, please note down two or three elements which you think are critical and specific actions that might be taken.

ATTACHMENT C LITERATURE REVIEW

A literature review was conducted for the purpose of looking at promising new and emerging road safety initiatives that may be appropriate for consideration in New Zealand. The authors examined road safety planning documents from high performing countries across the world, such as the Netherlands, Sweden, Norway, Germany, the United Kingdom, Australia as well as jurisdictions in the United States of America and Canada.

Research databases including as TRID and Google Scholar were used to identify evidence for key initiatives. Recent research was also reviewed from organisations such as the Institute for Road Safety Research in Netherlands (SWOV), the Swedish National Road and Transport Research Institute (VTI), the National Highway Traffic Safety Administration (NHTSA), and Austroads, as well as reports from databases and websites like the International Transport Forum, and the DaCoTA project and other European Commission reports.

The research presented is not intended to be exhaustive. It is intended to indicate areas of new or potentially effective road safety initiatives which merit consideration for implementation or intensification in the New Zealand context.

Road Safety Management

A 2008 joint OECD/ITF report "Towards Zero: Ambitious Road Safety Targets and the Safe System Approach" noted:

> *The limits to improved road safety performance are also shaped by the capacity of the road safety management system operating in a country. This determines the results being sought and produces the interventions to achieve them. The limits to a country's road safety performance are constrained by the institutional capacity to implement efficient and effective interventions, and the subsequent results may fall short of what is technically feasible with any particular set of road safety interventions.*[3]

Road safety management, specifically, has become an increasingly significant area of analysis. A major European study on road safety data, collection, transfer and analysis (DaCoTA) identified policy making and safety management processes as a key issue and concluded that:

> *Despite the differences in European road safety management systems, several elements have emerged as critical "good practice" criteria, such as the presence of a strong lead agency, the efficiency of the implementation-monitoring-evaluation part of the policy making cycle, the embedding of programmes in sustainable and results-focused structures and processes, and*

[3] Organisation for Economic Cooperation and Development and International Transport Forum (2008). *Towards Zero: Ambitious Road Safety Targets and the Safe System Approach*.

the distribution and coordination of responsibilities between national (or federal), regional and local levels.[4]

Indeed, a whole analytical framework for assessing the capacity of the road safety management system in a country to deliver sustained continual improvements in road safety performance has been documented by the Global Road Safety Facility. The associated methodology goes beyond evaluating the potential for improvement from various people, road and vehicle intervention sets, and into the performance of management functions within the institutions which hold responsibility for road safety.

The GRSF identifies seven institutional management functions: results focus, coordination, promotion, legislation, funding and resource allocation, monitoring and evaluation, research and development and knowledge transfer. The focus on results was identified as the primary function. It can be described as being to develop, implement and continually improve a road safety management system including a road safety vision, road safety targets, and interventions and management processes to achieve road safety targets. The significance of this notion of developing and improving a road safety management system was given further weight by the publication by the International Standards Organisation in 2012 of *ISO 39001 Road Traffic Safety Management Systems*.

Target setting is critical to this focus on results and has been an important part of road safety programs and strategies for decades. Elvik (1993) looked at the safety performance of counties in Norway and found that the greatest road safety outcomes occurred in counties that set targets. Building on this, in 1994 the OECD found that the existence of targets and targeted road safety programs increases the likelihood that safety policies would be implemented, and that target setting leads to better and more realistic programs (OECD, 1994).

In 2002 the OECD went further to outline several reasons that targets deliver road safety benefits:

- Setting targets communicates the importance of road safety
- Targets motivate stakeholders and increase accountability for achieving results
- Targets convey the message that the government is serious about reducing road casualties
- Sub-national (ie. State/county) targets widen the sense of ownership by creating more accountability, establishing more partnerships, and generating more action.
- Targets raise media and public awareness, and motivate politicians to support policy changes to provide resources (OECD, 2002).

The analysis used by the National Road Safety Committee to develop New Zealand's Road Safety to 2010 strategy was widely analysed and discussed in the international literature (Koornstra, 2002 and OECD 2008). The notable feature of this work was a

[4] Thomas P, Muhlrad N, Hill J, Yannis G, Dupont E, Martensen H, Hermitte T, Bos N (2013) *Final Project Report, Deliverable 0.1 of the EC FP7 project DaCoTA*.

fully documented and peer reviewed target setting model which used intermediate outcome targets to assist in setting final outcome targets. The imprint of this is still seen today, whether through the good practice advice of the Global Road Safety Facility, or the target setting model subsequently developed by the Monash University Accident Research Centre and widely used in Australia. The Centre for Automotive Safety Research has further extended possibilities in this area through the preparation of a highly disaggregated model to analyse changes in crashes over the course of South Australia's road safety strategy "Towards Zero Together" (Lydon et al, 2015).

The safe system approach incorporates the ultimate goal that road users will never be subject to energy levels that are sufficient to cause death or injury – that is the elimination of deaths and serious injuries on the road (OECD, 2008). In this context, road safety targets are best seen as interim steps on a systematic path towards the vision (UNRC, 2010).

Countries such as Australia, Finland and the Netherlands, and a number of states in North America have adopted versions of a zero fatality vision or goal for road safety (Wennink, 2011). Interim targets have been adopted by countries such as Canada, Japan, Australia, Finland, Norway, Denmark and the UK (Wennick, 2011). They not only provide a way to track progress towards an aspirational target, thereby allowing modification of policies or redevelopment of interventions to better achieve crash reductions, but they also provide clear opportunities for awareness raising through media and an important means to open a dialogue with the community.

Australia continues to set road safety targets as a matter of course, and the targets have not always been met. The headline target set by the National Road Safety Strategy 2001-2010 was for a 40 percent reduction in the per capita fatality rate, but only a 34 percent reduction was achieved (Australian Transport Council, 2011). A mid term review of the National Road Safety Strategy 2011-2020 concluded that Australia was on target to meet the less ambitious target of a 30 percent reduction in fatalities (Lydon et al, 2015).

Interim targets can be aspirational (seeking achievement which is unlikely to be delivered upon) or minimal (seeking achievement which will achieve little more than what is currently being delivered). At their most sophisticated, they offer an opportunity for an empirically based bottom-up approach that inherently meets good practice principles of being specific, measurable, achievable, realistic and timebound (Belin, Tillgren, Vedung, 2010). Empirically based targets involve the identification of current crash trends, which are then used to model the likely outcomes from implementation of selected road safety interventions. Typically the modelling also allows for variations in timing and intensity of policy or program implementation, and other variables such as economic or traffic growth (UNRC, 2010). UK researchers note that this use of a sound methodology, producing realistic targets, can help to ensure jurisdictional motivation and progress towards a common goal (Broughton, Johnson, Knight, Lawton, Lynam & Whitfield, 2009).

Safer Roads

The literature review identifed new road infrastructure initiatives to both enhance the safety of all road users, and target specific vulnerable users and high risk situations.

Roadside and median barrier treatments

In 2014 Austroads examined off road crashes in New Zealand and made a number of recommendations for barrier treatments (Jurewicz, Steinmetz, Phillips, Cairney, Veith & McLean, 2014). The authors noted that the safety benefits from barrier treatments are well documented, citing the European Union Road Federation determination that safety barriers 'can reduce fatalities by a factor of four when compared to collisions against other roadside obstacles'. The report also highlights barrier offset, or distance from the edgeline, as an issue. Installation between 1.5m and 4m appears to be most effective, with installation less than 0.5m from the traffic lane on high speed roads potentially negating any safety benefits. Woolley reinforces the importance of roadside barriers as a safe system approach as opposed to the older focus on clearzones.

The potential for barriers on medians to reduce road deaths is outlined in the NZ Strategy (NZ Transport Agency, 2011). They have been used to effectively address cross centreline crashes in many jurisdictions such as Sweden, where Carlsson (2009) reported a 76 percent reduction in fatalities on Swedish roads fitted with a 2+1 lane design with wire rope median barriers. Austroads (2010) recommended consideration of barriers on medians less than 15m wide, but noted that they may also be beneficial on wider medians depending on the nature of the crash risk at individual sites. This is consistent with research on the use of flexible barriers in narrow medians which has been found to significantly reduce fatalities and injuries on roads in Sweden and New Zealand (Nilsson & Prior 2004; Crowther and Swears, 2010).

Median barriers prevent cross centreline crashes and crashes where the vehicle leaves the roadway. Where they cannot be justified even with a safety focused analysis and resource allocation process, wide centreline treatments can be deployed. The NZ Transport Agency has trialed wide centrelines at a number of locations with the stated aim of addressing driver fatigue, inattention, and illegal overtaking manoeuvres which result in cross centreline crashes (NZ Transport Agency, 2011). Treatments generally replace the existing solid or dashed centre line with lines one metre apart, and in some cases with the addition of audio tactile line marking and additional cross hatching. Trials are also going on in a number of Australian jurisdictions and elsewhere (Department of Planning, Transport and Infrastructure, 2013; Levett, Job, & Tang, 2009; Sagberg, 2006). Wide centreline treatments are best seen as a step towards actual median barrier separation, but results have been positive in terms of both road user behaviour and crash outcomes. The NZ trial showed increased lateral separation of vehicles by an average of 0.6m, while NSW and Norwegian studies have shown reduced vehicle speeds and greater lane discipline (NZ Transport Agency, 2012; Connell, Smart, Levett, Cleaver, Job, de Roos, Hendry, Foster & Saffron, 2011; Sagberg, 2006). Most encouragingly, Queensland Department of Transport and Main Roads reported that the installation

of wide centrelines at a trial site on the Bruce Highway led to a 58 percent reduction in crashes (Transport and Main Roads, 2012).

Barrier systems for motorcycles

In collisions with crash barriers motorcycle riders have been found to be 15 times more likely to be killed than a car occupant, with vertical barrier posts causing a five-fold increase in injury severity compared to the average motorbike crash (EuroRAP, 2008). In response to this risk new barrier systems are being designed to reduce the likelihood of riders sliding under the roadside barrier rail, and to minimise rider contact with the vertical posts.

In 2010 and 2011 South Australia conducted trials of a Spanish flexible fabric mesh barrier that provides a continuous layer of protection below the guard rail and in front of the vertical posts. An alternative galvanised steel screen or rail was also tested during the trial. While crash numbers during the trial were too low to allow for crash outcome evaluation, the authors concluded that both the fabric and the galvanised steel barriers are effective products, with choice of installation dependent on the nature of road and barrier alignment (Anderson et al., 2012). Similar add-on systems, called "motorcycle friendly crash barriers", have been trialed in the UK, with reports of reduction in injuries at the trial sites (Department for Transport, 2011).

In 2014 the New South Wales Centre for Road Safety and Roads and Maritime Services announced a trial of "Rub Rails" on crash barriers. The tubular rail is mounted low to the ground, below the existing guard rail, and is designed to prevent the motorcyclist from hitting the crash barrier's vertical posts. No results of the trial have been reported to date (Transport for NSW, 2014). German research has also led to the development of a cap system for the top of the vertical barrier posts aimed at reducing upper body injuries for motorbike riders (Nicol, Heuer, Chrysler, Baron, Bloschock, Cota, Degges, Garber, Kolb, McGrath, Moreland & Tan, 2012; Berg, Rucker, Gartner, Konig, Grzebieta, & Zou, 2005).

Intersection treatments and roundabout design

The NZ Strategy proposes to focus safety programs on high risk urban intersections (NZ Transport Agency, 2011). Intersections present a higher level of crash risk than other parts of the road network because of the threatening angles of impact and potentially high collision speeds (Corben, Candappa, Van Nes, Logan & Peiris, 2010). By way of example, in a study of NZ killed and serious injury crashes from 2006-2010, Cairney, Bradshaw and Turner (2011) found that almost 18 percent involved cross/turning manoeuvres. In a report for Vicroads, Monash University Accident Research Centre noted that reducing travel speed (and hence impact speed) is the most effective way to reduce risk of a fatal or serious injury at intersections (Corben, et al., 2010).

The potential for new roundabout designs to significantly improve intersection safety was highlighted in the Netherlands, with the installation of new roundabouts with raised lane separators restricting vehicle lane changing on the roundabout. A crash evaluation of these "turbo" roundabouts showed an 80 percent reduction in injury crashes (Fortuijin, 2009). Corben et al. (2010) also outlined a number of new

and novel designs for intersections including speed humps on the approach to intersections, raised platforms at the centre of intersections, and a range of new roundabout designs with cut through lanes allowing right turning traffic to proceed through the roundabout.

Safety infrastructure for pedestrians and cyclists

Intersection treatments are also aimed at cyclist safety. In a recent Dutch study Schepers (2013) reported that using raised bicycle crossings at intersections (ie. a speed hump across the intersection, perpendicular to traffic), and separating the bicycle path 2-5m from the main carriageway on the approach to the intersection, has been found to significantly reduce crashes at intersections where the cyclist has right of way (ie. bicycle is on the priority road).

High Visibility Crosswalks are designed to enhance awareness and conspicuity of pedestrian crossing manoeuvres. This is expected to increase pedestrian confidence and usage of the facilities, and decreasing motorist and pedestrian failure to yield. A 2012 US study found that after the installation of a high visibility crosswalk significantly more pedestrians looked for vehicles before they began to cross. The study also showed a significant improvement in the proportion of drivers who yielded to pedestrians, and a significant increase in the distance at which drivers stopped (Pulugurtha, Vasudevan, Nambisan & Dangeti, 2012). Crash outcomes from high visibility school crosswalks are discussed by Feldman, Manzi and Mitman (2010) who found a 37 percent increase in safety at intersections with high visibility yellow road striping and fluorescent yellow-green pedestrian signage. Similarly, a 2010 study in New York City found high visibility crosswalks with longitudinal white stripes constructed from thermoplastic materials reduced pedestrian crashes by 48 percent (Chen, Chen, Ewing, McKnight, Srinivasan & Roe, 2012). Based on this evidence the Pedestrian Bicycle Information Center report for the Federal Highway Administration concludes that transportation agencies should install high visibility markings at uncontrolled crossing locations whenever a decision is made to provide marked crosswalks (McGrane & Mitman, 2013).

Engineering safer road user behaviours

Road treatments can not only reduce the likelihood of having a crash, and the level of trauma resulting from a crash, but can also encourage safer road user behaviours. For example, the UK Strategic Framework for Road Safety proposes the installation of Vehicle Separation Marking (chevrons) as a low cost countermeasure to discourage vehicles following too closely (Department for Transport, 2011). The inverted arrow head markings are painted on to the road surface at 40 metre intervals, with roadside signs advising motorists to keep “two chevrons” from the vehicle in front. Trials on the M1 motorway in Britain in the mid 1990’s showed a statistically significant 56 percent reduction in crashes on and near the chevrons, compared to control data (Helliar-Symons & Butler, 1995). Multi-vehicle crashes reduced by over 40 percent and single vehicle crashes reduced by almost 90 percent. Encouragingly, the crash reduction effect persisted for 18km from the start of the road markings. Road user behaviours leading to this crash reduction were examined in a study from Denmark, using loop detectors to look at traffic flow, speed and gaps (Griebe, 2010). The trial of vehicle separation marks on five road sections found that

two months after installation the treated sites showed fewer vehicles with small gaps (gap <1 second). The number of vehicles with gaps less than two seconds was also reduced, and speed was reduced slightly. The largest effects on gaps and speed were found to continue up to seven kilometres downstream from the road markings. A survey conducted as part of the study showed that that the purpose of the markings was well understood, and that majority of drivers claimed to have changed behaviour by leaving a greater gap to the vehicle in front (Griebe, 2010).

Summary

Safety benefits from barrier treatments are well documented. Expansion of their use onto medians has shown significant crash benefits, reducing vehicle speeds and increasing lane discipline and lateral separation of vehicles.

However, the vertical posts on barrier treatments are a significant injury risk for motorbike riders. Trials of "motorcycle friendly crash barriers" where the vertical post is protected with fabric or galvanised steel have shown that it is an effective mechanism to protect motorcyclists. The current NSW trial of "rub rails" under guard rail is applying a similar concept. UK trials of motorcycle friendly crash barrier systems have shown injury reductions at trial sites.

Intersection crashes are being addressed with new roundabout designs, speed humps on the approach to intersections, and raised platforms at the centre of intersections. New intersection treatments such as raised bicycle crossings, separation of the bicycle path from the main carriageway, and high visibility crosswalks, have been shown to significantly reduce crashes involving cyclists and pedestrians.

Road treatments can also be used to shape road user behaviour, as shown by UK and Danish trials of Vehicle Separation Markers (chevrons) painted onto the road surface. Results showed the markers significantly reduced close following behaviours and crashes, both at the trial site and up to 18km downstream.

Safer Vehicles

Intelligent transport systems

Cairney et al. (2014) examined casualty crash data from New Zealand from 2001 to 2010 and found that key crash types were loss-of-control on a curve, crossing/turning, loss of control on a straight, and rear-end/obstruction. Based on this analysis the authors recommend safety measures focus on: keeping vehicles travelling in their own lane and preventing them from straying off the roadway or into opposing lanes; vehicles crossing one another's path; and vehicles running into the back of other vehicles.

There are a number of well documented intelligent transport systems now in development or being incorporated into new vehicles which are aimed at addressing these crash types. Some, such as Electronic Stability Control (ESC[5]) and Intelligent

[5] Electronic Stability Control (ESC) is a computerised technology that improves a vehicle's stability by detecting loss of steering control and automatically applying the brakes and reducing engine power to help correct the steering error.

Speed Adaptation[6] (ISA), have already been outlined in the NZ Strategy (NZ Transport Agency, 2011). Others include warning systems such as Advanced Driver Assistance Schemes, lane departure and following distance systems, and connected vehicles.

As noted in the NZ Strategy, research shows that ISA systems that provide a warning for drivers would achieve significant reductions in fatal crashes (NZ Transport Agency, 2011). Field trials in the UK and New South Wales suggest that this advisory ISA could reduce fatalities and crashes, by eight percent and 2.7 percent, respectively (Lai, Carsten & Tate, 2012; Creef, Boland, Vecovski, Prendergast, Stow, Fernandes, Beck, Doecke, & Woolley, 2011). A 2012 New Zealand study estimated that the introduction of advisory ISA could reduce fatal and injury crashes by up to 22 percent on urban roads and five percent on rural roads, while an analysis of mass crash data in Australia suggests that advisory ISA could reduce injury crashes by 7.7 percent (Waibl, Batt, England, Thomas, Mora, Frith, Rive, Jamson, Carsten & Lai, 2012; Doecke & Woolley, 2011).

The addition of speed limiting to an ISA system is estimated to significantly increase the potential crash reductions. UK field trial results suggest a 29 percent reduction in crashes, and an analysis of crash data in Australia indicates a similar 25 percent reduction in injury crashes (Lai et al., 2012; Doecke & Woolley, 2011).

Advanced Driver Assistance Systems[7] (ADAS) can support older drivers to navigate complex and higher risk manoeuvres such as crossing uncontrolled intersections. For example, a 2013 simulator study used an intersection assistant with a head up display showing a green, amber or red flag to advise older drivers whether it was safe to cross an intersection (Dotzauer, Caljouw, de Waard & Brouwer, 2013). While only a small study, results were encouraging, showing that older drivers who used the intersection assistant were more likely to focus their attention on the highest risk area of the intersection, and cross the intersection faster, compared to the comparison group without the ADAS.

Lane Departure Warning (LDW) systems use a forward viewing camera and image processing technology, plus information on steering wheel angle and indicator use, to detect a vehicle unintentionally leaving its driving lane. The system then provides an audible, visual and/or tactile alert to the driver to take corrective action. Estimates of the effectiveness of this technology have ranged between two percent (Paine, Healy, Passmore, Truong, & Faulks, 2008) through to ten percent (iMobility Effects Database, n.d.). More recently, a 2011 examination of Australian historical crash data found that, while the Benefit Cost Ratio of LDW for passenger vehicles is somewhat low at 0.3, it rises to 2.2 for trucks. Overall, the study concluded that the technology could reduce fatal crashes in Australia by seven percent (Anderson, Hutchinson, Linke & Ponte, 2011).

[6] Intelligent Speed Adaptation (ISA) uses Global Positioning Systems (GPS) and speed zone maps to identify the speed limit. Advisory ISA provides a warning when the vehicle goes over the speed limit, while Limiting ISA uses electronic control of the engine to prevent the vehicle exceeding the speed limit.

[7] The term Advance Driver Assistance Systems (ADAS) refers to electronic technologies which support driving task such as Adaptive Cruise Control and Lane Departure Warning.

Connective technologies

New connective technologies allow vehicles to "talk" to each other or to the surrounding infrastructure, facilitating the passage of warning messages and information relevant to the driving task. Vehicle- to-vehicle (V2V) technologies allow vehicles to send information regarding their position and speed, and even emergency information. In a 2001 Austroads report Taranto, Young and Logan examined the potential benefits of V2V technology in Australia. They determined that when applied to the entire Australian vehicle fleet, technology to broadcast location, speed and direction of travel to predict collisions, and provide warnings to drivers of an approaching conflict, could reduce annual serious casualties by 25-35 percent (Taranto, Young and Logan, 2011).

Other vehicle solutions go beyond warning systems to vehicle control, effectively stopping drivers from making dangerous errors. A recent Australian review of light vehicle technologies examined a range of studies from the US, Germany and Australia, finding that Autonomous Emergency Braking (AEB) could prevent approximately 20-40 percent of crashes (Searson, Ponte, Hutchinson, Anderson & Lydon, 2014). AEB works by a vehicle detecting an obstacle in its path and braking without any intervention by the driver. The potential safety benefits of AEB have recently been recognised in an Australian vehicle insurer's incentive scheme, which provides premium reductions of up to 15 percent if the technology is fitted to the insured vehicle (NRMA, 2014).

Following distance warning (FDW) systems use dopplar-based radar systems to detect objects that come within a predefined interval in front of the vehicle and provide audio and/or visual warnings to the driver about safe following distances. Paired with an adaptive cruise control (ACC) system, it becomes a vehicle control system that can automatically maintain a set following distance between the vehicle and the one in front of it. A 2007 heavy vehicle field test by Volvo found that together these systems could reduce rear end collisions by between 23-28 percent, and help drivers maintain longer following distances to the vehicle in front (Battelle, 2007). Further US modelling in 2009 using heavy vehicle crash data estimated that the combination of FDW and ACC would reduce heavy vehicle rear end crashes by 20 percent (Murray, Shackleford and Houser, 2009).

Introduction of new vehicle technologies

Regulatory pathways provide a means of introduction of new systems and technologies into the vehicle fleet, such as successful mandating of ESC on new vehicles in Europe, Australia and New Zealand (European Commission, 2007; Albanese, 2009; Ministry of Transport, 2014). Alternative mechanisms range from providing safety information to the general public, partnering with industry and encouraging major fleet buyers to purchase vehicles fitted with these safety systems, through to incentive schemes, such insurance discounts for vehicles fitted with proven safety technologies.

Frequently these methods work together to introduce safety technologies into the fleet through a range of concurrent mechanisms. A recent example of this is the move towards the introduction of ABS on motorbikes.

German research suggests that Anti-lock Braking Systems[8] (ABS) could reduce motorbike fatalities by at least ten percent, while a US study indicates that motorbike ABS reduces fatal crash involvement by 37 percent per 10,000 registered vehicles (Seiniger, Schroter & Gail, 2010; Teoh, 2010).

In response to the growing body of evidence for motorbike ABS, the European Union is introducing a new standard that will require ABS on motorbikes over 125cc from 2016 (Council of the European Union, 2012).While the new EU standard for ABS on motorbikes was in development countries such as Germany were also actively lobbing motorbike interest groups to encourage their members to purchase bikes fitted with ABS (Federal Ministry of Transport, Building and Urban Development, 2012). Australian state governments like Victoria are providing information to the public about ABS for motorbikes including lists of manufacturers and motorbike models fitted with the technology (Vicroads, 2015), and insurance bodies like NRMA have been lobbying the government to mandate ABS in Australia (NRMA, 2010).

This collaboration between governing bodies and industry has also been seen in the successful partnerships created under eCall – the European trial of 112 crash notification. Over the 4 years from 2011-2014, 15 countries across the European Union trialled the in-vehicle system which aims to improve emergency response times and reduce the severity of crash outcomes (HeERO, 2014). In the event of a crash, eCall either automatically or manually calls the nearest emergency centre, and transmits relevant location information to emergency services. Trials of the system have shown that it cuts emergency response times by 50 percent in the countryside and 60 percent in built up areas (European Commission, 2015).

Implementation of eCall involved a multi-sector, public/private partnership to develop and deploy the intelligent transport solution. It also included the development of the European Emergency Number Association, which provides a discussion platform for researchers, emergency services representatives, decision makers, relevant associations and public authorities, aimed at information sharing and ensuring the ongoing efficiency of the eCall system (HeERO, 2014).

European legislation currently being finalised will require eCall to be installed on all new cars from early 2018, with all EU countries being able to process eCalls based on 112 from late 2017 or early 2018 (HeERO, 2014; European Commission, 2015).

Summary

There are a number of well documented intelligent transport systems now in development or being incorporated into new vehicles. Trials of ISA[5] systems that provide a warning for drivers travelling over the posted speed limit have shown that it has the potential to reduce injury crashes by between 7.7 and 22 percent. The addition of speed limiting to the system increases the potential for injury crash reduction to up to 29 percent.

ADAS[6] have been shown to support older drivers navigating complex and high risk manoeuvres like intersections, and Lane Departure Warning systems that detect a

[8] Antilock Braking Systems monitor wheel speed, reducing brake pressure when impending wheel lock is detected, and increasing brake pressure is increased when traction is restored.

vehicle unintentionally leaving the driving lane, providing an audible and visual alert to drivers, have been estimated to reduce crashes between 2 and ten percent.

It has also been estimated that Vehicle to Vehicle (V2V) connective technologies, allowing vehicles to "talk" to each other providing warning messages and information relevant to the driving task, could reduce serious casualty crashes by up to 35 percent.

Going beyond warning systems to vehicle control, Autonomous Emergency Braking could prevent between 20-40 percent of crashes, and Following Distance Warning paired with adaptive cruise control could reduce rear end collisions by between 23-28 percent.

Regulatory pathways provide a means of introducing these technologies into the vehicle fleet, such as the recent requirements for Electronic Stability Control in Australia and NZ, and ABS on motorbikes in the European Union. Government collaboration with industry sees interest groups lobbying for change and encouraging their members to adopt new technologies, while government agencies provide information to the community about their benefits.

The highly successful e-Call trial in Europe is an example of the effectiveness of such a collaboration. The multi-sector, public/private partnership trial of 112 crash notification showed a reduction in emergency response times of up to 60 percent, and the system will be installed on all new cars in the EU from early 2018.

Safer Speeds

Lower speed limits

Pioneers in speed limit setting, Sweden adopted Vision Zero in 1997, with the long term goal of eliminating death and serious injury from the road transport system. Under Vision Zero human life and health cannot be traded off for other benefits of the transport system such as mobility (Tingvall, 1998). Vision Zero describes the end product of a safe road transport system, relying on a balance between travel speeds and the inherent safety of infrastructure and vehicles (Tingvall & Haworth, 1999). This concept clearly aligns with the Safe System approach, with speed limits being set to ensure survivability in the event of a crash.

After decades of research on speed and crash survivability, road authorities across the world are now focussing on the lowering of speed limits on their road networks. In Australia a 40 km/h speed limit is being trialed on chosen roads in Melbourne, Adelaide, Canberra and Hobart, while the Sydney 40km/h trial program is currently being expanded (Lydon, Woolley, Small, Harrison, Bailey & Searson, 2015). Tasmania undertook a major change management exercise to reduce the default open road speed limit in that state, but the final change was limited to a reduction in the default speed applying to unsealed roads from 100 km/h to 80 km/h. Other speed limit reductions have been limited in recent years in Australia, but in 2012 South Australia reduced the speed limits on approximately 750 km of inner regional rural roads from 110 km/h to 100 km/h and is currently engaged in further discussion with regional communities about extending these safety improvements.

Some jurisdictions are introducing even lower speed limits on selected roads. A program of introducing 20mph speed limits in Great Britain has led to a 1.5 billion pound saving in social costs from crashes (IRTAD, 2014). The NZ Strategy (NZ Transport Agency, 2011) notes that some local authorities are introducing 30km/h speed zones, as did Sweden in 2007, and now the Netherlands and Spain (IRTAD 2014, Traffic General Directorate, 2011; Archer, Fotherinham, Symmons, & Corben, 2008). Rural road speed limits greater than 80 or 90 km/h exist in Australia and New Zealand, plus 18 other (mainly low or middle income) countries, including 7 in Africa, 6 in Latin America and 2 in Eastern Europe/ Central Asia. (WHO World Health Organisation 2013, Global Status Report on Road Safety 2013: Statistical Annexes, Geneva).

Speed camera program

The positive impact of speed cameras on road safety have been documented for many years, and are well outlined in the NZ Strategy (NZ Transport Agency, 2011).

Speed camera program intensification

Several Australian state governments have or are currently intensifying their speed camera programs, expanding the number of sites, vehicles and hours of operation. Under the Transport for NSW Speed Camera Strategy the NSW mobile speed camera program is expanding its enforcement from 930 hours/month to 7000 hours/month, with an increase of over 600 percent in the number of mobile speed camera vehicles (six cameras in the initial program, to 45 cameras in the expanded program), and double the amount and size of warning signs (Transport for NSW, 2012). Queensland's speed camera program expanded from 500 sites to 2300 sites between 1997 and 2003 (Newstead & Cameron, 2012), Tasmania are installing an additional eight fixed speed camera sites (Tasmania Police, 2015), and the Australia Capital Territory program is also being "gradually expanded" (ACT Auditor General's Office, 2014).

Speed camera tolerances

Recently several jurisdictions have been examining their policies for "tolerances" for speed cameras, that is, the speed setting at which the camera is activated and an offence is recorded. Tolerances were initially put in place to allow for variances in the accuracy of speedometers in cars, of speed detection technology, and placement of speed detection devices. As car speedometers become more accurate and speed camera technology improves the need for large tolerances is reducing. While most state governments don't actively publicise speed camera tolerance levels, in 2002 Victoria announced that they were decreasing their speed camera tolerances from ten percent over the speed limit, to 3km/h and 2km/h, for mobile and fixed cameras, respectively (RACV, 2014; Cameron, 2008). An evaluation found a reduction in drivers speeding 10km/h or more over the speed limit, with offence rates stabilising over two years (D'Elia, Newstead & Cameron, 2007). Based on this research, Cameron (2008) concludes that the general deterrence provided by a reduction in the speed enforcement tolerance will significantly reduce the proportion of drivers exceeding the old enforcement tolerance level. The discussion about speed camera tolerances is continuing in Australia, with news reports in 2011 indicating that NSW has also looked at the issue of tolerances (Smith, 2011), and in 2013 Queensland

Police announced a tolerance reduction (Queensland Police Media, 2013), although in each case the specific speeds are not discussed.

Speed camera penalties

Demerit points and fines are used as a specific deterrence mechanism for speeding in most jurisdictions (Willis, 2006; Watson, Siskind, Fleiter, & Watson, 2010; ETSC, 2011). Penalties apply equally to offences detected by both traditional hand held devices and mobile and/or fixed speed cameras, and are generally structured according to the specific "band" of speeding offence, for example, up to 10km/h over the posted speed limit, over 10 km/h over the speed limit, over 20km/h over the speed limit, and so on.

Across Australia speeding penalties for general drivers range from 1 - 7 demerit points, with fines ranging between several hundred to several thousand dollars, depending on the level of speeding. Some jurisdictions have specific penalties for learner and provisional drivers, or for speeding in specific areas like school zones. Automatic licence suspension occurs at more than:

- 25km/h over the speed limit in Victoria;
- 30km/h over the speed limit in NSW;
- 38km/h over the speed limit in Tasmania;
- 40km/h over the speed limit in Queensland; and
- 45km/h over the speed limit in South Australia.

Speeding penalty reforms in Queensland in 2003 saw demerit point and fine increases and immediate licence loss for high end offenders. A study conducted by Watson et al (2010) found that after the penalty change there were statistically significant reductions in the proportion of offenders who reoffended and the average number of offences committed among all offenders. In South Australia, a package of speeding penalty reforms in 2012 were implemented with the intention of doubling or tripling the vast bulk of demerit points for speeding, as well as substantially reducing the lowest level fine to $150 and increasing higher level fines.

Public education campaigns

Public education campaigns are used to increase awareness and garner public support of speed camera programs. Raftery, Kloeden and Royals (2013) looked at speed public education campaigns and public education material throughout Australia and concluded that the best campaigns contain evidence-based counterarguments to arguments used by the public to rationalise speeding behaviour. While the majority of resources reviewed focussed on the safety aspects of speeding (e.g., risks of crashing, injury severity, or benefits of reduced speed) those judged as "better" by the authors also addressed a wider range of evidence, including information on the environmental impacts of speed (e.g. emissions and noise), fuel economy, or travel time.

While the safety benefits of speeding public education can be hard to separate out from the engineering and enforcement initiatives that typically co-occur, research by Monash University Accident Research Centre indicates that publicity supporting enforcement programs has been effective in magnifying the effects of speed enforcement programs, and that the combined effect of speed enforcement

programs and publicity is highly cost beneficial (Delaney, Diamantopoulo & Cameron, 2003). Therefore, it is not surprising that in its 2006 report to the OECD on speed management, the Organisation for Economic Co-operation and Development notes that to maintain effectiveness the "production and dissemination of speed information should be continual" (OECD & ECMT, 2006).

Program transparency is another method to encourage awareness and public support for speed camera programs and reduce community perception of "revenue raising". The Transport for NSW website provides road users with the location of all mobile and fixed speed camera sites, red light camera sites, and point to point (heavy vehicle) camera sites (Transport for NSW, 2014). Road users can also nominate locations that they believe would benefit from the installation of a speed camera site.

State governments in Queensland, Victoria, South Australia and Western Australia also make their lists of mobile and fixed speed camera sites available to the community, as well as information on where the revenue from the program is allocated (Queensland Government, 2014; State Government of Victoria, 2015; South Australia Police, 2014; Western Australia Police, n.d). Victoria has gone even further in this move towards program transparency, appointing an independent Road Safety Camera Commissioner to monitor the road safety camera system, reviewing complaints, and investigating issues related to the camera system integrity, accuracy or efficiency (Road Safety Camera Commissioner, 2013).

Average speed cameras

Advances in speed camera systems in recent years include "point to point" or "average speed cameras" which have been operating in jurisdictions from the UK and Europe through to the Middle East. The cameras work by measuring the time taken for a vehicle to travel between two camera sites. If the average speed of the vehicle is greater than the speed limit the driver is issued an offence notice. A trial conducted in Norway in 2009 found that average speed cameras reduce driving speed by up to ten percent (Ragnoy, 2011). Average speed cameras are also being implemented in a number of Australian jurisdictions, and have been operating for some time for heavy vehicles in NSW (Department of Planning, Transport and Infrastructure, n.d.; Roads and Maritime, 2015).

Intelligent Speed Adaptation for recidivist speeders

The safety benefits of ISA for the general driving community have been discussed in the Safer Vehicles section of this report, but there is also emerging evidence of its benefit for addressing recidivist speeders. Recent trials in Victoria and the Netherlands have shown that installation of advisory ISA in the vehicles of recidivist speeders is effective at reducing speeding behaviours. In Victoria the installation and activation of the ISA system significantly reduced mean speed, time spent exceeding the speed limit, and time taken to return to the speed limit (Stephan, Young, Newstead, Lenne, Cavallo, Duck, Imberger & Healy, 2014). The Netherlands study also found significantly reduced mean and 85th percentile speeds for both advisory ISA (Speedmonitor) and ISA with speed control (Speedlock). Participants reported less aggressive braking and acceleration, less tailgaiting, and less driving unnecessarily in the left (overtaking lane). Those using the Speedmonitor system

also reported a higher awareness of speed limit signs (van der Pas, Kessels, Vlassenroot & van Wee, 2014).

Summary

Decades of research shows the impact of vehicle speed on crash risk. To manage this road authorities across the world are focussing on the lowering of speed limits on their road networks. Urban speed limits of 40km/h and 40mph are being trialed or introduced in Australia and the UK, respectively. Local authorities in Sweden, Netherlands and Spain are introducing 30km/h speed zones. Limits on higher speed roads in Australia are also being reduced, with Tasmania reducing their unsealed default speed limit from 100km/h to 80km/h, and South Australia reducing speed limits on rural regional roads from 110km/h to 100km/h.

Speed camera programs can be effective at obtaining compliance with speed limits, provided they have an appropriate system of penalties and sanctions, enforcement intensity, camera tolerances, and public education and program transparency to garner community support.

A number of jurisdictions are expanding their speed camera programs with more sites and higher frequency of site visits, and the introduction of Point to Point (or "Average") Speed Cameras.

Demerit point and penalty structures generally follow specific "bands" of offence which are the same for both fixed and mobile speed cameras and traditional hand held enforcement, for example: up to 10 km/h over the posted speed limit; over 10 km/h over the speed limit; and over 20km/h over the speed limit. Increases in penalties and demerits have been shown to reduce the proportion of offenders who reoffend, and the average number of offences committed among all offenders.

Reducing speed camera "tolerances" reduces the proportion of drivers travelling over the old tolerance level. Tolerance reductions have been reported in NZ, Victoria, NSW and Queensland. The reduction of Victoria speed camera tolerances from 10km/h over the posted speed limit to 2-3 km/h showed a significant and long term reduction in drivers travelling 10km/h over the speed limit.

Supporting publicity magnifies the effects of speed enforcement programs. The combined effect of speed enforcement programs and publicity is highly cost beneficial, prompting the OECD to note "production and dissemination of speed information should be continual". Program transparency increases community support and acceptance, with several jurisdictions now providing information on the location of fixed speed cameras and mobile speed camera sites, and Victoria going further to appoint a Road Safety Camera Commissioner.

ITS technologies like Intelligent Speed Adaptation complement speed camera programs, with trials showing it is a promising intervention for recidivist speeders, reducing speeding behaviours and aggressive braking and acceleration, and increasing awareness of speed limit signs.

Safer People

Graduated licensing systems

Jurisdictions across the world are addressing the issue of young driver safety by introducing Graduated Licensing Systems (GLS) (IRTAD, 2014). The aim of a GLS is allow young drivers to build their driving skills in a real world environment, but under a series of restrictions which gradually allow exposure to riskier driving situations as age and experience increase.

Austroads recently released a summary of the international evidence surrounding proven successful components of a best practice GLS (Senserrick & Williams, 2015). Components having the most examples of quantified benefits in terms of injury and crash reductions are:

- a minimum learner age of 16 years;
- a minimum learner period of 12 months;
- a minimum provisional licensing age greater than 16 years (the stage between learner and full licensing);
- night driving restrictions;
- peer passenger restrictions; and
- a zero blood alcohol concentration (BAC) limit.

The report noted that there is some evidence supporting a minimum of 80-120 hours of supervised driving during the learner stage, as well as hazard perception testing. The authors also reported that new research is showing that education programs addressing cognitive skills, to build resilience, and to involve parents in young driver training, is showing the potential to reduce crashes.

A number of these initiatives such as a minimum learner age of 16, zero BAC, night restrictions, and passenger restrictions, are already contained in the NZ GLS. However based on the research presented in the Austroads review, other initiatives such as minimum learner period of 12 months, hazard perception testing, and a requisite number of supervised driving hours, may prove beneficial.

Netherlands have opted to develop an alternative model to a GLS, whereby instead of a range of restrictions, young drivers can choose to obtain their licence earlier and be supervised by an experienced driver until age 18 (Shagen, Wijlhuizen & de Craen, 2013). The initiative is built on the evidence that young drivers are at much lower risk of a crash while driving accompanied, and that this lower level of risk continues when these young drivers go on to participate in traffic independently (Gregerson, Nyberg & Berg, 2003; SWOV, 2012) . The Netherlands supervised driving trial (2toDrive) commenced in 2011, with young drivers able to begin their driver training and take the theory test at a lower age from 16.5 years. These drivers can then take the driving test from the age of 17, but until 18 years of age can only drive on the roads if accompanied. An evaluation of the 2toDrive program will be conducted in 2017.

Germany has also incorporated this supervised driving restriction to the age of 18 in their driver licensing program, which is much stricter and potentially costlier than many other jurisdictions. The German model includes mandatory classroom and on-

road driver training, theory and on-road driving tests, an eye exam and a requirement to complete a first aid course (Federal Minister for Transport and Digital Infrastructure, 2015). Failure rates for the on-road assessment component are reported to be about 30%, with the total cost of obtaining a licence being equivalent to almost NZ $3000 (T-Online, 2013).

Motorbike licensing and testing

New licensing and rider testing initiatives to address motorbike rider safety have been discussed by the European Union in recent years. The licensing requirements for riding a moped or a small motorbike under 50cc vary between countries, with some requiring a motor vehicle licence, and others requiring no licence at all. Aimed at addressing these and other licensing discrepancies, the European Union introduced a new European Driving Licence in 2013, which includes the requirement for a mandatory theory test for moped riders. The EU Directive also allows Member States to go further to require applicants to pass a skills or behaviour test, such as the practical exam for moped riders in the Netherlands and Italy, and mandatory driving lessons in Finland (IRTAD, 2014; European Commission, 2013; SWOV, 2009;).

Drink and drug driving

Alcohol and drugs contributed to 31 percent of fatal crashes in NZ in 2008 (NZ Transport Agency, 2011). New initiatives to address drink driving include technologies like alcohol ignition interlocks[9], as well as targeted alcohol rehabilitation programs.

Alcohol interlock programs

In a European Parliament report, Martino, Sitran and Rosa (2014) note a 64-70 percent reduction in recidivism rates for alcohol interlocks as part of a drink driving rehabilitation program interlock programs for drink drivers, yielding a benefit-cost ratio of 1.9.

Alcohol interlocks have been used primarily in three different capacities: mandatory use as part of a rehabilitation program; statutory preventative use where they are required in specific vehicle types or vehicles being used for specific purposes; and voluntary use.

A voluntary alcohol ignition interlock program currently exists in NZ , where courts can order participation of repeat or high level drink driving offenders. Similar court ordered programs exist in most Australian jurisdictions, and in many European countries (Martino, Sitran & Rosa, 2014).

However participation rates for this style of interlock program are low, because they rely on the discretion of courts to order participation, and on offender willingness to participate in the program.

In Utah a study revealed that only 34 percent of all judges always or regularly sentenced felony DUI offenders to an ignition interlock as a condition of probation (Christenson & Haddon, 2004). ECORYS (2014) found that only a minority (30-40

[9] The terms “alcohol ignition interlock”, “interlock”, and “alcolock” are used interchangeably in this report.

percent) of eligible offenders offered an alcohol interlock program chose the opportunity to continue driving with an interlock. Most offenders preferred to have their driving licence suspended. Similarly, Swedish research found that only 11-13 percent of eligible drivers participated in the pilot trial of interlocks from 1999-2011. Participation rates in the first year of the NZ trial were lower still, at about two percent of eligible drink driving offenders (Waters, 2014).

Chamberlain, Solomon and Murie (2013) examined interlock programs in Canadian provinces and reported that participation rates are highest in programs where installation of the interlock is part of relicensing. In their report to the European Commission, ECORYS (2014) also note that participation is higher if the interlock program is an administrative measure. In South Australia the mandatory alcohol ignition interlock program for drink driving offenders is managed administratively as part of the relicensing process (Department of Planning, Transport & Infrastructure,2012). Netherlands has a similar administrative process for interlocks, however because police need to provide details of the offenders to the program an information "bottleneck" occurs and participation rates suffer (ECORYS, 2014).

Bailey, Lindsay and Royals (2013) examined interlock programs worldwide and noted that best practice models encourage participation by:

- having eligibility criteria that allow as many drink driving offenders into the program;
- making entry to the program as soon as possible after a conviction;
- allowing first time offenders into the program, even for low and moderate BAC's;
- using mandatory and voluntary forms of the interlock program in a complementary manner such that offenders who are not compelled to participate may elect to participate in exchange for a reduced period of licence suspension; and
- making the duration of interlock term dependent upon the participant's success in the program (based on a variety of measures), rather than a fixed interlock term.

Technologies for voluntary use of interlocks

New detection technologies may provide voluntary non-regulatory countermeasures to drink driving. The Driver Alcohol Detection System for Safety (DADSS) in Washington State is a research and development program looking at in-vehicle touch and breath based alcohol detection technologies. Development is aimed at creating less invasive, quicker to use, more accurate and reliable, lower cost and lower maintenance technologies than the breath alcohol ignition interlock device currently on the market (DADSS, 2010). The overarching goal of the project is to identify the feasibility and potential benefits of widespread use of these drink driving prevention technologies (NHTSA, n.d.).

Mandatory interlocks in commercial vehicles

Some countries now require the mandatory installation of interlocks for drink driving prevention in specific circumstances, or as an alternative to licence loss. For example, in Finland, Norway and France alcohol interlocks are required for school

transport vehicles, and in Sweden for government vehicles (ECORYS, 2014; IRTAD, 2014; Martino, Sitran & Rosa, 2014). In a commercial context, the European Parliament (2011) has recommended the mandatory fitment of interlocks to all new commercial passenger and goods transport vehicles. Alcolocks have been trialed in commercial vehicles in Germany, Norway, Spain and Sweden, and are now an option for commercial drivers in Norway as an alternative to licence loss (Assum & Erke, 2009; IRTAD, 2014).

Early intervention alcohol treatment programs

Alcohol treatment programs are traditionally offered to repeat and high end drink drivers as part of licence renewal requirements after a period of disqualification. However, in an early intervention style program trialed in Sweden in 2003, police were asked to offer all suspected drunk drivers the option of participating in the SMADIT project, where a member of staff from Social Services would contact them within 24 hours for assessment of their alcohol issues and referral to suitable treatment. Early results from the trial showed that participants had a positive attitude towards the program, and that it gave many of the individuals an opportunity to deal with their alcohol issues that they might not otherwise have had (Gustafsson, 2007). A small interview study of 11 program participants in 2012 found that the contact with Social Services and subsequent treatment helped participants overcome their problems with alcohol (Forsberg, 2013). Follow-up of these participants a year later found that their alcohol consumption had decreased, with some abstaining entirely, and several participants even chose to participate in an alcohol ignition interlocks program (Gustafsson, 2014). While these evaluations are small and are the results are self reported and qualitative in nature, they do suggest that the SMADIT program may present an effective method of early intervention for drink driving.

Behavioural choice programs and incentive schemes

Responding to concerns about the reliance on economic pricing activities (eg fines and penalties) and information campaigns in influencing social behaviour, the UK company Behavioural Insights Limited (previously the Behavioural Insights Team in the UK Cabinet Office) has developed a new approach to social policy and behavioural change. Based on the work of behavioural economists Thaler and Sunstein (2003 & 2008), the approach suggests governments aim to influence individuals choices (or “nudge” individual behaviour) by changing an individual’s perceptions of the environment, modifying their judgements about the consequences of alternative behaviours, and thereby motivating them to behave in a safer manner (Avineri, 2014).

The contextual influences on behaviour are summarised by the UK Institute of Government in the MINDSPACE framework (Dolan, Hallsworth, Halpern, King and Vlaev, 2010; Dolan, Hallsworth, Halpern, King and Vlaev, 2012). Avineri (2014) went further to highlight road safety examples associated with each element of the framework (see table below).

Messenger – we are heavily influenced by who communicates information	Information about risks associated with certain types of behaviours is more likely to be acted on if communicated by a person or organisation seen to have authority; to be 'independent'; by an individual who has similar characteristics to us; or by someone for whom we have positive feelings eg. Peer-to-peer education and youth-initiated monitoring of safety belt use among teens.
Incentives – our responses to incentives are shaped by mental shortcuts	Making 'good' road safety behaviour a matter for financial reward might discourage it. For example, penalties on illegal parking might be seen by some as a probabilistic signal of market price that might substitute a social norm.
Norms – we are strongly influenced by what others do	Providing people or organisations with information about their peers can exert a strong influence on them to modify their behaviour accordingly eg. Information about the proportion of people who perform desirable behaviours such as using seatbelts and refraining from drinking and driving.
Defaults – we "go with the flow" of preset options	Locating pedestrians' near-side signals or push buttons on the same side as the pedestrian, oriented to focus the pedestrian's attention in the direction of approaching traffic, making it a default direction for observing traffic.
Salience – our attention is drawn to what is novel and seems relevant to us	For example, ISA sound alerts when driving over the speed limit, or 'look right/left/both ways' signs reminding passengers to look at the direction of coming traffic.
Priming – our acts are often influenced by unconscious cues	Physical features of the road infrastructure aimed at subconsciously triggering certain behaviours eg. perceptual countermeasures for speed reduction.
Affect – our emotional associations can powerfully shape our actions	Road safety campaigns seek to reinforce the emotional consequences of crashes on those affected, and Share the Road type campaigns aim to increase awareness and empathy towards other road users.
Commitments – we seek to be consistent with our public promises, and reciprocate acts	Individuals and organisations who make a public commitment to change their road safety behaviour in some way (e.g. signing safety pledge cards) are more likely to sustain their change in behaviour, particularly if they have the support of others trying to do the same.
Ego – we act in ways that make us feel better about ourselves	Example - an educational program aimed at increasing road safety behaviour, providing incentives to generate motivation through competition.

The UK Department for Transport has drawn from these choice architecture concepts and developed a toolkit for travel behaviour and road safety policy makers and practitioners (Department for Transport, 2011).

Rewards and Incentives

Road safety compliance systems traditionally address undesirable road user behaviours through a system of demerit points (threat of licence loss/loss of access to the road network) and monetary disincentives (fines). However, drawing from theories of behaviour change and choice architecture discussed above, the concept of rewarding or incentivising positive social behaviours is gathering momentum.

In recent years alternative methods of rewarding desirable road user behaviours have been trialed in a number of jurisdictions. Incentive schemes have been proposed to encourage installation of safety systems like ISA (European Global Navigation Satellite Systems Agency, n.d.), and to discourage mobile phone use while driving (Johnston, 2009).

The use of economic incentives to reduce speeding behaviour has been trialed in the Netherlands and Sweden in both private and commercial vehicles (Agerholm, 2009 ; Elvik, 2014). For example, Stigson, Jaberg, Kullgren and Krafft (2014) reported on a one year trial using ISA as part of a Pay as You Speed (PAYS) system, where the driver's full incentive was a 30 percent discount off their insurance premium. Test subjects were given real time auditory and visual warnings from the ISA system whenever they exceeded the speed limit, and could also track their own driving results on a personal website. Study results indicate that the system is effective at addressing speeding behaviour, with the test group showing a greater than 50 percent reduction in speeding. The proportion of driving at a speed exceeding 5km/h over the speed limit was six percent for drivers in the PAYS system, compared with 14 percent for the control group. The authors noted that this effect was stable over the life of the trial.

In an Australian example, Grieves and Fifer (2011) discuss a kilometre-based rewards system to encourage safer driving practices. In the ten week trial a baseline of five weeks of driving practices was recorded, with drivers in the experimental group then offered financial incentives to reduce overall kilometres driven, night time driving and speeding behaviours over the following five weeks. Payouts ranged from AUD$2 to AUD$619, with an average payout of AUD$116. Trial results showed a 10 percent reduction in vehicle kilometres travelled and a 40 percent reduction in the number of kilometres spent speeding.

While these results are encouraging, in the context of the value for money that these incentive schemes represent, the research is not as positive. In a cost benefit analysis of schemes rewarding drivers financially for not speeding, Elvik (2014) notes that most studies have involved small groups of self selected participants who were much less inclined to speed than drivers in general. In addition, while rewarding drivers may be effective at reducing speeding, the cost of providing a benefit high enough to produce behaviour change is very high. The author examined four trials of incentive programs using ISA, modelling the cost of installing speed monitoring devices in cars, collecting and analysis and speed data, and payment of rewards, against the likely benefits in terms of reductions in traffic crashes and road trauma. This modelling showed that the costs of implementing the incentive system were greater than the likely benefits provided. Based on these results Elvik (2014)

concluded that while rewards can motivate car drivers to comply with speed limits, the cost of doing so means that the system is not cost-effective.

Summary

Research indicates that there are significant road safety benefits from focusing on young drivers, drivers of high risk vehicles such as motorbikes and mopeds, and targeting specific high risk behaviours like drink and drug driving.

The most effective aspects of young driver licencing programs focus on increasing driving experience and delaying the unrestricted driving age as long as possible to encourage gradual and supervised access to the road environment.

Similarly, stronger testing and licensing regimes for motorbike and moped riders focus attention on gaining experience and demonstrating skill before full licensure. An added benefit of the additional licensing hurdles is that they make this high risk driving activity less attractive, decreasing participation rates and reducing exposure to crash risk.

Alcohol ignition interlock programs are effective at reducing drink driving, but voluntary or court imposed programs are compromised by low participation rates. Mandatory programs have highest participation rates and therefore are most effective.

Best practice alcohol ignition interlock programs also include alcohol treatment programs which address the underlying issues of alcohol misuse. Evidence from Sweden is showing the effectiveness of early intervention programs targeting first time drink driving offenders. Run in conjunction with a program of alcohol ignition interlock, penalties, and sanctions, alcohol treatment programs provide a more holistic approach to addressing drink driving.

The use of behavioural choice programs and incentive schemes has been examined in a number of road use and road safety areas. Rewards systems have been used to reduce speeding behaviours but given the high cost of the schemes have not been found to be cost effective. Research into social behaviour change and choice architecture which can be applied to social policies like road safety should continue to be monitored.