INQUIRY INTO THE NATIONAL ROAD SAFETY STRATEGY 2011-2020

SEPTEMBER 2018

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Background to the inquiry

On 8 September 2017 an inquiry into the National Road Safety Strategy 2011–2020 was announced by the then federal transport minister Darren Chester.

A panel of four was convened to conduct the inquiry. It was co-chaired by Associate Professor Jeremy Woolley, Director of the Centre for Automotive Safety Research at the University of Adelaide, and Dr John Crozier, Chair of the Trauma Committee at the Royal Australasian College of Surgeons.

Official advisors were National President of the Australasian College of Road Safety, Lauchlan McIntosh, and CEO of the International Road Assessment Program, Rob McInerney.

A summary list of contributing participants, forums, workshops and submissions is included in this report's appendices. Submissions (where permission was granted to upload) can be viewed online at the Department of Infrastructure, Regional Development and Cities website.

Given the broad terms of reference, it must be noted that resourcing was limited and that a detailed and definitive assessment on every possible aspect of road safety was not possible. There were several very detailed and high-quality submissions on numerous specific issues. Omission of these topics does not indicate they are unimportant.

The key issue from submissions, forums, meetings and discussions was the need for dramatic change in road safety management given the inadequately acknowledged national road injury epidemic and the costs to the economy now and into the future. The panellists decided to emphasise and focus on high order governance and management issues. Many of the reforms recommended to the inquiry that have not been mentioned in this report could be reviewed and addressed within the new proposed structures. In addressing the terms of reference, the panel took into account information provided as well as their many decades of experience. The emphasis was on creating a step-change in road safety performance at the national level.

The inquiry focused on the current system's safety, while recognising that modal shifts in transport, urban planning, technology, data, users, usage and cultural factors can and will be important. However it was felt that the existing road transport system will predominate for at least another decade or more given the current capital investment in infrastructure and modes.

The inquiry delivered 12 recommendations that, if implemented, will help transform road safety performance across the nation.

How this report is structured

The report consists of three main sections. The first provides an overview of the road safety challenge and why there is a need for a transformative change. The second outlines key findings in relation to the terms of reference as a precursor to the third detailed section on recommendations and accompanying background discussion.

Table of contents

Terms of reference

Australia's road safety performance has stalled.

A total of 1,226 people were killed in road crashes in 2017. In addition to the tragedy of road deaths, at least 36,000 people are injured every year. Brain injury, quadriplegia, amputations, de-gloving, burns, loss of sight, fractures and dislocations are just some of the life-changing injuries that create an avoidable burden on families, friends, communities, the health sector, insurers and social services. The cost to the Australian economy is over $30 billion a year. The scale of the personal and financial cost of road trauma is unacceptable, and current actions and investments are not achieving the desired results. A step change in approach is paramount.

On 8 September 2017 an inquiry into the National Road Safety Strategy 2011–2020 was announced by the then federal transport minister Darren Chester with the following terms of reference:

1. Identify the key factors involved in the road crash death and serious injury trends including recent increases in 2015 and 2016.

2. Review the effectiveness of the National Road Safety Strategy 2011–2020 and supporting 2015–2017 action plan.

3. Identify issues and priorities for consideration in developing a post-2020 national road safety strategy and 2018–2020 action plan, focusing on how Australia can recognise and move towards a safe road transport system which minimises harm to all users.

4. Advise on arrangements for managing road safety and the National Road Safety Strategy, looking at best coordination and use of the capacity and contributions of all partners.

The inquiry obtained input through:

- written submissions through the Federal Department of Infrastructure, Regional Development and Cities website
- private submissions
- interviews and discussions with road safety stakeholders in Australia and globally, and
- a series of targeted workshops and forums.

Key findings

The consultative process provided a range of ideas and reforms, many of which deserve further consideration within the context of developing future action plans. The resources allocated and timeline requirements for the inquiry necessitated a focus on high-level actions and directions which, when implemented, provide the platform for many of these ideas and reforms to be reviewed and addressed.

Drawing on the insights provided through the consultative process—together with the collective experience and knowledge of an established advisory panel of experts—it became evident that a transformative approach to road safety was needed across Australia. Road trauma targets are not being met and, at the same time, the Safe System approach espoused in the National Road Safety Strategy 2011–2020 is often not being honoured 'in the field'. There is a disconnect between noble intentions, resourcing the actions and road safety practice.

A key finding of the inquiry is implementation failure. The lack of focus on a harm elimination agenda means that sub-optimal results are unintentionally achieved because some improvement in safety is often regarded as sufficient or is assumed. We accept that we are making the roads, vehicles and users "safer" but frequently miss the opportunity to make them "SAFE" outright. The distinction is subtle but vitally important. As part of providing a safe transport system, we must move from a coping mechanism to one that fixes the problem once and for all.

Moreover, the scale of response and the mechanisms in place to ensure judicious allocation of resources are critical if Australia is truly committed to eliminating all harm on its road network.

The substantial issue from submissions, forums, meetings and discussions was the need for dramatic change in road safety management, given the inadequately acknowledged national road injury epidemic and the national costs to the economy now and in the next 30 years from road crashes.

Many safety aspects have not received sufficient focus or resources under the life of the current strategy. These relate to accountability, the scale and source of funding, gap analysis, capacity building, change management, quality assurance, technology, insurance and organisational culture.

It is well recognised that the costs of reducing trauma from road crashes are borne in the health, social and productivity sectors of the economy. Some of the benefits of a judicious application of safety initiatives demonstrated to the inquiry show a return across portfolios of up to 20:1. Leadership from the very top of government is required to recognise and unlock these multi-agency high-returns on investment.

Failing to improve our current situation will result in 12,000 people killed and 360,000 injured at a cost of over $300 billion over the next decade alone. We must act on a scale that matters, with a disaster response that reflects the true measure of the problem. Lives depend on it.

Findings under the terms of reference

1 - Identify the key factors involved in the road crash death and serious injury trends including recent increases in 2015 and 2016.

There is considerable uncertainty regarding causes behind rises in fatalities observed in 2015 and 2016. Although modelling often associates fluctuations with road user exposure and economic activity, a lack of intermediate measures means that important hypotheses cannot be tested. For example, at a national level, we do not know if travelling speeds have varied or if speed enforcement has remained constant. There is currently a lack of understanding how the system is performing as a whole and changes in some parts of the system can go unnoticed and unaccounted for. A longer time horizon is required to establish if recent upward trends are due to random variation or constitute the commencement of a new trend. More must be done to understand how the system is providing error tolerant and survivable situations and a focus must move from fatalities to serious injuries, for which there is currently poor data.

2 - Review the effectiveness of the National Road Safety Strategy 2011–2020 and supporting 2015–2017 action plan, with particular reference to the increase in deaths and serious injuries from road crashes over the last two years.

The past decade represents an implementation failure. Comparison to a review of performance published in 2015 indicates little progress. Although the 2018-2020 action plans show some improvement towards better strategic alignment, there is still no clear definition of resources and capability required to satisfactorily execute the actions. For example, it is quite apparent that much of local government does not have the capability to implement the action plan and no meaningful resolution appears to be on the horizon. How then can we expect a performance gain in this area?

The ability to monitor performance against inputs and outputs is limited and there is an over-reliance on fatality data because there is insufficient or inconsistent injury data. The lack of a focus on the harm elimination objective under the Safe System approach means that sub-optimal results are unintentionally being obtained. The scale and leverage that can be obtained from embedding road safety in "business as usual" activity is still largely absent. With some notable exceptions, the tools, frameworks and quality control to guide harm minimisation remain in their infancy and are not widespread. Small groups in each jurisdiction work tirelessly to gain safety improvements however the scale of response is inadequate against the size of the problem. We should not be aspiring to safer roads but SAFE ones – we must move from a coping mechanism to one that fixes the problem once and for all. All levels of government, the private sector and key road safety stakeholders must become a part of the solution, otherwise the Safe System will continue to behave as a collection of Safe Silos.

3 - Identify issues and priorities for consideration in developing a post-2020 national road safety strategy and 2018–2020 action plan, focusing on how Australia can recognise and move towards a safe road transport system which minimises harm to all users.

The next strategy must be aligned with the time based elimination of harm on the road network. A point in the future needs to be nominated as the long term target for achieving zero. Modelling the scenarios and resource required to achieve this outcome needs to become a national priority and implemented in each jurisdiction, including local government.

Modelling will likely indicate that a longer strategy timeframe to 2050 is realistic and intermediate targets could focus on elimination of harm in various parts of the road system commencing with Central Business District areas, rural townships and on the highest volume roads.

A new suite of KPIs is required that can adequately measure inputs against outputs and determine how interventions are working towards the long term elimination of harm. The KPIs would consist of many intermediate measures and reflect how the system is being made error tolerant and survivable. The KPIs must be monitored and transparently reported on an annual basis.

Vehicle safety technology, speed management, infrastructure safety investment, quality assurance, stimulus, innovation, demonstration projects and enabling activity will be important features of a new national strategy.

4 - Advise on arrangements for managing road safety and the National Road Safety Strategy, looking at best coordination and use of the capacity and contributions of all partners.

The governance capability, combined with poorly defined and resourced actions, ill-defined accountability and an inability to report on progress in a meaningful way has been the background headline behind the implementation failure.

While it is true that states, territories and local government play a key role in implementation, it is clear that road safety is a national problem and requires all three levels of government to be an active part of the solution. Government also needs to build accountability frameworks for those parties that are also supplying the problem. Vehicle manufacturers and importers need to be a part of the speed management solution, telecommunication companies need to be a part of the distraction solution and electricity providers part of the roadside hazards solution.

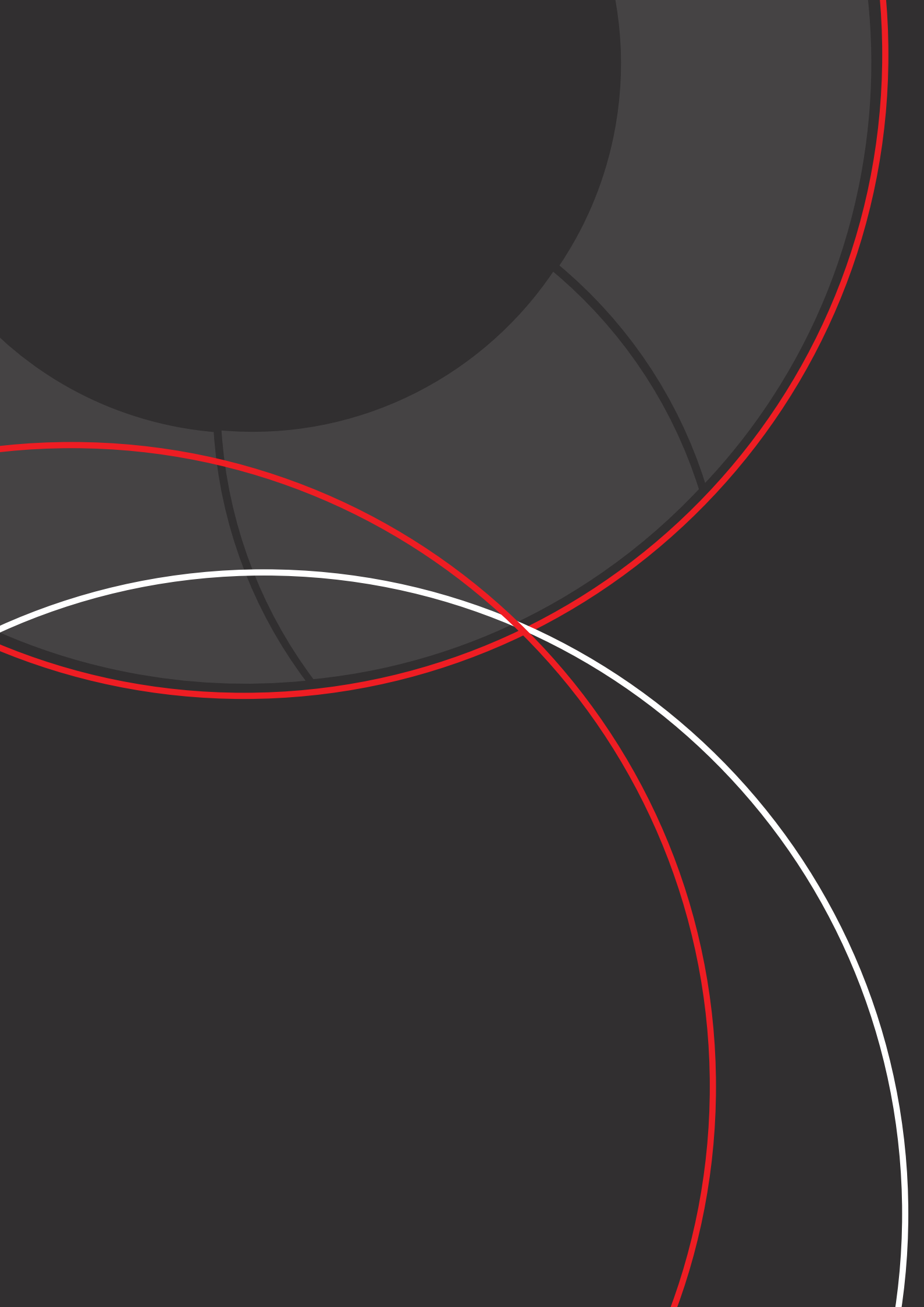
The inquiry determined that fragmented governance and resourcing has resulted in a lack of a strategic approach that comprehensively managed all options available to reduce death and injury. The lack of a holistic view for the nation meant that some issues were left unattended and others progressed very slowly. The community must be supported at all levels of government towards a point in time where no harm occurs from use of the road system. To do otherwise is to set a budget for death and injuries on our roads.

The inquiry recommendations are therefore focused on creating a step change in accountability, resourcing and impact in areas of national leadership. The creation of a well-defined national performance monitoring framework and transparent reporting will focus national resources. Dedicated road safety funding will support the implementation of agreed actions and provide stimulus and scale across all tiers of government. Key road safety enablers and innovators will be able to unlock the efficiencies and impact of long-term strategic commitments. Support for our neighbouring countries will strengthen Australia's reputation as a life-saving partner committed to shared prosperity. Implemented together they will save thousands of lives and reduce tens of thousands of serious injuries.

The inquiry has delivered 12 recommendations that, if implemented, will transform road safety performance.

Summary of recommendations

1. Create strong national leadership by appointing a Cabinet minister with specific multi-agency responsibility to address the hidden epidemic of road trauma including its impact on the health system.
2. Establish a national road safety entity reporting to the Cabinet minister with responsibility for road safety.
3. Commit to a minimum $3 billion a year road safety fund.
4. Set a vision zero target for 2050 with an interim target of vision zero for all major capital city CBD areas, and high-volume highways by 2030.
5. Establish and commit to key performance indicators in time for the next strategy that measure and report how harm can be eliminated in the system, and that are published annually.
6. Undertake a National Road Safety Governance Review by March 2019.
7. Implement rapid deployment and accelerated uptake of proven vehicle safety technologies and innovation.
8. Accelerate the adoption of speed management initiatives that support harm elimination.
9. Invest in road safety focused infrastructure, safe system and mobility partnerships with state, territory and local governments that accelerate the elimination of high-risk roads.
10. Make road safety a genuine part of business as usual within Commonwealth, state, territory and local government.
11. Resource key road safety enablers and road safety innovation initiatives.
12. Implement life-saving partnerships with countries in the Indo-Pacific and globally as appropriate to reduce road trauma.



INTRODUCTION

Road crashes: the impacts

Road crashes ruin lives.

Preventable harm from using the road system constitutes an ever present, unnecessary and hidden epidemic, not only now but for the foreseeable future.

Each year across Australia more than 1200 people are killed and at least 36,000 are hospitalised (Bureau of Infrastructure, Transport and Regional Economics (BITRE) 2018 and Australian Institute of Health and Welfare 2018). This amounts to five deaths and 155 hospitalisations for every 100,000 people in our communities every year. These figures also hide the great contrast between rural areas and capital cities.

The ripple effect associated with each road crash extends well beyond those directly affected. There are very few Australians who have not been affected either directly or indirectly as a result of road trauma. Tragically the reduction in road trauma over past decades has stalled.

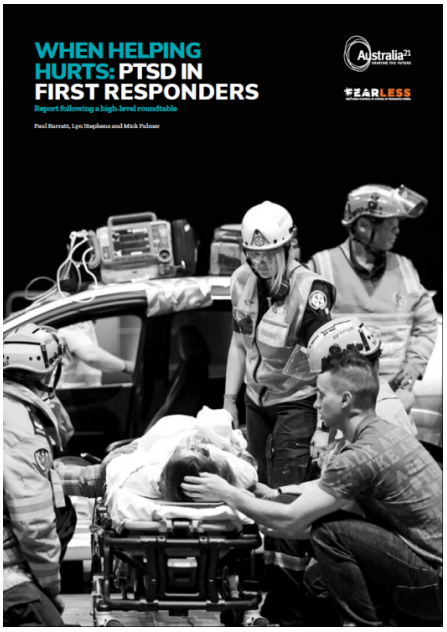
While we must reflect on past performance, the disaster that confronts the nation is the 12,000 people who will be killed (on current trends) on Australian roads by 2030 – and the more than 360,000 people who will be hospitalised – at an aggregated cost of over $300 billion.

How much lower this can be is in the hands of all three levels of government with contributions also to be made by the private sector and the community.

Focusing on deaths and the costs is alarming, but it also overlooks the total impact of road crashes on the nation.

Sweden's approach to road safety does not focus on calculating the social costs of crashes. Instead there is an ethical imperative behind the country's 'Vision Zero', where—as the Swedish Transport Administration puts it—authorities should take responsibility for "making it easy to act correctly in traffic and mistakes should not be punishable by death".

This approach takes for granted that no deaths or lifelong injuries should occur as consequence of workplace accidents. In the administration's view, the same should apply for the roads.[1] This concept is covered in detail in a submission from Michael Griffiths[2] who consulted with the Director of Sustainability and Traffic Safety in the Swedish Road Administration Maria Krafft, for his submission.



"The layering of suicides, road crashes and sudden deaths that you attend as a first responder leave you with dents in the soul."

PTSD Roundtable participant

These words were kindly contributed by Peter Frazer whose daughter was tragically killed when her car broke down. The tow truck driver who came to assist also tragically lost his life.

On 15 February 2012 my daughter Sarah Frazer was travelling from our home to Wagga Wagga to start university. While she was driving along the Hume Freeway her vehicle broke down, something that happens hundreds of times a day across Australia. But because the emergency lane she pulled over into hadn't been built to Australian Standards (it was just 1.5 metres wide), her car was left overhanging into a 110 kilometre an hour lane.

Through no fault of her own, Sarah was now the ultimate vulnerable road user.

It was around 11:15am when she left me a voicemail that will haunt me for the rest of my life. She said that as her car had lost power, she pulled over close to the guardrail but couldn't get her vehicle out of the high speed lane. She was crying when she said that as there were brambles on the other side of the guardrail, she couldn't physically get herself off the road either. She was trapped.

I will never forget these words.

"Cars and trucks are speeding past just centimetres away from my car... No one is changing lanes away from me ... I am terrified that they will hit me. I rang the NRMA. Dad, please call me!"

As I was at work, my mobile was off so I didn't get the voicemail until just after 12:30pm. Hearing her message, I went into a state of panic. I dialled her mobile but she didn't answer. I kept dialling but it just kept going to her voicemail.

My beautiful daughter was the kindest, funniest, most intelligent person I had ever met. She had everything to live for. But at 12:32pm, Sarah and the tow truck driver who had come to assist, were horrifically killed when a passing truck crashed into them. She was now left in pieces on Australia's most important road.

We wouldn't find out until the NSW Police came to our place around 5.00pm that evening. But one of my other daughters who wasn't with us would find out at the same time. She was alone watching the news when a story came on about a tow truck driver and a young woman who were killed on the Hume Freeway. She recognised Sarah's car from the helicopter footage and knew it was our Sarah who had been killed. Sarah's loved ones will grieve for the rest of their lives.

If every life matters, then no one should ever lose a loved one in such preventable road crashes.

A dangerous inheritance

The road system plays a critical role in the everyday lives of people and in our economy. Virtually everyone in the country has some sort of daily interaction with the road network. However our roads do not provide a safe workplace or a safe place for Australians. No other government owned asset creates this level of negative impact on the nation.

Imagine a newly planned transport infrastructure project that incorporated in its design assumptions including the death of 1200 people and the serious injury of at least 36,000 people a year. This wouldn't be tolerated, yet horrific carnage and death on our roads is the norm.

The nature of our road safety problem is best summarised as follows:

"Historically, we designed and operated a fundamentally unsafe road transport system because, as motorised transport was a revolutionary development, the necessary fundamental knowledge to do otherwise simply did not pre-exist. We evolved inappropriate policies, practices and designs from an unmotorised era of personal transport because we had nothing else to go on and struggled to react to the rate of growth. While we have made substantial improvements over a range of specific elements, the system remains inherently unsafe, exacerbated by the increasing diversity in vehicle mix and mass."

Johnston et al (2014).

To this day we struggle to deal with this legacy and re-orient many of the inappropriate policies, practices and designs on which we based the system.

Entrenched perspectives in government, road authorities and treasuries have meant that progression out of this situation continues to be frustratingly slow.

The link between where the costs of road trauma are borne and where the solutions exist is not made, and gross under-funding results.

World leading responses to road safety acknowledge that a transformative change is required to establish an inherently safe system.

Acknowledging the limitations of historical approaches is part of the journey to provide a solution.

Management and actions

A key headline from the inquiry is the lack of focus on a harm elimination agenda. This means that sub-optimal outcomes are unintentionally achieved because some improvement in safety is often regarded as sufficient or is assumed. We accept making the roads, vehicles and users safer, but frequently miss the opportunity to make them SAFE. The distinction is subtle but vitally important.

As part of providing a safe transport system, we must move from a coping mechanism to one that fixes the problem once and for all.

This cannot happen overnight, however there are a few places where the road transport system is already close to achieving such outcomes: fatality free cities and regions, zero child deaths in school zones and the virtual elimination of deaths on some road corridors are tangible examples. New technologies, new communications and regulatory mechanisms to design and build SAFE infrastructure, at survivable speeds and with safe vehicles, can be achieved by concerted actions.

Improving road user competence and awareness through education, enforcement and technology has been and remains a key factor in reducing road crashes. This is ongoing and traditionally managed by states and territories with support from range of community organisations, business and groups such as Austroads, the National Road Safety Partnership Program, the National Transport Commission, the National Heavy Vehicle Regulator and the Australasian College of Road Safety.

New drivers and riders enter the roads every year as children become adults. Immigrants and tourists add to the user contingent, and new technologies help our ageing population stay mobile. New devices, such as electric bicycles, larger trucks and autonomous vehicles, also enter the fleet. Communication devices like phones and e-call can hinder or assist road users. The inquiry recognised these issues—and also the role that licensing, enforcement, communication and behaviour modification programs play in improving road safety. It also recognised that while there is much interest and activity in these critical areas, they must be pursued in the context of creating a SAFE system.

Many recommendations for specific action across a wide range of areas were made to the inquiry, often well-known and effective. The recently published National Road Safety Action Plan 2018–2020 includes many of these actions and others, although several have been on the agenda for decades. Many safety solutions are known and some are in play to some degree, while others still sit on the shelf, often due to a lack of capacity and resources.

Turning intent into action is challenging but essential to ultimately eliminate harm on Australia's road network. Many aspects relating to accountability, the scale and source of funding, gap analysis, capacity building, change management, quality assurance, technology, insurance and organisation culture have not received sufficient focus or resources under the life of the current National Road Safety Strategy (NRSS).

There are many examples of how improvements to vehicles, infrastructure and speed management can reduce crashes and trauma. There also many opportunities to improve road user behaviour using education, technology and enforcement measures.

A detailed Australian study has shown the value of simple, low cost technological devices such as Intelligent Speed Adaptation (ISA) which can help drivers keep to the speed limit. It concluded that if:

- advisory ISA was fitted to all vehicles it would reduce injury crashes by 7.7% and save $1,226 million a year
- supportive ISA was fitted to all vehicles it would reduce injury crashes by 15.1% and save $2,240 million a year, and
- limiting ISA was fitted to all vehicles it would reduce injury crashes by 26.4% and save $3,725 million a year.

The economic analysis revealed that ISA can be a cost effective way to reduce injury crashes in Australia.[3]

A high-level global analysis of the business case for safer roads has estimated that Australia would reduce fatal and serious injuries by more than 30% by improving road infrastructure to achieve more than 75% of travel on 3-star or better roads for all road users.

Over the life of the improvements more than 88,000 deaths and serious injuries would be avoided, saving over $100 billion in crash costs to the Australian economy.[4]

A more detailed analysis of roads in Victoria undertaken as part of an impact investment case study demonstrated that infrastructure improvements would take the network from:

- 40% 4 star or better to 78% 4 star or better for vehicle occupants, and
- 54% 3 star or better to 87% 3 star or better for motorcyclists.

Based on the BITRE cost model, the combined private and social benefit of the above investment would be approximately AUD$323.8M and would have a benefit cost ratio of approximately 9.7 and an internal rate of return of 130%.[5]

It is well recognised that the costs of reducing trauma from road crashes are borne in the health, social and productivity sectors of the economy. Some of the benefits through judicious application of safety initiatives demonstrated to the inquiry show a return across portfolios of up to 20:1.

Leadership from the very top of government is required to recognise and unlock these multi-agency high-returns on investment. Like defence, it is important that there is a non-partisan approach to road safety that is capable of following strategic objectives over long-term time horizons.

We need to accept the Swedish view that there is an ethical imperative not to accept death and injury as a normal consequence of road use. To do anything less is to budget for death.

Some of the recommendations that follow warrant immediate attention while others may be introduced progressively. These recommendations seek to influence road trauma in three important ways. By:

1. Establishing institutional arrangements and relationships that are responsible for effective and accountable safety improvement. **SAFE** has to be the priority, just as it has become in workplaces and other forms of transport including rail and aviation.
2. Modifying current criteria and programs that bear directly upon transport to ensure that enhancing road safety is embedded and prioritised within these programs.
3. Applying additional resources and focus to the problem to accelerate the rate at which road trauma decreases on Australian roads.

While it would be easy to criticise organisations for their road safety response, we must understand that the issue is complex and the response is constantly evolving as new evidence and practice comes to light.

This inquiry acknowledges the significant ongoing efforts to deal with road trauma and also observes the complexity associated with governing and implementing actions, often across multiple overlapping legislative Acts, portfolios and jurisdictions.

This report does not apportion blame on individuals, but rather seeks more coordinated accountability from government, organisations, researchers and leaders to implement the safe system and harm elimination policy, practices and outcomes.

The inquiry has identified many dedicated, knowledgeable and capable people who help 'nudge' organisations and the community towards better safety outcomes. The efforts of these individuals should not be underestimated; they often operate in constrained environments and compete for the resources, attention and cultural change required for the road safety transformation that is desired.

A national response must rise above these constraints with realistic expectations on what individual organisations can contribute, and a better understanding of what else might be needed to create a lasting step-change in road safety performance.

Accountability for road safety has been a shared responsibility between the various layers of Australian governments and to a lesser extent corporations and organisations. Frequently, there is still an overarching view that road users are entirely to blame.

A range of representative bodies have provided recommendations for a scale-change of action. The Australasian College of Road Safety in a 2017 Submission to Federal Parliamentarians recommended the need to "Develop and implement new road trauma reduction funding opportunities."[6]

The Australian Automobile Association in its Pre-budget Submission (2017-18) also recommended that a system of incentive payments be arranged to help states and territories take action under the National Road Safety Strategy banner. The scale of investment is recognised as one of the important determinants to achieving zero harm on the road as expeditiously as possible. In this way, the loss of life and incidence of serious injury can be much reduced on the journey to zero harm.

The federation model, through the Council of Australian Governments (COAG) processes, has developed mechanisms for coordinating road safety in a variety of organisations such as the Transport and Infrastructure Council (TIC), the Transport and Infrastructure Senior Officials' Committee (TISOC), Austroads, the National Transport Commission, the National Heavy Vehicle Regulator, Infrastructure Australia and the National Road Safety Partnership.

Funding for leadership and coordination, safer vehicles, road infrastructure, regulations for equipment and usage, post-crash care, research and development is rarely tied to coordinated specific, reportable SAFE outcomes.

Private sector road operators take a corporate approach to reporting and managing road safety risk. Major international corporations design, develop and operate with a zero harm agenda. We must translate those experiences across agencies, across stakeholders and across the nation.

In addition, key influencing factors through areas such as insurance—where new real time monitoring technologies can bring real change—are overlooked in road safety portfolios (Tooth, 2017)[7].

The inquiry believes the insurance industry could be more collaborative in reducing crashes and their impacts. For example, third party insurers already contribute to varying degrees in each state and territory, such as investing surpluses in road safety projects including vehicles and infrastructure.

In the USA, over 100 insurance companies support the Insurance Institute for Highway Safety and the Highway Loss Data Institute, an independent, non-profit scientific and educational organisation dedicated to reducing deaths, injuries and property damage from motor vehicle crashes. The institute:

- undertakes scientific studies of insurance data representing the human and economic losses from owning and operating different types of vehicles
- publishes insurance loss results by vehicle make and model, and
- has a large covered test facility for crashworthiness and collision avoidance with over 100 staff.

Its work is in addition to the large test programs and analysis work of the National Transportation Safety Board.

Sweden's major insurer, Folksam, has a research affiliation with Chalmers University. The university also hosts SAFER, a collaboration between government, researchers and industry as well as Folksam.[8]

Nationally, we are funding a range of projects on autonomous vehicles, from infrastructure to regulation and legal factors.

There are already calls for a national approach to harmonise the infrastructure for these vehicles, and to establish national regulations over any self-certification and national insurance (for example, IAG 2018).[9]

Road crash trauma management

Severe injuries resulting from road crashes place a significant burden on health care services and families across all parts of the victim's journey.

Trauma care is unscheduled, and must be available 24 hours a day across urban, country, regional and remote areas.

It is a multi-disciplinary task involving a wide range of government services and specialist medical staff.

Injury rehabilitation requires hospital and post admission resources, often for the lifetime of those affected.

Costs

A 2011 study conducted at the Princess Alexandra Hospital in Brisbane used in-hospital and Medicare data as well as a survey tool to calculate the average direct and indirect costs of major trauma incurred up to one year post-discharge. The estimates were $78,577 and $24,273, respectively.[10]

A 2012 Western Australian study using hospital and insurance data for the state reported that transport injuries accounted for 13.6% of fatalities, 11.5% of non-fatal hospitalisations and $1.1 billion in costs.[11]

The lifetime costs of traumatic brain injury and spinal injury are estimated to be $8.6 billion and $2 billion respectively.[12]

The ancient Greek physician Hippocrates said that war was the only proper school of the surgeon. But NSW's true war zone is the road carnage seen at John Hunter Hospital's trauma centre, says Professor Zsolt Balogh, the surgeon in charge of the state's busiest trauma centre.

"When you see these injuries you don't need to go to war", he says. "We don't see shrapnel or gunshot wounds, but the experience in a busy trauma surgical service from car crashes can be extraordinary."[15]

Professor Zsolt Balogh, director of trauma surgery at the John Hunter Hospital

Quality of care

The Australian Trauma Registry (ATR) is currently the only way to measure serious injury in Australia's major trauma centres. It provides a platform to benchmark trauma care and deliver service improvements to help minimise preventable deaths and disability.

From July 2015 to June 2016 a total of 8,283 severely injured people were admitted to Australia's 26 major trauma centres, 46% of these injuries were sustained on streets and highways. This is an underestimation of the total burden of road trauma as it only captures acute hospitalisation data for the most severely injured.[13]

A robust trauma registry and accurate data are an important base on which to evaluate trauma care outcomes, improve the quality of trauma care and evaluate adequate resourcing. Government funding beyond 2020 is needed, and is essential to ensure the sustainability of the registry.

In a 2016 report evaluating trauma patient outcomes, the NSW Institute of Trauma and Injury Management (ITIM) recommended mandatory five-yearly Royal Australasian College of Surgeons (RACS) trauma verification for all NSW trauma services by 2021. It also recommended progressive implementation of system-wide standards associated with verification requirements.[14]

RACS strongly endorses the ITIM recommendation to mandate trauma verification for all major trauma services as an effective step in improving the quality of trauma care across Australia. The impetus for this is clear, with the ATR's Annual Report 2015–16 stating that improving trauma systems alone can reduce preventable death following injury by more than 50%. The cost of doing this in Australia's 26 major trauma services would be approximately $650,000 over five years.

There is not a good national estimate of the burden of road-related trauma on the health care system (Kirsten Vallmur, CARRSQ pers comm). A national data linkage, multi-disciplinary project investigating pre and in-hospital costs, rehabilitation costs and costs to the victims, families and community is needed to help deliver a better understanding of the total health care costs.

The rate of injury from road crashes is higher in regional and remote Australia as shown below (see Figure 1).

This inquiry recommends that our national capacity to manage and improve trauma care be urgently investigated and resources allocated to not only continue funding for the ATR, but to implement change to reduce preventable death from injury by up to 50% with the associated benefits of:

- reducing trauma,
- improving national productivity, and
- reducing the unnecessary, unplanned burden of road crashes on our health system.

Figure 1: Age-standardised rates for hospitalised cases of on-road crash-related injury by sex and remoteness of usual residence in 2014-15 (AIHW)[16]

INTRODUCTION

Reasons for change

Cultural and institutional rigidity has allowed us to overlook the trauma epidemic of road crashes. We have failed to make the change needed to save lives and injuries in the future.

Health, insurance and social welfare budgets and services amongst others will benefit from reductions in road deaths and injuries, and ultimately achieving vision zero. The recommendations of this inquiry should provide the change—and coordinated action nationally—that will provide a legacy of safer roads and mobility for future generations.

To achieve this we need real overarching change. This must be driven by leadership, and supported and encouraged by a political and community process to deliver stimulus and scale. This will help ensure that we create the capacity and management efficiency that will stop killing and injuring so many, so often, so unnecessarily.

There is much at stake and it is appropriate to reflect on a better response and potential future strategy. We must:

- create the institutional accountability for national, state and local performance
- connect the beneficiaries of road trauma reduction with the solutions, and
- rigorously monitor and transparently report results so we can measure success and change tactics when needed.

We must continue to strive for the elimination of harm and provide the leadership needed to manage, monitor and resource a response to deal with the scale of the problem.

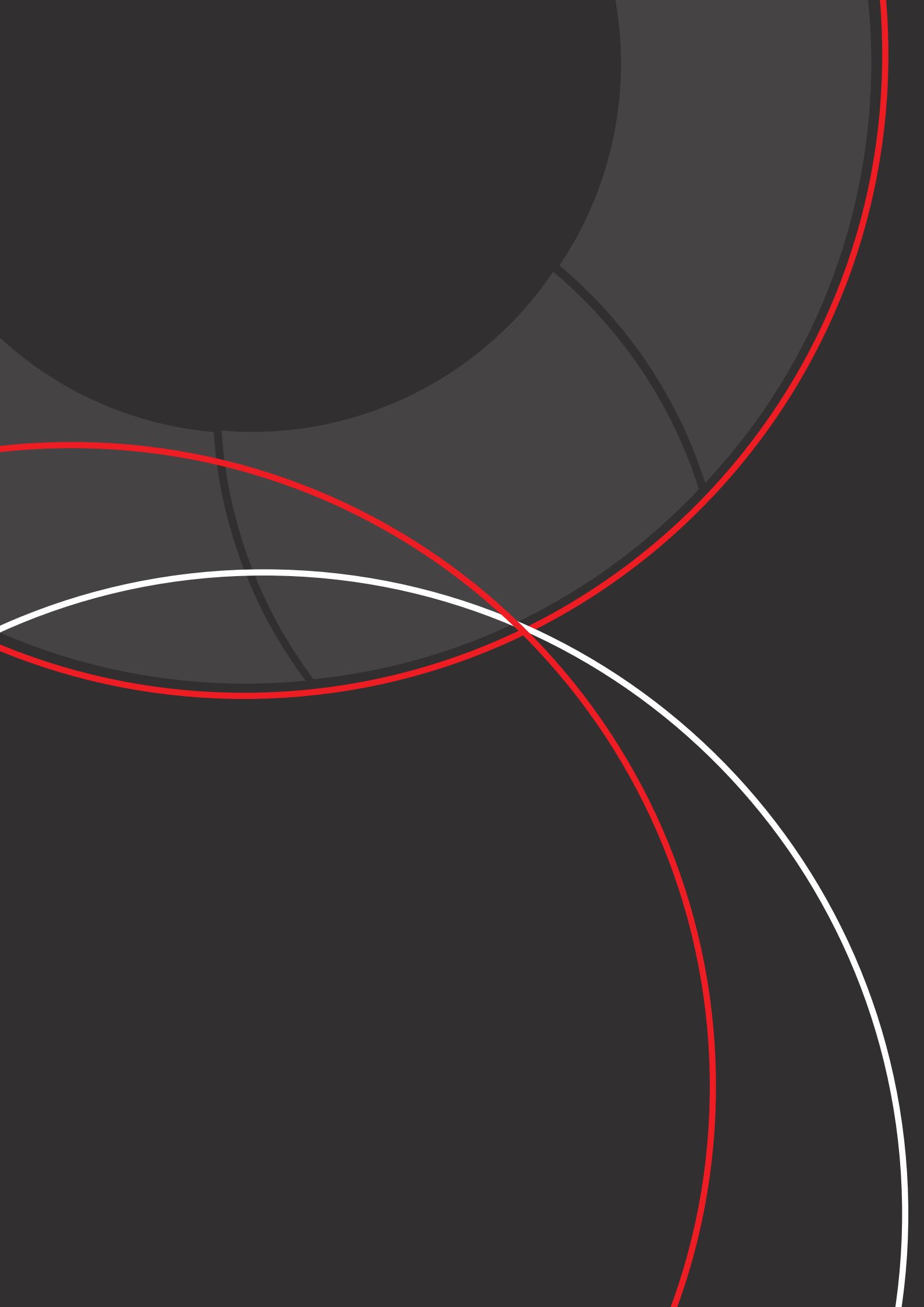
There is an economic and ethical imperative to address this unnecessary and hidden epidemic.

Failing to improve our current situation will result in 12,000 people killed and at least 360,000 injured at a cost of more than $300 billion over the next decade alone.

The Impact Investment study completed using TAC data in Victoria[17] highlighted that more than 50% of injury claim costs for those injured occurs two years following the crash.

Our perspectives must change and we must act on a scale that matters, with a disaster response that reflects the true extent of the problem.

This inquiry has provided recommendations that will create a national climate for success and the elimination of unnecessary and preventable harm from the road transport system.



FINDINGS UNDER THE TERMS OF REFERENCE

Findings under the terms of reference

The National Road Safety Strategy (NRSS) 2011–2020, launched in 2011, was predicated on the Safe System approach to road safety.

This approach is consistent with many well performing countries and has been formally endorsed by the OECD.

Accepting that road users make mistakes, the NRSS recognised that "the whole system needs to be more forgiving of those errors".

The portfolio minister for each state and territory together with the federal minister and parliamentary secretary for Infrastructure and Transport were co-signatories to the strategy.

The strategy recognises that a strong collaborative approach involving government, industry and the community is necessary to reduce the level of serious trauma on Australia's roads.

The focus of proposed interventions is on the Safe System approach: Safe Speeds, Safe People, Safe Vehicles and Safe Roads. The strategy aims to reduce death and serious injury by at least 30% by 2020.

The strategy is underpinned by three consecutive action plans that build on new knowledge while taking account of progress against Safety Performance Indicators, a number of which were to be progressively refined.

The strategy provides a direction and broad framework to guide the actions of state, territory and local governments as well as non-government organisations, commercial partners and the community.

TOR 1 - Identify key factors involved in the road crash death and serious injury trends including recent increases in 2015 and 2016.

From a statistical perspective, the national trend data is subject to fluctuations and a longer term perspective is required to establish if variations are the result of random effects or the commencement of a new trend.

There appears to be a general consensus from researchers that overall crash numbers are associated with the exposure of the population to risk through:

- the extent of travel
- number of road users, and
- population size.

There are often secondary associations with economic indicators such as fuel sales and economic activity.

There is however a considerable degree of uncertainty as to what is influencing the observed trends and much evidence is contradictory or inconclusive. The truth is likely associated with the fact that injury outcomes are the result of interactions within a large complex system. Many variables can be associated with rises and falls in the crash data, yet there are very few variables measured that have a sufficiently large effect in isolation that stands out from all other influencing factors.

While we can train, educate and enforce road users to make less errors and take less risks, the fact that the system is not well suited to human operation in the first place means that crashes will continue to occur.

Even though there are 5 star cars on the road, their ability to protect people is easily diminished if the infrastructure is deficient.

The speeds adopted on the rural road network are still greater than the capacity of vehicles to protect the occupants. Pedestrians, cyclists and motorcyclists are likely to be seriously injured or killed even if struck at the default urban speed limit. The mass difference between heavy vehicles and all other vehicles and unprotected road users means that any collision has a high likelihood of severe injury or death.

In this way the system can be regarded as inherently unsafe, and crashes will continue to occur until the system is made inherently safe. We are not currently measuring progress against the latter very well.

Although there are several very effective countermeasures that can have considerable effects, there are very few countermeasures that are capable of creating a system wide effect. Lower travelling speeds is an example that gets closest to this: all road users, all road types and all vehicle types can benefit from a speed change. While behavioural measures can be effective, the enforcement pressure must be maintained. Safer vehicles deliver incremental benefits over the long term but it takes about 20 years to achieve fleet turnover. Infrastructure improvements can also create safer roads, but such improvement cannot exist everywhere, and so benefits are slow to accrue.

It is important that all components of the system work together to eliminate the harm. If one part of the system is deficient, other parts in combination should combine to compensate.

Trend modelling from numerous sources over the past decade has highlighted likely contributions of improved vehicle safety, safer infrastructure, speed management, legislation changes and combinations of enforcement and communication.

The relationship between travelling speed and crash outcomes constitutes one of the most robust evidence bases that exists in road safety. However, we are unable to report if speeds on the nation's roads were going up or down during the period of interest.

Australia is a world leader with many of its legislation and enforcement based behavioural interventions, yet we are unable to determine to what extent enforcement input is held constant over a certain period. Fatigue and distraction provide further examples where there is little information to guide us.

Exposure data is also limited and variations within the system are poorly understood. While there is some information for motorised vehicles, very little is known about other road users.

When crashes occur, there is still a strong culture of looking at issues associated with the performance of the road user. In most jurisdictions, it would be rare that the role of the speed limit, the safety quality of the vehicle and the safety attributes of the road are also considered.

The nation is overly reliant on fatality crash data and therefore misses the opportunity to properly manage the serious injury burden. The characteristics associated with fatal crashes can be quite different to injury crashes, and countermeasures should not be based on fatal crash information alone.

Serious injury reporting has been an embarrassment for the nation for several decades and only now is there the prospect of a genuine, regularly updated national snapshot. Even so, an operational database is still at least a year away. There are many gaps in knowledge regarding injury numbers to the point that different sources contradict each other in relation to an increasing or decreasing trend. Furthermore, alternative databases provide quite different snapshots of the injury situation. Needless to say, finding a solution to this situation is complicated but essential. Efforts must continue with the utmost priority to better understand the nature and quantum of injury associated with road use.

A significant challenge is that only snapshots of the road transport system can be obtained.

Although some jurisdictions are rapidly increasing their capability, there is limited ability to look at intermediate indicators and assess how these may be influencing trauma outcomes nationally:

- What proportion of travel was on the most risky parts of the network?
- What road cross sections are associated with the least harm?
- What injuries are usually sustained in head on collisions and can the health and insurance costs be tracked?
- How did enforcement input change over a period of interest?
- How much travel was not conducted in 5 star vehicles?
- How much travel on the riskiest roads is in 5 star vehicles?
- What is the safest vehicle on the roads and why?
- In what ways has the extent of travel changed during the period?
- Is fringe area development offsetting safety gains made elsewhere?
- Why are fatalities possible in 5 star cars?
- Have vehicle speeds remained constant during periods of increased trauma?
- To what extent are mobile phones in use when crashes occur?
- On what parts of the network or in what circumstances is it difficult to receive a fatal injury?

We struggle to obtain insights into such matters and many feasible hypotheses cannot be adequately tested. As stated previously, road safety is part of a large complex system that is influenced by many specific factors. Progress in one area might be undermined by influences and changes in other areas. We must do more to understand how the system as a whole can eliminate harm.

TOR 2 - Review the effectiveness of the National Road Safety Strategy 2011–2020 and supporting 2015–2017 Action Plan, with particular reference to the increase in deaths and serious injuries from road crashes over the last two years.

The current strategy and action plan have many good initiatives that would be a feature of any world leading road safety response.

However, many recommendations from the last review (see below) are still to be implemented across levels of government.

Previous review of the National Road Safety Strategy

A review of the National Road Safety Strategy commissioned by Austroads and published in 2015 made the following recommendations:

Priority areas

Thirteen priority areas were identified where more emphasis is recommended because of changing crash patterns or a real or perceived lack of activity. The priority areas are not intended to replace the content of the 2011 strategy but are aimed at supplementing both the strategy commentary and associated action agendas.

1. Vulnerable road users
2. Older road users
3. Indigenous road users
4. Speed management
5. Remote areas
6. Vehicle safety
7. Cooperative Intelligent Transport Systems
8. Communication strategies
9. Monitoring serious injuries and crashes
10. Infrastructure investment
11. Coordination with urban planning
12. Workplace road safety
13. National leadership

Recommendations

As well as the priority areas, the consultation identified a number of broader suggestions for consideration in developing a new action plan. These are summarised below:

- That the next action plan be developed taking into account the identified priority areas and the current First and Future Steps agendas.
- That a clearer statement of implementation and parameters of success for each identified action be included in the next action plan.
- That the next action plan be written to clearly delineate each action as the primary responsibility of the Commonwealth, the Transport and Infrastructure Council, Austroads or individual states and territories.
- That the separation of 'responsible' and 'irresponsible' in the road user section be removed from the next action plan.
- That a method for engaging with other government and non-government agencies in ongoing implementation of the strategy be included in the next action plan.
- That a priority be to develop a method for measuring serious injuries in the next action plan.
- That the importance of modelling the effects of countermeasures and monitoring the strategy be recognised in the next action plan.
- That the importance of ongoing research and development be recognised in achieving continuing improvements in road safety in the next action plan.[18]

Despite some stand-out activities, the management and coordination issues are replicated at state and federal levels.

The inquiry recognises that several initiatives (including the Bruce Highway upgrade, TAC Victoria SSRIP project, NSW data management and safety infrastructure investment, Main Roads Western Australia quality assurance frameworks) will be effective.

However the road safety response over a long-term horizon has to offset increases in exposure and population growth. While some parts of the system are demonstrating considerable safety performance, a complete system—or a mainstream approach to safety—is limited. The lack of progress in relation to recommendations of the last review and the strategy overall are quite obvious—the headline conclusion is that there has been a failure to implement in a meaningful way.

Overall roads are becoming safer; however this in itself creates a crisis of complacency – is ongoing small scale change sufficient?

Community debates on safety tend to focus on road user performance and infrastructure investment issues rather than an expectation that all possible options within the system be holistically explored.

One fundamental question that must be considered is what is the purpose of a national strategy if there is limited accountability? Due to the federated nature of Australia's government, most initiatives run the risk of becoming a consensus promise. As such the detail and level of commitment in the strategy tends to cater for what all jurisdictions will agree to, rather than what the nation should aspire to. It is not the place for this inquiry to solve problems associated with federalism, however best practice frameworks and aspirations should be made explicit and resources committed by all the participants.

A framework needs to exist that allows jurisdictions to excel if they choose, but also offer help where it is required.

There is no coordinated national research or implementation effort which includes diverse stakeholders: roads, vehicles, insurers, researchers, users, regulators and innovators for example.

The Australian Transport Safety Bureau (ATSB) was formed on 1 July 1999. It combined the Bureau of Air Safety Investigation, Marine Incident Investigation Unit and parts of the Federal Office of Road Safety. From July 1999 until March 2008, Australian Government road safety initiatives were primarily the ATSB's responsibility. While part of the ATSB, the road safety branch was involved in many state and federally based programs and research projects. The branch helped develop informed road safety policies by collecting and disseminating national road crash statistics, producing research and public information materials, and providing evidence-based advice on a range of road safety issues. It also coordinated a number of national stakeholder bodies and events, including the biennial Indigenous Road Safety Forum and the National Road Safety Strategy panel. The Road Safety Branch is now part of the Infrastructure and Surface Transport Policy Division of the Department of Infrastructure, Regional Development and Cities.[19]

The department argues that similar activities continue today with responsibilities spread throughout the entity (Pers Comm Department Secretary and Deputy Secretary). However previous policy leadership either through FORS or ATSB is no longer obvious. It could be argued that this lack of leadership since 1998 has contributed to a lessening decline in national road safety performance, and the recent increase in road trauma as the longer term benefits of that leadership have "worn off". Short term perspectives and limited long term strategic thinking on the safety issues dominate, and are still almost always in the context of mobility.

Fundamentally, despite the aspirations articulated in the strategy and action plans, there has not been much change in the response to road safety. With some notable exceptions:

- funding with a focus on safety is still largely isolated and insufficient
- roads continue to be built and operated with inherent safety issues
- the mass of evidence supporting speed management continues to be overwhelmed by opposing issues, and
- there is still a heavy emphasis on extracting better road user performance in a system not well suited to human operation.

It is unsurprising therefore that we are not observing a significant downwards shift in road trauma trends.

A key finding of the inquiry is that the performance failure of the past decade can largely be associated with a failure to implement the Safe System approach to road safety.

It is only now that tools, frameworks and quality assurance around an elimination agenda are building momentum.

Change management has been left floundering and isolated groups are tasked with managing the road trauma problem for the nation and jurisdictions with comparably small budgets and influence relative to the size of the problem.

When local government is considered, there is a need to recognise that there is extremely limited ability to pursue the agenda with no alternatives in sight.

The inquiry is pleased to report however that towards the end of the current strategy, an increasing awareness of these issues has emerged and some organisations have been pursuing the required change in earnest.

The TAC infrastructure funding in Victoria and renewed aspirations in the current action plan point to increasing momentum on this issue. This must be followed through for success to occur.

Ultimately having harm elimination as "business as usual"—rather than an add-on activity—will be a key indicator of transformational change.

While a target of 30% provides something to work towards, it is an admission that the other 70% may still be harmed. A long term strategy perspective must be introduced and the community shown that elimination at some point in the future is achievable. Modelling in some jurisdictions is moving a step closer towards this perspective and must also be applied nationally. There is a need to identify and celebrate our successes on our journey towards zero.

TOR 3 - Identify issues and priorities for consideration in development of a post-2020 national road safety strategy and 2018–2020 action plan, focusing on how Australia can recognise and move towards a safe road transport system which minimises harm to all users.

To ultimately eliminate harm on Australia's roads, a transformative approach to addressing road trauma nationally is required. The harm elimination agenda under the guise of the Safe System needs to have a specific focus and be backed with tools and processes that ensure the agenda is truly embedded into "business as usual".

There is a significant challenge in setting up institutional arrangements and collaborative mechanisms across all levels of government and key stakeholders to achieve consistency in terms of Safe System approach, measures of performance and targets to be achieved.

Setting a time-bound target to achieve zero harm is essential. A long time horizon, to 2050 for example, is regarded as an ambitious but achievable target for achieving zero harm. Intermediate goals can be established for 2030 and 2040, again focused on achieving zero in certain parts of the system (such as in CBDs, rural towns and outside of schools) progressing to inner suburbs and rural townships. Corridor and intersection transformations could be guided by proportion of travel on roads of varying minimum safety standards (for example 90% travel on 4 star roads or 90% on roads with a limit less than 80km/h or with centre barrier protection). Ongoing modelling work will be required to establish feasible timelines, targets and scenarios that will allow jurisdictions and the nation to achieve zero.

The next strategy will need to be guided by a new suite of KPIs that can monitor actions and measure how the system is being made error tolerant and more survivable. A starting point for these should be the KPIs adopted by Sweden for its national road safety approach and the UN Global Road Safety Performance Targets agreed by Member States.

Sustained and timely reporting from national data sets should be underway at the start of the new strategy.

A national data observatory is suggested as the mechanism to bring the data together, which builds on the work of BITRE under the current strategy. Serious injury data presents a challenge, however an operational database must be established to guide actions under the next strategy. Refinements should continue under the life of the next strategy and work to link injury information with road and vehicle attributes needs to be a high priority. Further support and development for the Australian Trauma Registry – and refinements that might complement AIHW data – need to be pursued.

Embedded tools, frameworks, training, accreditation and quality assurance processes at all levels of government and in the private sector are required to ensure that organisations maintain alignment with the Safe System approach. KPIs need to be developed that measure the embedding of road safety in "business as usual" activities.

Areas where performance gains can be made under the next strategy include vehicle safety technologies, speed management, infrastructure safety investment, quality assurance, demonstrations, stimulus, innovation and enabling activities.

There is a need to better define actions under the next strategy so that interventions can be adequately monitored and assessed. The role of actions in ultimately achieving zero harm needs to be understood so a more focussed strategic approach can be taken.

TOR 4 - Advise on arrangements for the management of road safety and the NRSS, looking at best coordination and use of the capacity and contributions of all partners.

As the inquiry progressed it became apparent that leadership and management were of concern to many stakeholders. This was also a key outcome of the 2015 review.

The governance capability, combined with poorly defined and resourced actions, ill-defined accountability and an inability to report on progress in a meaningful way has been the background headline behind the implementation failure.

While it is true that states, territories and local government play a key role in implementation, it is clear that road safety is a national problem and requires all three levels of government to be a part of the solution. Government also needs to build accountability frameworks for those parties that are also supplying the problem. Vehicle manufacturers and importers need to be a part of the speed management solution, telecommunication companies need to be a part of the distraction solution and electricity providers need to be a part of the roadside hazards solution.

The inquiry determined that fragmented governance and resourcing has resulted in a lack of a strategic approach that comprehensively managed all options available to reduce death and injury. The lack of a holistic view for the nation meant that some issues were left unattended and others progressed very slowly. Gaps in fleet safety not covered by ANCAP or regulations provide stand out examples of this.

In similarity with the 2015 review, stakeholders also regarded that they had something to offer but were largely unconnected with the strategy. This contrasts, for example, with the Swedish approach that utilises an independent performance and monitoring group and conferences with key stakeholders.

The recommendations outline a transformative approach to road safety governance and management focussed on pursuing the harm elimination agenda under the Safe System approach. A decision to recommend a new national entity was not taken lightly and it is acknowledged that this is not a trivial matter and will require much talent and resource.

However, as the inquiry progressed, it became apparent that improved national capability in pursuing a strategic agenda was required. The implementation failure of the previous decade needs to be addressed.

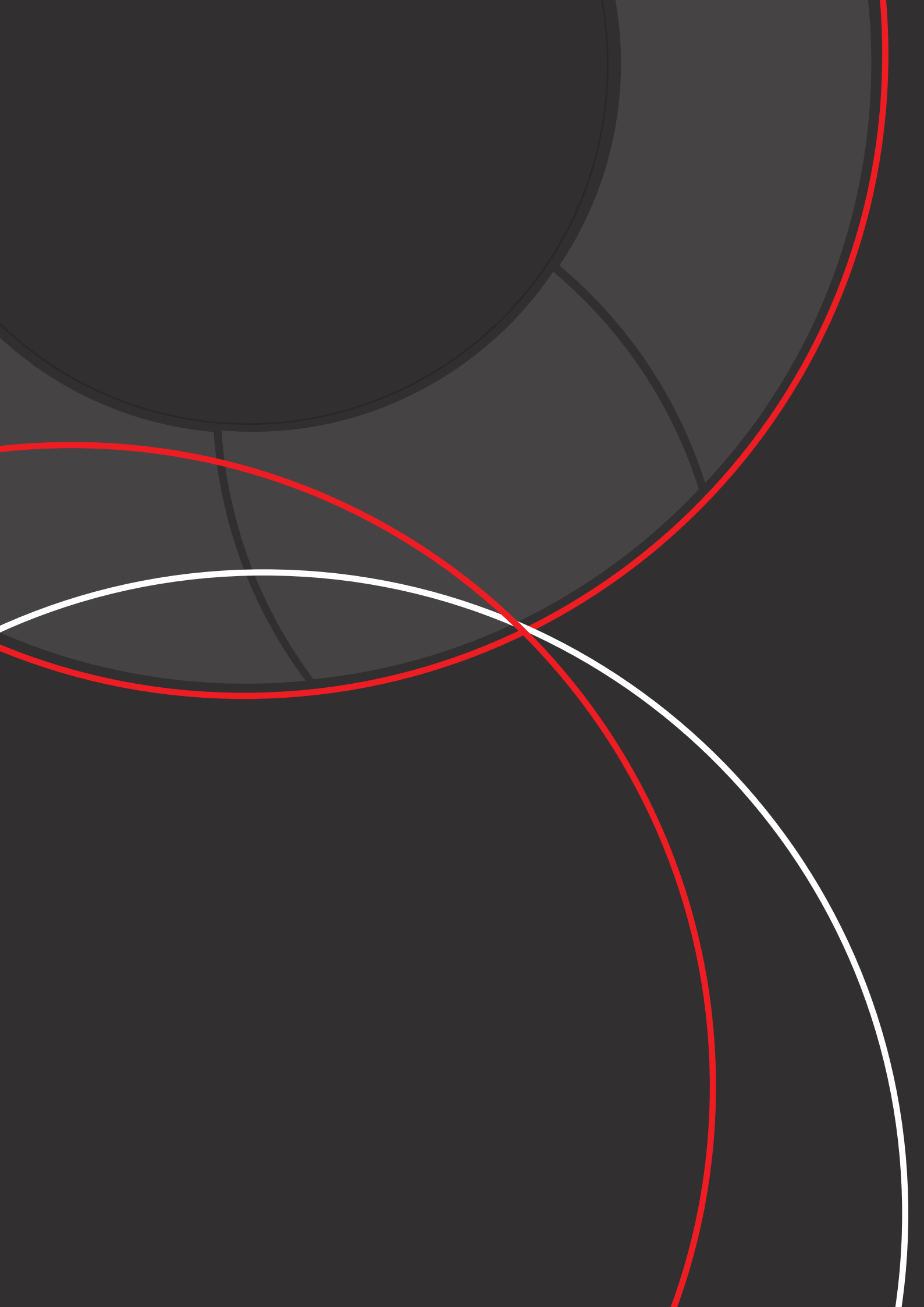
Political will at the highest level of government is required, realised through the appointment of a Cabinet minister responsible for road safety as a central focus of accountability for delivery of government transport-related services. The need for national leadership has been recognised by many submissions to the inquiry and highlighted in the comprehensive submissions to Federal Parliamentarians over the past few years by the Australasian College of Road Safety.[20]

Financial resources must be commensurate with the challenge of accelerating harm reduction; a $3 billion investment a year by the Australian Government is recommended, representing just 10% of the estimated annual cost of road trauma to the Australian community of $30 billion. Stimulus and scale of investment are critical if appreciable progress is to be made toward eliminating harm on Australia's roads and fulfilling the strategy and current action plan.

Government is urged to support a strategic national research and development program that:

- complements studies conducted by jurisdictions and Austroads
- is focused on supporting the achievement of a zero harm outcome
- promotes innovation
- facilitates collaborative research activity to achieve scale and nurture capability, and
- publishes and promotes outcomes to guide future safety development.

Importantly, we must celebrate our successes and identify where the system is no longer harmful. The community must be led towards a point in time where zero is possible – to do otherwise is to budget for death and injury on our roads.



DETAILED RECOMMENDATIONS

1 Create strong national leadership by appointing a Cabinet minister with specific multi-agency responsibility to address the hidden epidemic of road trauma, including its impact on the health system.

Key actions:

- Appoint a Cabinet minister with multi-agency authority for managing all road safety. This will provide a national focal point and accountability for delivery of federal programs and the National Road Safety Strategy.
- Formalise non-partisan support for road safety action building on the existing Parliamentary Friends for Road Safety.
- Report bi-annually to parliament on road safety progress linked to government input and funding.
- Host an annual national road trauma crisis performance monitoring summit with national, state and local stakeholders to review performance against agreed key performance indicators (KPIs), and implement remedial action as needed.
- Develop an interdepartmental, industry, research and community taskforce that captures the depth and breadth of road safety issues across government, the private sector and the community. This would build on the existing work of Austroads.

Appointing a Cabinet minister for road safety would prioritise the issue and ensure it is addressed by government. The minister would be responsible for establishing and monitoring road safety performance indicators tied to all federal road infrastructure, and vehicle related research and development projects, federal road funding (for all jurisdictions) and all associated federal transport related contracts.

This position would be responsible for developing thorough cooperative processes at the scale needed for state and local government projects to ensure SAFE is a priority.

Building road safety considerations into all government arrangements that intersect with road transport would also be a key responsibility for the minister. Furthermore, the minister should oversee development of an interdepartmental and external taskforce—and strong strategic alliances with states and territories—to ensure that jurisdictional and national actions complement each other and optimise harm reduction on Australia's road network.

Convening a performance summit will bring together all agencies and groups that influence road safety outcomes to examine the successes and failures reflected in progressive trauma outcomes and KPI performance. Driving accountabilities among peers is a powerful way to achieve successful measures while seeking alternative approaches where the trauma picture is static or deteriorating.

The inaugural summit would have as its focus agreeing appropriate measures—both trauma outcomes and KPIs—to monitor progress on eliminating harm on the road network.

The Minister for Road Safety would report progressive results of trauma outcomes and KPIs to the Federal Parliament twice a year. Tabling the results would confirm the Australian Government's priority to eliminate serious road trauma on Australia's roads. Elevating road safety in Parliament also helps drive home accountability for delivering on commitments, and implementing new interventions where targets are not being met.

Highest level commitment to the ultimate elimination of harm

Sweden signalled its commitment to eliminating serious trauma on its road network in October 1997 when the Vision Zero concept was passed by a large majority in the Swedish Parliament. It enshrined a commitment to the principle that it can never be ethically acceptable for a person to be killed or seriously injured when using the road transport system.

On 1 September 2016 Sweden relaunched Vision Zero to improve transport safety, with a renewed emphasis on vulnerable road users and technology.

"Swedish transport safety work is successful. Sweden occupies a leading position in the fight against transport deaths. It is a position we cannot afford to lose. With the relaunch of Vision Zero we will secure elements that work well and develop elements that work less well," said Sweden's Minister for Infrastructure, Ms Johansson. "Now we will create the conditions for Sweden to continue to export Swedish expertise and solutions in road safety, and contribute to an enhanced innovation climate."

2 Establish a national road safety entity reporting to the Cabinet minister with responsibility for road safety

Key actions:

- Based on the Road Safety Management Capacity Review (recommendation 6), establish a national road safety entity with sufficient resourcing and capacity to perform the intended functions.
- Undertake leadership on road safety areas under federal jurisdiction, and monitor national performance and collaboration with road safety stakeholders.
- Coordinate the targeted stimulus of road safety action nationally as part of the National Road Safety Fund (recommendation 3).

A key factor in helping the national strategy to achieve its trauma targets is to ensure that:

- the national, state and territory strategies align
- each reflects a best practice framework, and
- agreed key performance measures and targets are met.

The terms of reference for this inquiry reference and seek guidance in the effectiveness of past and proposed national road safety strategies and action plans.

These have been developed under the Council of Australian Governments (COAG) Transport and Infrastructrue Council through Austroads – the peak organisation of Australasian road transport and traffic agencies. Austroads is a valuable coordination agency but has no responsibility for resources and delivery, or accountability for the outcomes.

The Australian Government is an active participant in the Austroads programs, although its resource allocation for road transport activities is not directly related.

Increasingly road transport issues are becoming national as data management, tracking technologies, pricing and funding are developed with smart systems based on a global marketplace.

While this is obvious in autonomous vehicles, it is overlooked and even discouraged in terms of prioritising a safe road transport system today.

The Australian Government already has specific transport safety agencies or offices for air transport, marine operations and increasingly over rail. It has an ATSB, an independent Commonwealth Government statutory agency. The ATSB is governed by a commission and is entirely separate from transport regulators, policy makers and service providers.

The ATSB contributes to air, marine and rail transport safety by independently investigating, analysing and openly reporting on transport safety matters. All ATSB investigations are 'no blame' – the emphasis is on learning to improve future safety.

The ATSB is entirely separate from transport regulatory authorities such as the Civil Aviation Safety Authority (CASA), the Australian Maritime Safety Authority (AMSA) and state and territory rail safety regulators, and also from service providers such as Airservices Australia and the Australian Rail Track Corporation (ARTC).

For many years the Australian Government had a Federal Office of Road Safety (FORS), which enhanced coordination of road safety programs nationally. This was closed and partly replaced by the ATSB until road safety responsibilities were placed within the department in 2008. It has been suggested that a reason for failing to meet road safety reduction targets is that the momentum built with FORS has 'worn off'. Austroads has attempted to fill that gap, but with limited responsibility to direct funding change, it is unlikely to be able to achieve the necessary and urgent reform this inquiry recommends.

Accordingly, the entity would assume the specific role to enhance national collaboration with state and territory road safety departments, local government and other key agencies and organisations that influence safety on Australia's roads.

Against this background, key functions of the entity would include providing leadership on accountability, and working collaboratively with states, territories and local government to:

- provide national accountability for the total road safety performance of the nation
- implement the agreed recommendations from this inquiry and subsequent areas where national leadership is required (e.g vehicle standards, national trauma registry)
- allocate, oversee and monitor the cost-effective allocation of National Road Safety Fund investments (recommendation 3) and establish a set of best practice guidelines to allocate funds cost-effectively
- establish, monitor and report against a set of key performance indicators that are measurable and reliable, and that truly reflect ultimate road safety performance in terms of reduced deaths and serious injuries on the road network (recommendation 4)
- conduct a gap analysis to identify areas of trauma that are appropriately defined and significant, and for which evidence-based countermeasures are available for effective application
- keep Australian vehicle regulations up with world best practice
- support a national well-resourced strategic research program. This would also include major demonstration projects that would build on and complement Austroads and jurisdictional programs. It would:
    - ensure scale in multi-factorial research in areas such as economics, planning, engineering, technology, trauma care, communications, management and workforce planning
    - reconcile the differing definitions to establish a national database of road fatalities and serious injuries, and to create a national data observatory
    - establish a national investigative regime to enhance current police, coronial and research centre road crash investigations along the lines of the ATSB. This would ensure independent investigation and analysis, and open reporting on road safety matters without a focus on "blame"
- liaise with federal departments, local government, statutory bodies, and professional and community groups whose functions – including funds disbursement – intersect with road transport and safety outcomes, to help embed best practice principles in their activities
- identify priority actions for expanded implementation as part of the 2018–2020 Action Plan.

The idea of establishing a new national entity with a road safety focus has received strong support, including from the Australian Automobile Association (AAA – 33), RACV (22) and the Australian Trucking Association (ATA – 44). Some submissions called to extend the functions of existing bodies.

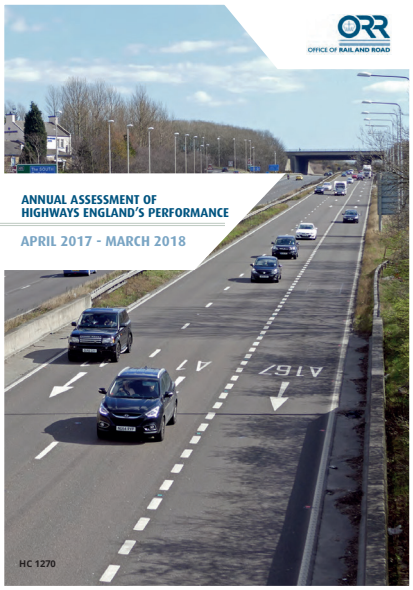
The formation of a properly resourced entity is a significant undertaking. It heralds road safety promotion as a vital government role given the pain and suffering road trauma inflicts upon the community, as well as its attendant cost and drag on economic progress. A proper assessment of the entity's resource requirements, skills mix, roles, accountabilities and governance arrangements will be critical to its success. An Australian road safety governance review (recommendation 6) can specifically address these issues.

Office of Rail and Road, and Highways England (United Kingdom)

The Office of Rail and Road (ORR) is the UK's independent regulator overseeing the rail industry's health and safety performance, and the safety performance of Highways England. The safety and economic functions of ORR are driven by EU and UK legislation. It is accountable to parliament and the public.

Highways England was established in April 2015 as a government company to operate, maintain and improve England's motorways and major roads. The current £15 billion investment program and delivery plan includes a commitment for 90% of travel on the strategic road network to be at three stars or above by the end of 2020.

The Office of Rail and Road ensures that Highways England delivers its major program of investment and other performance commitments. The safety and related performance targets are independently monitored and reported annually..



3 Commit to a minimum $3 billion annual road safety fund

Key actions:

- Establish a minimum $3 billion a year road safety fund.
- Enact legislation to ensure Australian Government investment in road safety is at least 10% of the annual cost of road crashes to the country.
- Empower the national road safety entity to disburse funds on federal, state and local schemes that create stimulus and scale, follow agreed best practice guidelines, contribute to achieving agreed key performance indicators, and meet a demonstrated need or gap in action or scale.
- Allocate a minimum 5% of funds for a road safety innovation initiative that can deliver results in Australia and provide export potential globally. This could include:
  - new insurance or mobility solutions
  - speed management
  - infrastructure treatments and delivery mechanisms
  - enforcement techniques, or
  - trauma care that could include national data linkage, a multi-disciplinary project investigating pre and in-hospital costs, rehabilitation costs and costs to the victims, family and community.
- Allocate a minimum 5% of funds for a road safety enablers initiative. This would provide appropriate long-term resourcing to key agencies and non-government organisations with a demonstrated role in accelerating road safety improvements.
- Build on current research and government capabilities in each jurisdiction to implement a 'safe system' based crash investigation program. This would sample a cross section of the most harmful crash types from around the nation, including those involving heavy vehicles, emerging vehicle safety technologies and vulnerable road users.
- Perform ongoing reviews on the safety performance of new infrastructure projects completed within the past five years.
- Develop, refine and implement tools, frameworks and quality assurance processes within key road safety organisations to ensure Safe System alignment with a focus on eliminating death and serious injury.

Recent increases in deaths and serious injuries on Australia's roads demonstrate that the scale of resources currently allocated to reduce harm is far from adequate. Coordination of activities—and the accountability for action and results—is missing in many areas. Ensuring road safety investment is mobilised in a targeted, cost-efficient and cost-effective way is the focus of the following recommendations.

Given the urgent need to stem the tide of trauma and ultimately eliminate harm on the national network, it is recommended that the Australian Government commits $3 billion a year from 1 July 2019 to meet the challenge.

The fund would represent 10% of the $30 billion plus annual cost of road trauma to the Australian community, and would support all of the recommendations from the inquiry. It would be administered through the new national road safety entity.

Funds provided by the Australian Government, some of which may come from existing program funding (for example, the Black Spot Program), could be supplemented through public-private partnerships with organisations that stand to profit through improved safety performance (for example impact investments with insurance sector support).

Identifying and allocating such a specific level of funding is a necessary and urgent investment to overcome a real, unrecognised community epidemic.

The aim is to ensure appropriate, accountable resourcing that supports national, state, territory and local government agencies, trauma facilities, corporate entities, non-government organisations and others. Resourcing would be targeted to deliver high-return safe system interventions. To ensure funds are best spent, a business case would need to be developed for any significant disbursement, as would progress in meeting intermediate, jointly agreed performance targets. Separate funds quarantined for innovation in road safety would also allow new, potentially more effective countermeasures and approaches to be explored.

The disbursements would focus on areas of national accountability. Funds would be made available on the basis of knowledge gained through the national entity's collaboration with jurisdictions, as well as agreed best practice guidelines, the contribution to key performance indicators, and the results of a gap analysis.

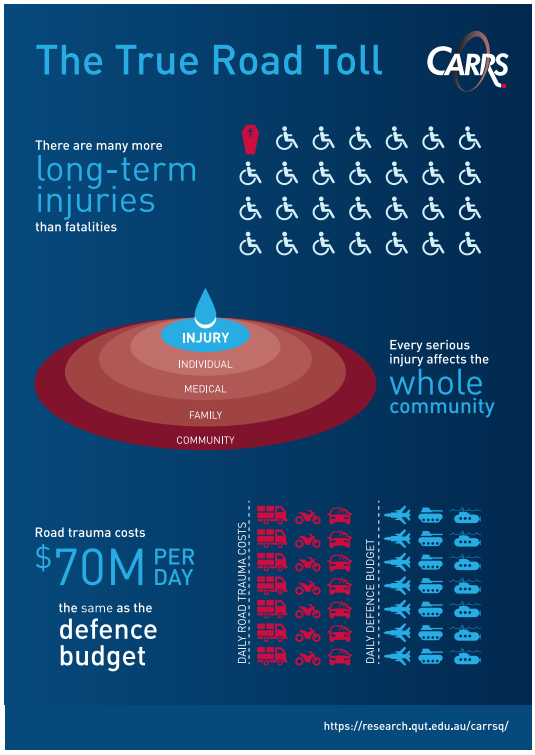
Importantly the funds could be applied in all key domains of the Safe System that directly influence road safety outcomes, specifically:

- speed management
- leadership and skills development
- infrastructure safety
- vehicle safety
- enforcement, and
- post-crash care.

Road safety spending is similar to defence spending, and like defence is a national insurance policy. The current trauma rates in road safety have often been discussed in defence terms by our generals. The current Governor-General, Sir Peter Cosgrove, has called road trauma "an innocent war on our roads.[22]

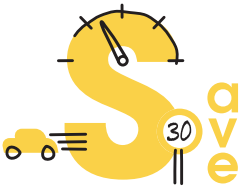
Former governor-general, Major General Michael Jeffery, said in 2006, "take the mortality rate (of road trauma) alone. If a similar statistic applied to Australians in battle, the public outcry would galvanise the country into action".

Defence spending is to mitigate risks. It provides training and capacity to deal with potential but unknown future risks to the safety of Australians. Currently the price tag is about $35 billion a year rising to over $40 billion by 2021. Naval shipbuilding alone will attract $3.5 to $4 billion of the nation's cash flow, every year, forever.[23]



Save LIVES

A ROAD SAFETY TECHNICAL PACKAGE
Every year over 1.25 million people die because of road crashes, and millions more are injured. The World Health Organization has synthesized evidence-based measures that can significantly reduce road traffic fatalities and injuries. The result is Save LIVES: 6 effective strategies for reducing the impact of road traffic crashes. Prioritizing investment in these strategies will save lives.



SPEED MANAGEMENT

- Establish and enforce speed limits
- Require car makers to install new technologies to help drivers keep to speed limits
- Build or modify roads which calm traffic using:
  - Roundabouts
  - Speed bumps
  - Rumble strips
  - Chicanes

LEADERSHIP ON ROAD SAFETY

- Create an agency to spearhead road safety
- Develop and fund a road safety strategy
- Evaluate the impact of road safety strategies
- Monitor road safety by strengthening data systems
- Raise awareness through education and campaigns

INFRASTRUCTURE DESIGN AND IMPROVEMENT

- Safe passageways for pedestrians
- Bicycle and motorcycle lanes
- Crash barriers and forgiving road side features
- Safer intersections
- Separate access from through-roads
- Vehicle-free zones
- Traffic and speed restriction in residential, commercial and school zones
- Better, safer public transport

VEHICLE SAFETY STANDARDS

- Establish and enforce standardized regulations related to:
  - Seat-belts including anchorages
  - Frontal impact
  - Side impact
  - Electronic stability control
  - Pedestrian protection
  - ISOFIX child restraint points
- Establish and enforce regulations on motorcycle anti-lock braking

ENFORCEMENT OF TRAFFIC LAWS

Establish and enforce regulations related to:

- Seat-belts
- Child restrains
- Speeding
- Drinking and driving
- Motorcycle helmets

SURVIVAL AFTER A CRASH

- Develop prehospital and facility-based emergency care systems
- Train people who respond to crashes in basic emergency care
- Promote community first responder training

For more information:
www.who.int/violence_injury_prevention/publications/road_traffic/save-lives-package/en/

World Health Organization

The World Health Organization's Save LIVES package[24] outlines six evidence based measures that can significantly reduce road trauma. Are these basic building blocks sufficiently actioned in Australia?

Funds would be allocated on the basis of lives saved per unit of investment, and the level of support to achieve agreed road safety KPIs. Currently there is a specific need to support the National Road Safety Strategy priority actions for 2018–2020 and ensure they are adequately resourced.[21]

These actions include:

- managing speed
- providing safe infrastructure in regional and remote areas
- managing and funding local government to address the higher rates of trauma
- urban intersections
- vulnerable road user safety
- Autonomous Emergency Braking (AEB) deployment
- other new vehicle technologies
- finding efficiencies in national enforcement collaborations (eg drug testing), and
- a focus on regional road safety issues and strategies.

Issues such as road user distraction are currently being investigated by Austroads. This includes initiatives ranging from education programs to technological disruption (as recommended in submissions including from Katasi). Resources for and to encourage communications suppliers to advance these solutions should be accelerated.

The fund would also support a multi-portfolio project to build a national data linkage, multi-disciplinary program investigating pre and in-hospital costs, rehabilitation costs and costs to victims, families and communities to manage and improve road crash trauma. This would not only fund a national Australian trauma registry, but implement the changes needed to reduce preventable death from injury by up to 50% with the associated benefits of reducing trauma, post-trauma care, improving national productivity and the unnecessary, unplanned burden on our health system.

Independent research for the Australian Automobile Association shows the annual cost of road safety to the Australian Government alone is about $3.7 billion.

The Australian Government has committed to a rolling 10 year investment of $75 billion in infrastructure, some of which will deliver safety outcomes. The absence of road safety as a priority for Infrastructure Australia and this national investment must be addressed to ensure safety outcomes are maximised from these existing commitments. The $3 billion Road Safety Fund must be in addition to these commitments with a focus purely on road safety actions across all areas of safe system and harm elimination priorities.

Australian Government road funding is through a range of initiatives, including:

- national projects
- off-network projects
- the Roads to Recovery Program
- funding for local roads, and
- the Black Spot Program.

The Black Spot Program, which provides funding in the order of $80 million a year, is the only program where safety is a priority. Given the annual cost to the Australian Government alone is $3.7 billion, this investment is hardly likely to be effective.

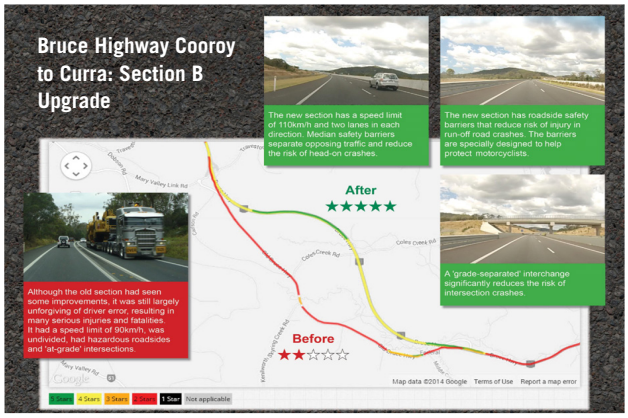
While successive Australian governments since 1959 have distanced themselves from previous hypothecation arrangements from fuel excise charges on motorists, the AAA has pointed out that motorists will pay $12.6 billion in net fuel excise in 2018–19, up from $12.2 billion in 2017–18. However forward estimates show that the proportion returned to land transport infrastructure will decrease from 61% in 2017–18 to just 32% in 2021–22.

Infrastructure assessment tools and frameworks

AusRAP rating tools - Bruce Highway – Cooroy to Curra – 4 and 5-star road delivers 82% reduction in death and injury

The Cooroy to Curra section of Queensland's Bruce Highway used to be one of the deadliest stretches in the country. It is now one of the safest, moving from a 2-star safety rating to 4 and 5-star following a state and Australian Government funded upgrade. Road infrastructure improvements have enhanced safety and efficiency on this important transit and freight corridor, with long distance traffic now separated from the locals.

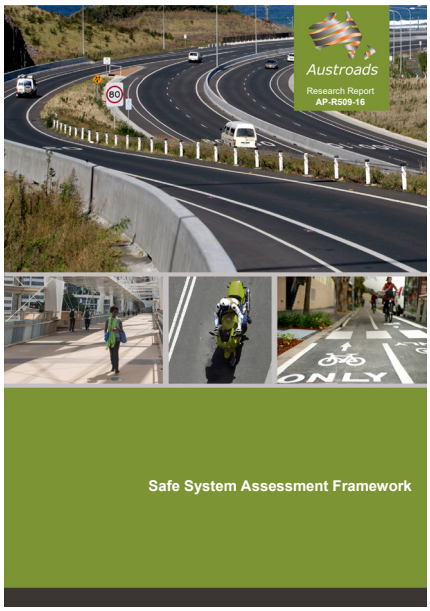
The project has delivered both safety and efficiency outcomes: the speed limit has been raised to 110km an hour and an 82% reduction in fatal and serious injuries was achieved in the three years after opening when compared to the Old Bruce Highway before 2010.



Austroads Safe System Assessment Framework

The Austroads Safe System Assessment Framework helps road authorities consider Safe System objectives in their road infrastructure projects.

The framework considers fatal and serious crash outcomes, as well as the risks associated with these (exposure, likelihood and severity). It provides prompts to ensure each pillar of the Safe System is considered. A treatment hierarchy is also provided to help identify the most effective treatments to minimise death and serious injury.



4

Set a Vision Zero target for 2050 with an interim target of Vision Zero for all major capital city CBD areas, and high-volume highways by 2030.

Key actions:

- Formally establish the target for zero road deaths by 2050, and suitable interim targets ≥ 50% reduction by 2030 and ≥ 75% by 2040 based on the 2020 baseline.
- Identify partner agencies, cities, companies and non-government organisations to jointly fund and deliver Vision Zero demonstration projects on targeted city and highway networks to achieve Vision Zero by 2025.
- Develop time-bound targets for severe injury reductions and harm elimination based on detailed modelling of existing and new solutions applied on scale across the country.
- Celebrate and publicise successes at all levels of government jurisdiction.

The Safe System approach has been adopted in the National Road Safety Strategy as well as in all state and territory plans.

The fundamental tenet is that no loss of life is acceptable and, therefore, the complete elimination of harm can be the only ultimate aim.

Many jurisdiction level plans have already established vision zero or towards zero targets. This aim is consistent with the United Nations Sustainable Development Goal No. 3, Ensure healthy lives and promote wellbeing for all at all ages", and established work-place targets for zero harm.

Safe System practice seeks to address the built-in risks of travel with a systematic approach to road and transport system design and operation. The key Safe System principles (ITF 2016; PIARC 2018) are that:

1. People make mistakes that can lead to road crashes.
2. The human body has a limited physical ability to tolerate crash forces before harm occurs.
3. A shared responsibility exists amongst those who design, build, manage and use roads and vehicles, and those who provide post-crash care to prevent crashes resulting in serious injury or death.
4. All parts of the system must be strengthened to multiply their effects; and if one part fails, road users are still protected.

As a consequence, builders have a responsibility to deliver a traffic system that accommodates the foibles of human behaviour on the road. This approach is no different to that adopted within the health, safety and environment domain. If there is loss of life or severe injury in a workplace, this results a system-based investigation to identify measures that ensure an incident of this type does not occur again. "Safe, not Safer" is an important distinction.

Setting an ambitious long-term vision for zero road trauma over a realistic timeframe provides the impetus for action and cultural change amongst those responsible for the system. Resources can be progressively allocated to evidence-based solutions targeting key safety problem areas with clear intermediate goals in sight.

A modelling exercise in collaboration with states and territories can help identify the appropriate countermeasure/resource mix and who is accountable. Performance modelling is to be encouraged around a climate of transparency and constructive debate on possible implementation scenarios. It is understood that some jurisdictions are currently modelling time bound scenarios that achieve the elimination of fatal and severe injuries.

The approach can include a staged targeting of geographic areas or types of road for zero road deaths ahead of time as significant public signposts of progress. For example, targets for zero deaths could include urban CBD areas by 2030 and residential streets by 2040. Similarly, freeways, motorways and high-volume highways could be targeted for zero deaths by 2030, other major cities and primary highways by 2040 and all roads by 2050. It is understood that some jurisdictions are currently modelling pathways to zero.

To achieve the 2030 interim targets, demonstration projects should be identified, and the results communicated widely for replication across the country. The demonstration projects may focus on one part of a city, one city or a section of highway, and involve both public and private sector cooperation. These innovative partnerships can unlock new investment opportunities that deliver road safety results.

An example is a partnership to implement a transit oriented development that delivers a mode shift to rail and upgrades pedestrian and cycling facilities to a 5-star standard for a two kilometre radius around the development.

The inquiry understands that BITRE is developing a Vision Zero dashboard using the National Crash Database to show equivalent information for Australia. For cities and towns with populations greater than 50,000 (defined by the Australian Bureau of Statistics as Significant Urban Areas'), the map will show the number of years that there has been zero road crash fatalities.

Promoting this information is essential to demonstrate to the community and governments that zero road crash fatalities can be a reality and not an exception. Setting an ambitious and yet achievable long-term target with commitment and responsibility shared by national and state authorities can provide the impetus for a staged, evidence-led and financially viable approach to achieve success. Transparent reporting of success can also inspire others and create unstoppable momentum for community action and support for Vision Zero initiatives.

Sweden's renewed commitment to vision zero

Sweden's long-term objective is that no one be seriously injured in traffic and that the design, function and use of the transport system be adapted to the standards this requires.

Vision Zero is an approach where responsibility for transport safety is shared between individual transport system users and "system designers" (the entities that shape the system, such as the automotive industry, law makers and infrastructure owners). If transport system users do not follow the rules for reasons such as lack of respect, knowledge, acceptance or capacity – or if personal injuries occur in a crash, the system shapers must take further measures to prevent deaths and serious injuries.

Cities that regularly achieve zero fatalities

The European vehicle inspection company DEKRA publishes results of the cities in Europe, USA and Japan that achieve zero fatalities. There is a growing number of cities in the world that achieve zero on a regular basis.

The map (right) shows cities in Europe with a population of at least 100,000 that have had three years in five of fatality-free outcomes (from 20 participating countries over the period 2009 to 2013 inclusive)[28]

Joining together to eliminate the harm

The Vision Zero Network[25] in the USA is bringing together the key partners and cities that can make zero road deaths a reality. Mayors are committing to a Vision Zero plan and key city departments are mobilised to make it happen.

A step change in New York

The New York Department of Transportation has almost halved pedestrian fatalities in the past five years through Safe System initiatives. A large part of its success has been a focus on culture change and innovation.

"Traffic fatalities are headed in the right direction, down toward zero," says State Senator James Sanders Junior. "The Mayor's Vision Zero Plan is working. Preventing traffic fatalities and promoting the peaceful co-existence of pedestrians and motorists should be applauded. If New York continues to lead the nation in year-after-year declines in traffic fatalities, zero deaths is achievable."[26]

Lifting road safety performance in Scotland

Scotland's road safety framework adopts national targets and has won numerous awards for its outstanding achievements and strong collaborations. New official statistics show Scotland's road safety targets—as set out in the Scottish Road Safety Framework—have been achieved years in advance, after deaths on roads fell by nearly a quarter in 2017. Compared to the 2004–2008 baseline, in 2017 there were:

- 146 fatalities—a reduction of 50% on the 2004–2008 baseline (the 2020 target is a reduction of 40%)
- 1,580 serious injuries, representing a reduction of 39% on the baseline (the 2020 target is a reduction of 55%)
- an average of six children killed over the last three years, representing a reduction of 61%. The 2020 target is a reduction of 50%
- 152 children seriously injured, a reduction of 53% on the baseline. The 2020 target is a reduction of 65%.

Transport Scotland has championed the use of average speed cameras on its trunk road network, with some success. Recent statistics show cameras are having an impact on the A9 between Dunblane and Inverness, which have seen 10 fewer deaths on the road over a three-year period.[27]

5 Establish and commit to key performance indicators in time for the next strategy that measure and report on how harm can be eliminated in the system, and publish these annually

Key actions:

- Establish national KPI and measurement activities that report against the United Nations Sustainable Development Goal 3.6 and the associated United Nations Global Road Safety Performance Targets by June 2019.
- Confirm existing and establish new KPIs for the new road safety initiatives to be supported at the national level, and minimum common reporting metrics at the state and territory level by December 2019. A focus is intermediate measures that indicate how the system is being made error tolerant and survivable. The Swedish practice may provide an initial starting point.
- Establish new KPIs that reflect management performance and capacity building.
- Include KPIs on the safety performance of corridors on which new infrastructure projects (incorporating lengths or a discrete site) have been completed within the past five years.
- Build on BITRE's existing role and establish – and adequately resource – a national road safety observatory initiative that supports and aligns with similar initiatives around the world.
- Undertake baseline measurements for all agreed KPIs by the end of 2020 and establish targets for each metric by 2025, 2030 and visions for 2050.
- Provide sustained support to establish and maintain systems that inform of the injury burden:
  - Ensure ongoing funding for the National Trauma Registry to provide detailed information on the quantum of serious road trauma.
  - Acknowledge current activity led by BITRE, develop and deliver a regularly updated national serious injury database and ensure that it is operational at the start of the next strategy.
  - Include indicators associated with the lifelong burden of serious injury and rehabilitation, and where and when the costs are experienced in the emergency services, health, social welfare and insurance sectors.
  - Include regular reporting on national estimates of trauma associated with work related activity.
  - Establish and report on the link between where the costs of road trauma are borne and where the solutions exist.
- New technologies and big data provide an opportunity to enhance understanding of the road transport system:
- Collect and report detailed information on exposure measures by road user, vehicle and road type using existing and new data sources and partnerships.
- As an immediate priority, adequately resource the collection of cycling exposure data for the nation.

The first term of reference for this inquiry could not be adequately addressed because of insufficient data on the full extent of influences on the road transport system. While exposure data exists, it is predominantly associated with motorised vehicles. Intermediate measures are also poor and sporadic, and something as simple as regular speed measurement across the network is often difficult to obtain across all jurisdictions.

Enforcement data is also often limited in scope and difficult to interpret. The absence of this base data makes it extremely difficult to understand variations in overall patterns of crashes and injury, and the underlying causes to observed changes.

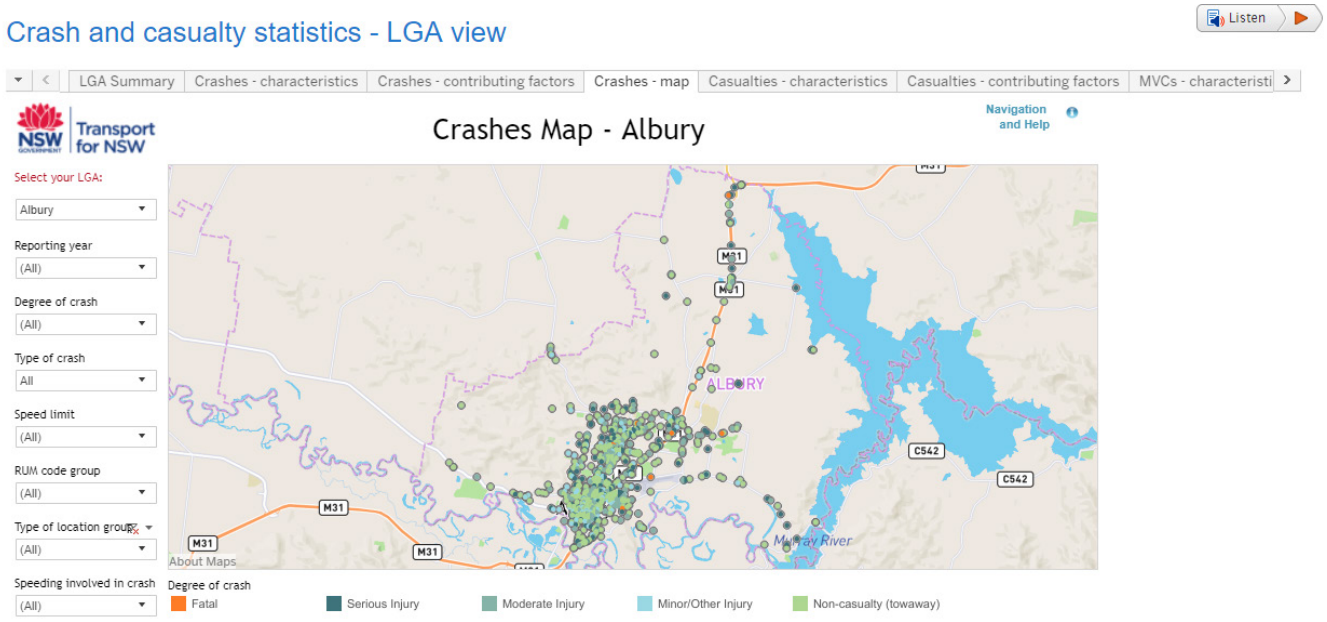
Linking data sets to improve understanding

A step change in data reporting in NSW

Transport for NSW has successfully linked several databases to gain new and detailed insights into the road injury problem. To overcome a lack of injury reporting, a new linked system has been created[30] that connects data from NSW Health, the State Insurance Regulatory Authority (SIRA), icare (Insurance and Care NSW), the New South Wales Police Force and Transport for NSW to obtain a frequently updated holistic view of road crash injury in the state.

As with all jurisdictions, there are significant numbers of road-related trauma victims admitted to hospital who did not appear on the police database. Further efforts are still required to enable a large scale and accurate picture of road trauma amongst all road user groups.

The developments in NSW need to be replicated elsewhere to achieve a more comprehensive snapshot of the national injury burden. Results can then be more readily shared with non-government road safety stakeholders. The linked datasets and the geocoding of individual crashes permit meaningful insights into road system performance and interactions.



A step change in linking infrastructure to injury costs in Victoria

Victoria's Transport Accident Commission (TAC) is partnering with iRAP to develop linked databases that detail the types of crash injuries that occur, the total claim costs, and where these costs are borne in the system. The work will help inform the business case for local investment, predict the expected reduction in claim costs linked to TAC investment in safer roads and other initiatives, and enable the global development of impact investment and financing through public-private partnerships that improve the star rating performance of road infrastructure for all road users.[31]

In 2018—approximately 120 years after the first motor cars travelled on Australian roads—there is still uncertainty over the level of injury and serious injury that results from road use. Worse still, there is uncertainty as to whether serious injuries are actually trending up or down.

A recent publication by the Australian Institute of Health and Welfare (AIHW) notes that in 2014–15:

- more than 36,000 people were admitted to hospital due to non-fatal injuries sustained in road crashes
- over 14,000 were hospitalised after being injured in off-road crashes, and
- about 6,000 injury cases had no specification of where the crash occurred.

The Australian Trauma Registry (ATR) serves a vital two-fold function:

- monitoring progress in addressing the quantum and severity of road-based trauma at major trauma centres across Australia, and
- providing guidance to improve quality, safety and patient outcomes.

Ongoing long term support for the registry is vital to maintain and improve these important functions in trauma care.

With the feasibility of a national injury database languishing for decades, a project is now well established to achieve a regular snapshot of the national road injury situation (BITRE info sheet 76). The successful completion of this work will be vital to future efforts to monitor and improve road safety efforts. The project under a priority action in the 2015–2017 Action Plan is to be applauded, however progress is still frustratingly slow and a fully operational regularly updated dataset is still at least a year away.

"If you can't measure it, you can't manage it".
Former New York Mayor, Michael Bloomberg

To track progress and drive home accountabilities, it is vital that progress to reduce serious road trauma on our road network is subject to ongoing monitoring. In addition to tracking trends in serious trauma over time, KPIs must also represent important complementary measures. They must reflect how the system-wide approach is eliminating the potential for harm to occur. Examples of KPIs could include:

- number of brain injuries
- reduction of travel speeds in local streets
- proportion of on-road vehicles with auto-emergency braking, and
- the percentage of high-speed, high-volume freeways and highways with full barrier protection.

A set of KPIs associated with managing road safety are also essential. These could relate to the uptake and deployment of tools, frameworks and quality assurance processes to ensure safe system alignment with a harm elimination agenda.

In support of the UN Sustainable Development Goal to halve road deaths and injuries from road crashes, UN Member States have now agreed to 12 Global Road Safety Performance Targets. These provide a minimum set of KPIs to be adopted and regularly reported at the national level in Australia and globally as part of our UN commitments. Australia should aim to lead on all metrics (top five globally) and also play a leadership role in supporting countries in the Asia–Pacific to report against the UN targets.[29]

The final set of KPIs should be developed collaboratively with state and territory jurisdictions to ensure joint ownership and understanding of each jurisdiction's specific context. Importantly, the KPIs should:

- leverage the existing metrics reported by Australian jurisdictions
- enable definitive monitoring of the impact of the National Road Safety Strategy, and
- allow for reporting against the UN Global Road Safety Performance Targets.

A comparison with KPIs used against the national strategy in Sweden should be used as a starting point during the development process.

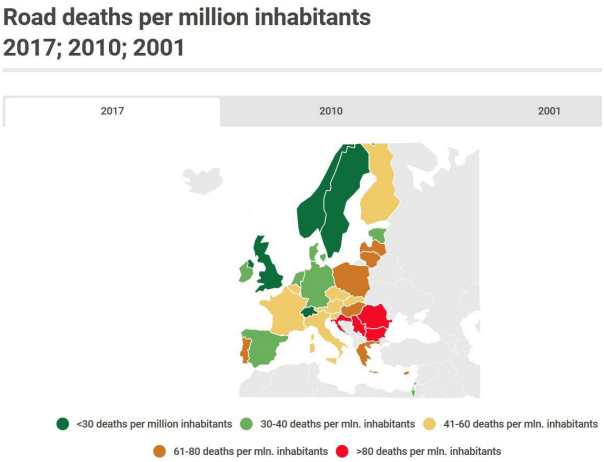
The need for nationally agreed performance measures received broad support including from the Royal Australasian College of Surgeons (46), AAA (33), and the Australian Road Research Board (31). A coalition of representative cycling bodies (27) advocated for vulnerable road users to form part of the performance assessment.

Disbursement of federal funds for road safety purposes can be linked to jurisdictional road safety performance as measured by trauma outcomes and KPIs. It is vital therefore that these are developed with urgency.

The ETSC PIN program

The European Transport Safety Council's (ETSC) Road Safety Performance Index (PIN) program was set up in 2006. It was a response to the first road safety target set by the European Union to halve road deaths between 2001 and 2010. In 2010 the European Union renewed its commitment to reduce road deaths by 50% by 2020, compared to 2010 levels.

By comparing member state performance, PIN identifies and promotes best practice, and inspires the kind of political leadership needed to deliver a road transport system that is as safe as possible. ETSC also organises PIN talks in member states each year.[32] The PIN program receives financial support from Volvo Group, Toyota Motor Europe, the Swedish Transport Administration, the German Road Safety Council and the Norwegian Public Roads Administration.

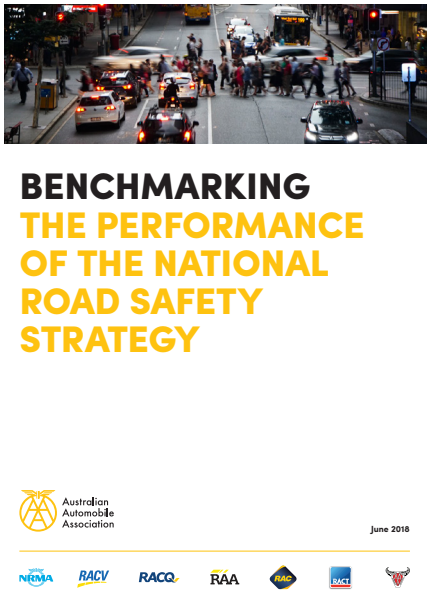


There are currently few independent sources for progress monitoring of the national strategy. Although some information is published by governments, there is limited transparency and detail that relates inputs to expected outputs. The AAA benchmarking report is a lone voice, which also appears not to receive a formal response from agencies responsible for road safety. More transparency and open discussion with stakeholders is required if the response for road safety is to be magnified.

At a national level, BITRE is hampered in socialising road safety data. Nearly all requests for data for the inquiry had to be cleared with all jurisdictions on all occasions. This process is slow and cumbersome and reflects the complexity of current arrangements.

This situation must improve to eliminate inefficiency and encourage the contribution of those outside government towards solutions. It is a recommendation of this inquiry that a national data observatory be created and resourced to address the nation's long standing and embarrassing data issues in road safety.

AAA independent monitoring



6 Undertake a national road safety governance review by March 2019

Key actions:

- Engage Australian and global road safety experts to undertake a formal road safety governance review using established global procedures and with reference to leading relevant countries (for example, Sweden, Norway and the UK).
- Through the Transport and Infrastructure Council and related health and welfare portfolios, agree on options to host the new national road safety entity. Include suitable structures that capture areas for federal leadership and how state-led and other agency and organisational responsibilities can be best supported to provide an efficient Australian response to the road safety crisis and support for neighbours in our region.
- Confirm the host organisation/structure, budget and accountabilities for the new national road safety entity. Identify priority investments at the national level that will create stimulus and scale across all jurisdictions and at all levels of government.
- Recommend any skill development and capacity building priorities (including tertiary education) to be implemented during the National Road Safety Action Plan 2018–2020.

Success in delivering the key recommendations in this report hinges on establishing the appropriate road safety entity structure, governance, resources, skills and relationships. Institutional leadership at each layer of government is critical to addressing serious road trauma in a progressive, sustained and effective evidence-led way. There must be a holistic specification of roles across agencies and jurisdictions that provides an effective organisation chart for Australian road safety.

In the absence of accountable, responsible leadership at each level of government, international road safety experts Bliss and Breen affirm that,

"efforts aimed at improving, for example, program coordination, funding, decentralisation and promotion will often be illusory and unsustainable".

The National Road Safety Action Plan 2018–2020 specifies a number of very worthy actions that can contribute collectively to reduce levels of serious road trauma. But to what extent? Collectively, what level of resource is being invested in each of the initiatives and what does the scientific evidence suggest in terms of their safety impact by the year 2020? After accounting for external upward pressures on road trauma levels such as population growth and ongoing favourable trends in safety with their own momentum (for example new, safer cars replacing older, less safe cars), does modelling point to the likelihood that the 2020 trauma target will be achieved?

What skills do we need to achieve the required outcomes? A current detailed draft assessment of workplace skills by Austroads suggests we will be short of on the ground and in the office staff over the next decade. The report is silent on how to gain the political, economic and community skills needed to build the overarching management capacity.[33]

Answering the questions above is not a trivial exercise. Outcomes are highly dependent on resourcing and the countermeasure mix at federal, state, territory and local government level.

It is critical that a lead entity be established at the national level that is responsible for road safety development, research, performance measures, funds disbursement and results achieved in close collaboration with other tiers of government. A review of existing and proposed institutional road safety governance is the recommended pathway to define national road safety roles, accountabilities and capacity requirements.

The World Bank has published road safety management review guidelines[34] which:

- specify a management and investment framework to overcome institutional capacity barriers and support the successful implementation of road safety interventions
- provide practical procedures designed for application at a country level to accelerate knowledge transfer and sustainably scale-up investment to improve road safety results, and
- ensure that institutional strengthening initiatives are properly sequenced and adjusted to the absorptive and learning capacity of the country concerned.

Such a review would entail a strong consultative approach with federal, state, territory and municipal agencies with road safety responsibility.

A particular focus should be on an integrated approach, joint responsibilities, separable accountabilities, building scale and avoiding duplication.

A well-resourced, well-managed national road safety entity can ensure areas of federal responsibility are delivered effectively with stimulus and scale provided at the state and territory levels.

Best practice can be shared and a gap analysis undertaken to understand the most pressing problems nationally, with associated performance indicators to drive action.

A coordinated approach involving local, state and national bodies provides a strong foundation for disbursing funds for the best possible effect in eliminating harm on the network.

7 Rapid deployment and accelerated uptake of proven vehicle safety technologies and innovation

Key actions:

- Accelerate and incentivise early adoption of life-saving vehicle, truck and motorcycle technologies in line with global best practice.
- Accelerate and incentivise early adoption of driver assistance technologies that support safety improvements in line with global best practice.
- Support coordination of legislation review and autonomous technology deployment that removes duplication between states and territories while also informing public policy and consumer awareness of technology opportunities, limitations and realistic timelines for impact on safety outcomes.
- Immediately review with a view to accelerating the implementation of vehicle, truck and motorcycle fleet National Design Regulations to mandate proven low-cost safety technologies in all new vehicles (for example, auto emergency braking and electronic stability control).
- Revise the luxury car tax to encourage the take-up of vehicles with safety features.
- Increase the scale and scope of the Australasian New Car Assessment Program (ANCAP) or similar entities to cover the vehicle fleet beyond light vehicles.
- Support and enhance vehicle testing capabilities to verify safety across all vehicle types to prepare for rapid advancements in driver assist and autonomous systems (linked with recommendation 3).

The process of vehicle regulations in Australia is complex, covering safety as well as environmental vehicle performance, and are subject to review every 10 years.

In recent decades, improvements in the capacity of vehicles to protect occupants in a crash have been appreciable and have significantly helped reduce serious trauma on Australia's roads. BITRE estimates show 36% of the reduction of 1260 deaths a year for the period 2000–2017 came from better vehicle safety (see table 2 on page 4 'Modelling road safety in Australian states and territories'[35]).

These estimates are confirmed by research from the Australian Automobile Association[36] , the University of Adelaide Centre for Automotive Safety Research[37] and the Monash University Accident Research Centre (MUARC)[38] .

There are considerable safety benefits to be collected in this domain. Newer, safer vehicles are replacing less safe cars through natural attrition. These have the latest protective structures for occupants and other road users, and very effective collision avoidance technologies.

ANCAP analysis of the Australian registered light vehicle fleet (passenger vehicles and SUVs) shows older vehicles are over-represented in fatal vehicle crashes, with the average age of a vehicle involved in a fatal crash increasing.

Over the past three years the average age of light vehicles in Australia remained constant at 9.8 years, yet in 2015 the average age of a vehicle involved in a fatal crash was 12.5 years. This rose to 12.9 years in 2016 and further to 13.1 years in 2017.

The average age of the Australian truck fleet in 2016 was 14.8 years with recent trends confirming the age of the fleet is increasing. According to the Australian Bureau of Statistics January 2016 Motor Vehicle Census, almost 45% (44.7%) of the nation's truck fleet was manufactured before 2003.[39]

New active technologies have been introduced to the market to help prevent crashes or, at the very least, reduce the severity of a crash. Technologies include auto-emergency braking (AEB), Electronic Stability Control (ESC) and Lane Departure Warning (LDW).

Notwithstanding these favourable past safety trends, the potential safety dividends of new technologies are significant.

Detailed research from insurance data shows a 50% reduction in front to rear crashes alone from autonomous emergency braking. Similar reductions are shown by MUARC[40] and CASR[41] Australian research.

The lag between new safety technologies arriving and a legal requirement that proven forms of these technologies be compulsory in new vehicles through the design rule process in Australia is unacceptable. Every vehicle imported to Australia without high protective value and the new active low-cost safety technologies is an opportunity lost not only for today, but for the life of that vehicle, which may be 30 years or more. These vehicles have an inherently higher risk of death or serious injury occurring in the event of a crash for all those 30 years. New highway trucks for instance are "handed down" into the urban fleet over that time. Delay in mandating proven safety technologies in new vehicles in Australia is costing lives now and will continue to do so.

The Australian research results highlighted above underline the latent potency and urgency of mandating a high level of inherent safety in every new vehicle sold in Australia.

Across member countries, the European Union regulates active and passive safety requirements through vehicle type approval regulations, and requires vehicles to pass minimum standard crash tests.

Autonomous Emergency Braking for heavy vehicles has been mandatory in Europe since 2014, yet Australian regulators do not expect to do the same here until 2020.[42]

In May 2018 the European Commission announced proposals to introduce a range of new systems into the new car fleet.[43]

While many of these features will be included in the ANCAP ratings for light vehicles in Australia, ANCAP does not cover heavy vehicles. ANCAP's primary role is to independently test and make relative safety assessments of light vehicles to encourage consumers (private, commercial and government) to seek and purchase the safest models. As ANCAP and the AAA have shown in their submissions, there is also considerable value in a more modern fleet.

The case for streamlining the process and bringing forward Australian Design Rules for key proven safety technologies is compelling, and a key plank in the system-wide approach to ultimately eliminating harm to all users of the Australian road network.

Non-regulatory processes also have an important role to play. ANCAP, through its independent crash testing of new cars, linked safety ratings and accompanying promotions, has helped bring forward the voluntary take-up of high-performing vehicles across Australia. For example, ANCAP promotions were accompanied by a 10-fold increase in auto emergency braking (AEB) offered as standard in new car sales (3% to 31%) from December 2015 to the present day.[44]

Appreciable penetration of these life-saving technologies through non-regulatory means paves the way for early evaluation of effectiveness and expeditious introduction of a regulatory requirement (ANCAP, 20). Similarly, the Used Car Safety Ratings provide a valuable community service through the safety assessment of used cars based on real-world crash experience.[45]

Both ANCAP and the Used Car Safety Ratings provide a valuable, independent service to the community and merit strong ongoing support from government, a view supported by the Queensland Department of Main Roads (36) and RACV (22).

Further worthy non-regulatory initiatives that warrant consideration and subsequent action include abolishing tariffs for vehicle imports with high safety performance (AAA 33, RACS 46), and government and commercial fleet purchasing and leasing policies (ANCAP 20) with an accompanying timetable and metrics to track progress.

Recommendations for changes to the mechanisms to encourage and regulate are not new. The sooner the process is streamlined for mandating proven, low-cost road safety technologies in the vehicle fleet, the sooner the vision of ultimately eliminating harm on Australia's road network draws nearer.

Non-regulatory initiatives are a valuable ally in helping to achieve early safety gains while acting as a catalyst to expedite the regulatory process. This process does not have to be left to governments alone. Governments can lead in encouraging such partnerships.

David Ward, the Secretary General of Global NCAP, in a recent address 'Trust and Verify'[46] said:

"...I would urge support for a new framework for automotive policy-making that:

» Builds in a role for watchdogs and funds them in a way that ensures their independence.

» Recognises the important role of global harmonisation in a rapidly motorising world.

» Aims for an approach in which the automotive industry tries to become a partner rather than a protagonist in the vehicle regulatory process."

David Ward, Secretary General of the Global New Car Assessment Programme

- Advanced emergency braking (cars)
- Alcohol interlock installation facilitation (cars, vans, trucks, buses)
- Drowsiness and attention detection (cars, vans, trucks, buses)
- Distraction recognition / prevention (cars, vans, trucks, buses)
- Event (accident) data recorder (cars and vans)
- Emergency stop signal (cars, vans, trucks, buses)
- Full-width frontal occupant protection crash test - improved seatbelts (cars and vans)
- Head impact zone enlargement for pedestrians and cyclists -safety glass in case of crash (cars and vans)
- Intelligent speed assistance (cars, vans, trucks, buses)
- Lane keeping assist (cars, vans)
- Pole side impact occupant protection (cars, vans)
- Reversing camera or detection system (cars, vans, trucks, buses)
- Tyre pressure monitoring system (vans, trucks, buses)
- Vulnerable road user detection and warning on front and side of vehicle (trucks and buses)
- Vulnerable road user improved direct vision from driver's position (trucks and buses)

The overlooked cost of delays in mandating new vehicle technologies: an example

In 2011 NSW Deputy State Coroner Carmel Forbes recommended that all vehicles in Australia used to transport dangerous goods be fitted with an electronic stability control system, after a detailed investigation into a petrol tanker crash on the Pacific Highway two years earlier. No action was taken on the recommendation until there was a second petrol tanker crash on Mona Vale Road in Sydney in 2013.

The NSW Environmental Protection Authority required that all dangerous goods tanker trailers used in NSW and built after 1 July 2014 be fitted with stability control. It later issued a determination that will require all dangerous goods tanker trailers used in the state after 1 January 2019 to be fitted with stability control. Efforts to secure a national agreement on this approach were not successful.

In December 2017 – eight years after the Pacific Highway crash and six years after Coroner Forbes's recommendation – the Australian Government Department of Infrastructure and Regional Development issued a consultation regulatory impact statement (RIS) on mandating stability control for some categories of new trucks and trailers.

The consultation RIS recommended that stability control should only be required for prime movers weighing more than 12 tonnes and trailers weighing more than 10 tonnes. Based on guidelines issued by the Australian Government Office of Best Practice Regulation, the department recommended this approach because it would deliver the highest net economic benefits, even though industry called for a broader approach that would have required stability control for new rigid trucks as well. The Australian Government promulgated the rule in 2018. It extended the mandatory requirements slightly to cover short wheelbase rigid trucks that could be converted to prime movers or truck and dog combinations.

The regulated implementation timetable is:

- For heavy trucks and buses (ADR category NC and ME vehicles): 1 November 2020 for new models and 1 January 2022 for all new vehicles.
- For medium and heavy trailers (ADR category TC and TD vehicles): 1 July 2019 for new models and 1 November 2019 for all new vehicles.

The positive net benefits of this intervention over the business as usual case are conservatively estimated at $217 million with the potential to save 126 lives and see a reduction of 1101 serious injuries over the term proposed in the Regulatory Impact Statement of 44 years. This is 28 killed and seriously injured a year. Had regulators acted immediately on the NSW Deputy Coroner's recommendation and applied the current policy approach, it seems likely that more than 200 deaths and serious injuries could have been avoided.

Autonomous vehicles

The public imagination has been kindled by a strong media focus on a future populated by a fleet of 'robotic' vehicles that require no human intervention for perfectly safe and efficient travel. In truth, the pathway between the present day and a possible 'utopian' future is both extended and far from certain. The immediate challenge is to maximise the safety outcomes as the journey unfolds.

Fortunately, along the pathway a number of active safety technologies are being progressively introduced into the new vehicle fleet that have significant safety value. These include variants of Auto-Emergency Braking (AEB) that are active at high-speeds and detect pedestrians and cyclists, Lane Keep Assist (LKA) and Intelligent Speed Assist (ISA). Retro fitting these technologies may become possible and if so, encouraged where safety outcomes can be shown to be effective. Engineering regulatory and non-regulatory instruments to accelerate their introduction to the on-road fleet are critical to capitalising on innovative technologies as they continue to emerge rapidly along the journey – a journey that will entail a transitional phase for the best part of 30 years.

US research shows that autonomous vehicles would have to be driven hundreds of millions of miles and sometimes hundreds of billions of miles to demonstrate their reliability in terms of fatalities and injuries.

The longer-term challenge is to manage the progressive transfer of control from the human to the machine while maintaining the highest levels of safety. Attention must be paid to the capacity needs and training requirements of the human controller as well as human-centric design of the vehicle and environment. The human–machine interface in which control is being passed on demands that redundancy be built into the system to ensure a fail-safe outcome.

The road and roadside environment can help facilitate the full safety potential of many technologies as they form part of the continuing shift to automation—for example, clear line-marking delineation to support the operation of Lane Keep Assist and clearly visible speed limit signs that coincide with recorded GPS coordinates to support Intelligent Speed Assist. It is likely that the transition to full automation will be confined firstly to specified areas or sections of the road network, such as freeways where the complexity of interacting with other vehicles is reduced. As the influence of automation expands, it is conjectural whether the scenario will finally evolve where no human intervention is required under all circumstances, in all vehicle types and for all road users.

Importantly, the current range of infrastructure and speed management safety initiatives reported elsewhere remain as critical measures to support development of an error-tolerant and forgiving traffic system with the ultimate aim of eliminating harm.

The Australian vehicle fleet has almost 20 million vehicles with an average age of over 10 years.[47] Replacing this fleet even under a very optimistic scenario will take some time, and during that period the current fleet will dominate Australian traffic. The recommendations of this inquiry are therefore focused on reducing crashes and associated trauma from that fleet.

Finally, given the rapid pace of change coupled with a lack of certainty in the technology's future trajectory, agility is critical. Regulatory and non-regulatory mechanisms need to be managed holistically. Australia may wish to follow the lead of other countries, although there are varying views as to what type of regulatory mechanisms (if any) should exist. Experience with the Australian Design Rule process would suggest that it is inadequate for the rate of change required.

		Benchmark Failure Rate		
Statistical Question	**How many miles (years[a]) would autonomous vehicles have to be driven...**	**(A) 1.09 fatalities per 100 million miles?**	**(B) 77 reported injuries per 100 million miles?**	**(C) 190 reported crashes per 100 million miles?**
	(1) without failure to demonstrate with 95% confidence that their failure rate is at most...	275 million miles (12.5 years)	3.9 million miles (2 months)	1.6 million miles (1 month)
	(2) to demonstrate with 95% confidence their failure rate to within 20% of the true rate of...	8.8 billion miles (400 years)	125 million miles (5.7 years)	51 million miles (2.3 years)
	(3) to demonstrate with 95% confidence and 80% power that their failure rate is 20% better than the human driver failure rate of...	11 billion miles (500 years)	161 million miles (7.3 years)	65 million miles (3 years)

[a] We assess the time it would take to compete the requisite miles with a fleet of 100 autonomous vehicles (larger than any known existing fleet) driving 24 hours a day, 365 days a year, at an average speed of 25 miles per hour.

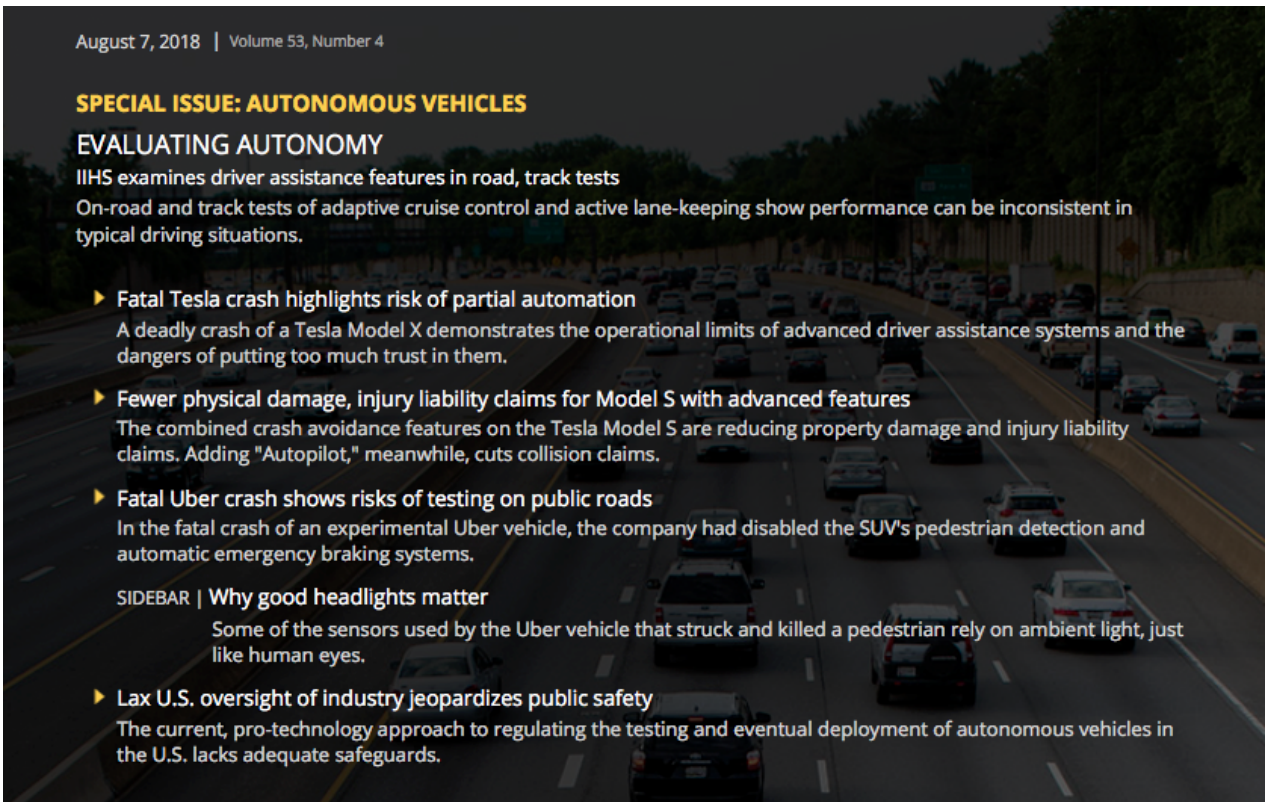
Figure 2 - Examples of Miles and Years Needed to Demonstrate Autonomous Vehicle Reliability[48]

Evaluating autonomy – the US experience

Researchers at the US Insurance Institute for Highway Safety studying five well known new vehicles—all equipped with various collision avoidance technologies—asked the question "do the systems handle driving tasks as humans would?"

Not always, tests showed. When they didn't perform as expected, the outcomes ranged from too-cautious braking, to the dangerous, for example veering toward the shoulder if sensors couldn't detect lane lines.

"We're not ready to say yet which company has the safest implementation of Level 2 driver assistance, but it's important to note that none of these vehicles is capable of driving safely on its own," Zuby says. "A production autonomous vehicle that can go anywhere, anytime isn't available at your local car dealer and won't be for quite some time. We aren't there yet" [49]



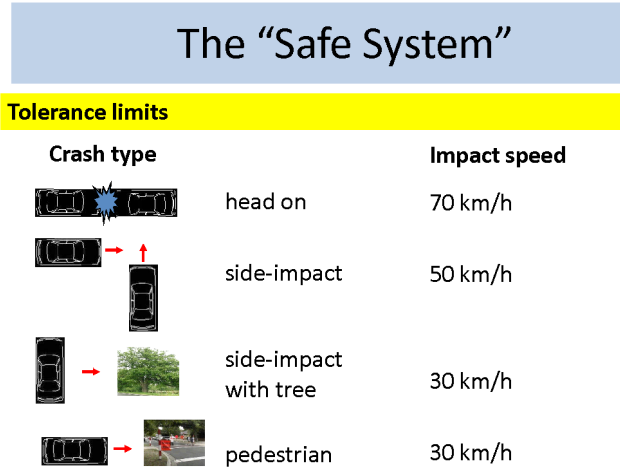
8 Accelerate the adoption of speed management initiatives that help eliminate harm

Key actions:

- All levels of government to accelerate matching speed limits with road attributes in accordance with Safe System principles.
- Innovation in speed management to be pursued as a high priority noting best practice in the vehicle sector (e.g. Intelligent Speed Adaptation), private sector (fleet management incentives and workplace culture), and insurance reforms (e.g. telematics).
- Manufacturers and vehicle importers must be engaged by government to ensure that they also become part of the speed management solution.
- Seek alternative ways of achieving survivable speeds: where relevant, work with and support speed management improvements in the road sector (for example road star ratings, traffic calming, liveable streets, urban planning), enforcement technology and road user behaviour (e.g. speeding warning signs and app-based technology).
- Create research projects that seek to understand how the speed management agenda can be progressed with the community.

In its simplest form, eliminating harm in the road safety setting is concerned with effectively managing energy dissipation. Road trauma results when the human body must absorb energy in excess of its biomechanical tolerances. Energy in turn relates to the mass of the object and the square of the speed: double the speed and there is four times the energy; triple the speed and nine times the energy needs to be dissipated. The energy in a traffic system escalates rapidly as vehicle speeds increase.

The diagram below estimates impact speeds for differing crash configurations above which the risk of death or serious injury begins to escalate rapidly. The challenge is to progressively implement a multi-facetted approach that seeks to eliminate harm while maintaining mobility and the viability of the traffic system.



An audit of the road system is not required to realise that many speed limits currently across the Australian road network are not conducive to eliminating harm. Many local streets—which are often used by pedestrians and cyclists—have speed limits of 50km an hour, a limit well in excess of the biomechanical tolerances of pedestrians and cyclists of around 30km an hour. Similarly, a regional back road with no shoulders, narrow profile, and no line markings, and a high-volume, multi-lane highway with protective barriers share the same 100km an hour limit. These anomalies need to be rectified and speeds better aligned with the road infrastructure.

A major historic impediment to applying measures to reduce travel speeds is the perceived increase in travel times associated with going slower. In most settings however, increases in travel speeds translate into extremely modest decreases in travel times, but an escalating risk of crashing. A seminal study conducted in Adelaide showed that a 5km an hour increase in travel speed in a 60 zone resulted in double the crash risk (Kloeden et al, 1999).

Eliminating harm through speed management is not all about reducing travel speeds. The relationship between travel speeds and road design and infrastructure is an important one. For example, the presence of flexible barrier systems roadside and as a central median provides an error-tolerant environment that can accommodate much higher travel speeds. Similarly, the installation of well-designed roundabouts slows vehicles down through intersections so that any collision is unlikely to lead to serious outcomes.

The national road safety entity faces the challenge of working productively with state, territory and local governments to manage travel speeds in a coordinated and concerted way, and to contribute as a key plank to building a traffic system that fully accommodates human error and survivability.

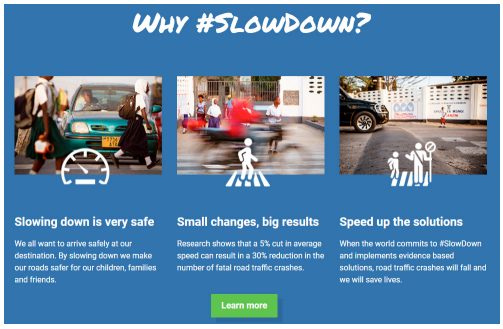
This challenge forms part of the broader collaborative approach with states, territories and local government—with the support of incentive funding—to develop coherent safety strategies and action plans that are Safe System aligned. To meet national trauma targets, the mix of safety measures across jurisdictions must be targeted to ensure cost-effectiveness, cost-efficiency and safety impact.

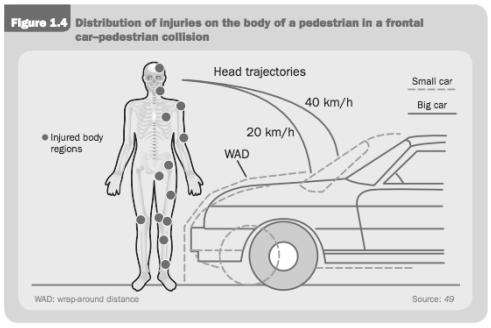
In addressing speed, there are a number of approaches that need to be pursued. They relate to configuring speed zoning/support infrastructure combinations to achieve an error-tolerant and survivable traffic system while building compliance through a range of effective mechanisms.

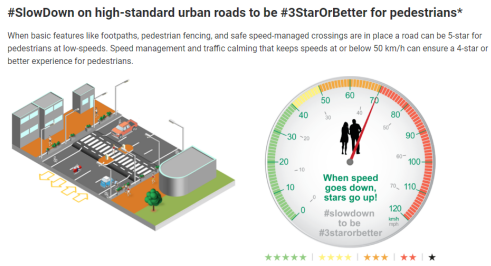
UN Road Safety Week 2017 – Save Lives #SlowDown

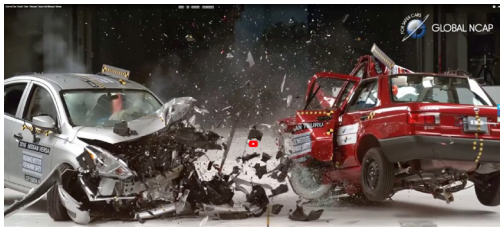
The UN Road Safety Week in 2017 included a focus on speed and safe systems. The initiative included a range of resources[51] to demonstrate:

- the impact of speed on road safety
- the personal tragedies that occur, and
- road user, vehicle and infrastructure solutions to ensure safe and appropriate speeds.









Key issues to be pursued collaboratively include:

- Speed enforcement – a proven means of reducing serious road trauma by moderating speeds (randomised approaches as demonstrated by Queensland's Operation Road Watch as well as the under-used Time over Distance or Point to Point approaches have great potential for expanded operations.[50] The latter approach is strongly endorsed by the Royal Australasian College of Surgeons and is capable in some instances of capitalising on existing roadside infrastructure; importantly Point to Point measures average speed over a specified distance rather than a spot speed and is therefore likely to reflect deliberate actions.

- Vehicle safety – the automotive industry has been slow to react to technology that can help drivers stay within speed limits. Intelligent Speed Assist (ISA) is one such technology that can advise drivers on speed zones. Alternatively, Michael Griffiths (38) purports that all cars are speed limited with the limit being a typical factory setting; these limits can be reset if the manufacturer provides the software. A further option also proposed by Michael Griffiths is the potential to limit a car's upper speed to the speed limit given that all of Australia's speed zones are GPS mapped. The potential role of the vehicle in eliminating harm is clear; government needs to play an active advocacy role with importers and manufacturers—including specifying future public sector vehicle fleet safety requirements—to effect change, with ANCAP playing a key supportive, promotional role. The more influential the vehicle is in promoting speed compliance, the lower the demand on enforcement resources and the significant associated costs.

- Aligning speed zoning with road function and infrastructure – a key development in achieving an error-tolerant traffic system:

  - Lower speeds in local streets – there was strong support for reducing limits in local streets to 30km/h including by using speed moderating installations where appropriate. Submissions were received that expressed views towards better protecting vulnerable pedestrians and cyclists to provide a more liveable, safer environment for all.

  - Lower speeds on lower quality, high-speed roads – there is a vast network of 100km/h roads that offer no protection from the severe "head-on" or "run-off-road hit fixed object" crashes. Maintaining the current speed setting on this road type is unacceptable; governments have a responsibility to advise drivers of the appropriate travel speeds on these roads – a setting of 70 or 80km/h will save lives.

  - Create survivable interaction speeds and configurations at intersections – historically intersections have assumed a right angle geometry with no active speed management in place. This ensures that vehicles collide in their most vulnerable orientations at non-survivable or harmful speeds. Reducing through-intersection speeds to 50km/h or lower will make most collisions survivable. Intersection geometries can also be altered to reduce crash severity.

- Communications – communications help the community understand change and the reasons underpinning that change. For example, building an understanding of:

  - travel times

  - impact speed tolerances in different crash configurations

  - the rationale underpinning flexible barrier systems and the implications when they are absent, and

  - the risk of detection through speed enforcement.

The challenge is significant but changes to the speed zoning regime need to be explained in a staged, logical, coherent way, and through messaging from each jurisdiction.

The Australian Government, along with state, territory and local governments, has a crucial role in progressively introducing an error-tolerant and survivable speed regime. While statutory responsibility for speed limit setting rests at the state or local government level, the national entity has an opportunity to work collaboratively to facilitate substantive change. This includes best practice enforcement approaches, communications, improvements to vehicle fleets and aligning speed limits with road function and safety infrastructure.

Such a collaboration would represent significant progress towards eliminating harm on Australia's roads. Effective speed management still remains one of the key ways road trauma can be significantly reduced and there is still much that can be explored regarding driver and rider compliance beyond traditional roadside enforcement approaches.

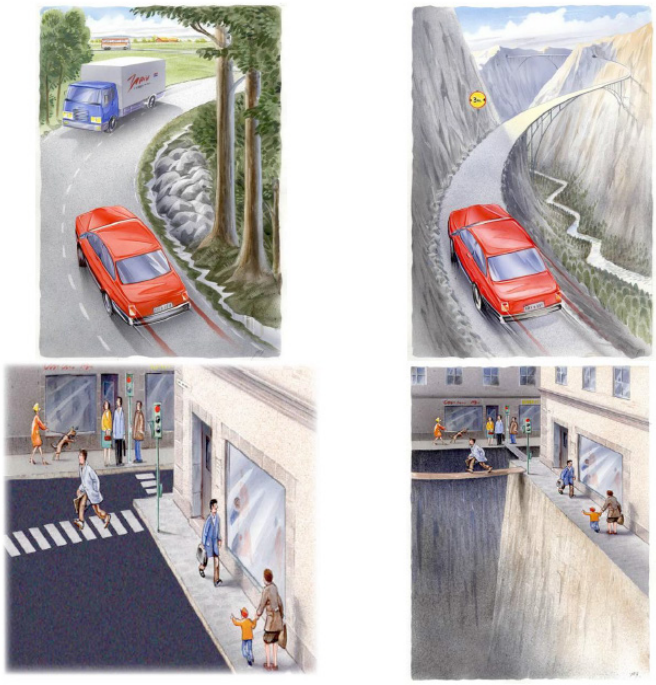
Our perception of the risk associated with road use is distorted – we must accept the role of speed in achieving a safe system

Claes Tingvall, one of the key proponents of the Swedish Vision Zero, has famously portrayed the inherent danger of road use by comparing speed related kinetic energy to that of height related potential energy. We all perceive the risk associated with heights much better than risk associated with travelling speed.

Sustainable Safety – the Dutch Experience

Since the launch of the Sustainable Safety vision in the early 1990s (Koornstra et al., 1992), the road safety approach in the Netherlands has shifted from reactive to a general proactive and integral approach to the elements of the traffic system. The idea behind Sustainable Safety was that we have to make our traffic system – with its large speed and mass differences and with its (physically) vulnerable and fallible users – inherently safe. We came to realise that if we did not want to burden our children with such a dangerous traffic system, something structural had to happen, and a system quantum leap had to be made. At that time, the term 'sustainable' was chosen to make a link with ideas concerning a sustainable society and sustainable development.[52]

A key feature of the road safety philosophy in The Netherlands is to re-engineer roads to conform to one of three functions – through roads, distributor roads and access roads. This greatly simplifies the task of applying safety features and speed limits in-line with community expectations. In Australia, the road hierarchy is far more confusing and this ambiguity works against efforts to align road attributes with safe speeds.



Sustainable Safety principle	Description
Functionality of roads	Monofunctionality of roads as either through roads, distributor roads, or access roads, in a hierarchically structured road network
Homogeneity of mass and/or speed and direction	Equality in speed, direction, and mass at medium and high speeds
Predictability of road course and road user behaviour by a recognizable road design	Road environment and road user behaviour that support road user expectations through consistency and continuity in road design
Forgivingness of the environment and of road users	Injury limitation through a forgiving road environment and anticipation of road user behaviour
State awareness by the road user	Ability to assess one's task capability to handle the driving task

9 Invest in road safety focused infrastructure and mobility partnerships with state, territory and local government that accelerate elimination of high-risk roads

Key actions:

- Ensure the Infrastructure Australia audit for 2019 includes a compilation of all AusRAP and Australian National Risk Assessment Model (ANRAM) data, and that it is fully calibrated to identify high-return investment priorities.
- Ensure all new road infrastructure funded projects supported by the Australian Government contribute to achieving UN Global Road Safety Target 3: ensure all new roads achieve technical standards for all road users that take into account road safety, or meet a three star rating or better.
- Establish a Safer Roads Fund for local government that targets the 100 highest risk sections of road each year (based on risk mapping of crashes per kilometre travelled) and supports implementation of corridor safety plans as identified in the 2018–2020 National Road Safety Action Plan.
- Undertake Safe System, urban redevelopment and mobility demonstration projects with local government (including un-incorporated areas) that maximise life-saving outcomes. Also include a focus on demonstrations that enhance safety for pedestrians, cyclists, motorcyclists and heavy vehicles.
- Establish and resource an AusRAP national partnership similar to the established ANCAP partnership for new car assessments. This should link closely with the National Road Safety Observatory, Infrastructure Australia and the Local Government Safer Roads Fund to ensure transparent and cost-effective investment in safer road infrastructure and speed management.
- Build on the National Road Safety Action Plan 2018–2020 for 90% of travel on National Highways to be 3-star or better, and 80% of travel on state roads to be 3-star or better by 2020. Identify priority roads for dedicated and targeted road funding partnerships with the relevant jurisdictions.
- Work with jurisdictions to support knowledge transfer, capacity building and mentoring programs between similar agencies that allow for the successful and sustainable assessment, planning and implementation of Safe System interventions.

Infrastructure Australia does not currently promote or encourage infrastructure projects that primarily deliver road safety improvements and reductions in road trauma. A sample of AusRAP/ANRAM assessments in Australia currently shows that 7% of travel is on 1-star roads and 28% on 2-star roads for vehicle occupants (based on 117,000km of assessments carrying over 150 billion kilometres of travel a year). The figures are much worse for pedestrians, cyclists and motorcyclists.[53] More than a third of all road deaths and severe injuries could be saved if the National Road Safety Action Plan 2018–2020 achieves the target for 90% of travel on National Highways to be on 3-star or better roads, and 80% of travel on state roads to be 3-star or better.

A review of national design standards is being undertaken by Austroads. This includes road stereotypes such as safety performance outcomes and star ratings. Updating standards and guidelines is a slow process. Reviews and assessments need to be more frequent. Ensuring no new high-risk roads are built is critical for Australia's future. Supporting the widespread roll-out and institutionalisation of road design standard reform is needed to prioritise road safety outcomes for all road users. National and jurisdictional safety performance reviews of all newly completed infrastructure projects (for example in the past five years) would help focus on systemic issues with planning, road design and maintenance practices.

Much of the road safety benefit in the past decade has been associated with improvements to the national and state-managed major road system together with metropolitan centres. However, WALGA (37) in referring to an Austroads report states that:

"Local governments are responsible for managing around 82% of the road network in Australia where 52% of all casualty crashes and 40% of all road deaths occur. This means that driving on a local road involves an increased risk of being seriously injured that is 1.5 times higher than driving on a state road".54

The Local Government challenge to improve road safety is also extended to rural and remote state and territory controlled road networks (including roads in unincorporated areas) where resources to implement road safety improvements, and the range of feasible countermeasures, are limited.

The inquiry identified considerable capacity and resource issues that are hindering the ability for local government to pursue the desired transformative approach to road safety. In many cases the benefits of improved road safety and reduced road trauma do not directly impact the budget bottom-line of local government agencies, and is therefore under-resourced given the competing priorities for expenditure.

Many municipalities face considerable challenges with funding for safety infrastructure, and support for capacity building, speed management and enforcement coverage. Regional and remote municipalities also face the additional challenges of low population density, distance and long road networks. Many metropolitan-based initiatives are not feasible in regional settings.

The challenges are further compounded by the fact that a very substantial proportion of the total harm burden is spread across a vast local road network, and that there are few examples of 'blackspot' locations with large concentrations of severe crashes. This applies as equally to residential streets in built-up areas as it does to long stretches of low-volume, low quality, high-speed roads in regional and remote areas. System-based solutions are needed which differ markedly when targeting low-speed versus high-speed environments.

Given the size of the trauma problem and the challenges that municipalities face in addressing it, the national road safety entity will play a key role in providing stimulus funding to improve road safety. This will need to be coordinated with the local government sector in a strong consultative process with state and territory jurisdictions. Engagement with local government received support from the associations including the Local Government Association of Queensland (51) and the Western Australia Local Government Association (37). The vision of achieving no harm on Australia's roads depends critically on creating a mechanism for national and state agencies to support local governments and effectively reduce trauma on locally-managed roads. Incentive funding, in this context, is an important tool to coordinate and apply cost-effective and cost-efficient safety measures at the local and regional levels. In addition to safety, such partnerships would also generate local employment opportunities.

Support to develop local road safety strategies and initiatives, undertake network assessment in accordance with Safe System principles, develop corridor safety plans, and produce tools to help performance assessment and tracking consistent with the nationally agreed KPIs, are all important elements to address.

Supporting local government

The Victorian Transport Accident Commission has a community grants program to support municipal road safety strategies and to fund small-scale infrastructure projects. The collaboration grew in the case of Mornington Peninsula Shire:

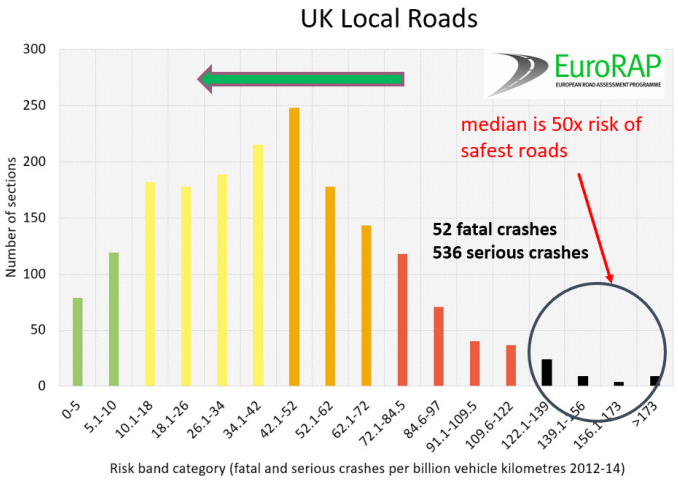
"Mornington Peninsula Shire joins forces with TAC, VicRoads and Victoria Police to become the state's first Toward Zero road deaths municipality"
Mornington Peninsula Leader, 12 April 2016.

Municipalities are important contributors to the nation achieving its "zero harm" vision. Initiatives such as the Vision Zero Network[55] provide powerful platforms to unite municipalities seeking to provide both liveable and survivable communities. The national road safety entity, in collaboration with state and territory agencies, must equip local government with the capacity, instruments and resources needed to pursue zero harm on locally-managed roads. A formal mechanism of consultation and support should be initiated with the states and territories to achieve meaningful collaboration and support.

The Department for Transport Safer Roads Fund (UK)

On average, about 70 people are killed or seriously injured every day in road crashes in the United Kingdom, with a value of prevention of £36 billion to the British economy. In 2016, the Department for Transport created a £175 million Safer Roads Fund to tackle a portfolio of the 50 most dangerous local A roads in England.

This systematic approach used the EuroRAP risk mapping protocol to identify the highest-risk 50 sections of road. Selected roads were then star rated and associated Safer Road Investment Plans were generated, funds allocated and roads upgraded to maximise the percentage of travel at a 3-star or better standard.[56 57 58]



10 Make road safety a genuine part of "business as usual" in all levels of government

Key actions:

- All government department health and safety plans to include specific analysis of road safety risks and actions for all employees and business functions, including contracts for the supply of goods and services.
- Vehicle fleet purchasing requirements to include specification of safety related driver assistance technologies and five-star crash performance, along with telematic solutions that encourage safe road user behaviour.
- The appropriate minister to instruct Infrastructure Australia to make safety a governing criteria for its assessments, with road safety specific applications encouraged.
- All Commonwealth infrastructure funding to include star rating and safety performance criteria with Safe System Assessments to be used at the planning and completion stages on all projects.
- Network risk assessments to be published for each jurisdiction with associated network and corridor safety plans, as specified in the National Road Safety Action Plan 2018–2020 (state/territory and local government).
- Health and welfare departments to include specific details and actions on road safety related services and costs.
- Third-party insurance schemes to include regulation and reporting of the optimisation of patient/client outcomes along with managing the financial cost of road trauma. Provision for prevention schemes to be included in all private sector and government owned insurance models.

The constant "drip feed" of death on our roads can breed complacency among responsible system builders, as it can in the community. And yet gathered together at the end of each year, the quantum of serious trauma occurring on Australian roads is alarming. The enormity of the problem cries out for us to explore every avenue possible to eliminate harm on our road network.

Almost every workplace in Australia has a significant and often under-resourced road safety risk to manage. Of the 3,414 workers who have died from 2003 to 2016 in workplace incidents, 39% of incidents were due to a vehicle collision.[59] The injury levels from road crashes are also likely to be a significantly high proportion of workplace injury.

Government has a legal and moral obligation to ensure road safety is mainstreamed in all departments, and associated supply contracts and partnerships. This can include vehicle choice, mode choice, route choice, road user behaviour training, technology and operating standards, incident response and a range of other safe system practices. The National Road Safety Partnership Program[60] includes many corporates that are leading the way in workplace safety. Government can learn from industry in this key area of road safety action.

Within areas of direct government responsibility, the mobility agenda still dominates key decision-making and investment decisions in the transport field. Safety considerations are viewed as an unfortunate by-product which may be addressed, but often too late in the planning and delivery phases. Numerous examples can be cited where practice does not reflect Safe System principles—principles that are espoused within the national and jurisdictional road safety strategies. Examples of a disconnect between principles and practice include building high speed undivided roads with dangerous roadsides, right-angle intersections across 110 km/h freeways and replacing roundabouts with traffic signals.

With the end of the current National Road Safety Strategy approaching, it is apparent that we are still creating problems for our future. Many new and retrofit infrastructure treatments are going to require further treatment in years to come. Consideration for infrastructure treatment needs to be in relation to the life cycle that relates to the elimination of harm at the site or along the corridor. Often a small incremental improvement in safety is justification to proceed; often this is an assumed by-product of treatment for the purposes of broader mobility objectives.

Safety is hidden when considering projects of national significance

The July 2018 infrastructure priority list published by the Australian Government and Infrastructure Australia lists 14 high priority projects and 84 high priority initiatives. Categories for these projects include urban congestion, national connectivity, opportunity for growth, corridor preservation, remote infrastructure, water security, waste water treatment, resilience, and efficient markets. There is no focus on safer road infrastructure.

High priority projects are defined as 'potential infrastructure solutions for which a full business case has been completed and been positively assessed by the Infrastructure Australia Board. A high priority project addresses a major problem or opportunity of national significance.' The projects represent billions of dollars of joint investment between the Commonwealth and other jurisdictions.

It is unacceptable that with 12,000 lives to be lost and at least 360,000 injuries over the next decade, none of these significant future facing projects have a specific safety focus. Eliminating the burden of injury from road use needs to be a part of the overall economic discussion for the nation.

A key means of establishing a strong nexus between mobility and safety is to introduce safety as a critical feature in all aspects of government—and potentially across the private sector—that intersects with road-based transport. The national road safety entity is ideally placed to prosecute this agenda through government relations at the federal level, as well as through mechanisms established to facilitate meaningful collaboration with state and local jurisdictions.

Freight and passenger travel time efficiency has historically been assumed as the central goal of the road transport system. Mainstreaming road safety is a key approach to ensuring that the bond between the two transport goals of mobility and safety is strengthened.

Key mainstreaming opportunities include:

- Infrastructure Australia has stringent harm elimination criteria linked to the disbursement of funds supporting road-based transport through construction of new roads, refurbishment or maintenance.
- All transport related contracts made by the Commonwealth Government or its agencies must contain stringent requirements on road law, including travelling unimpaired and within specified speed limits, as well as the safety performance requirements of vehicles, both heavy and light.
- Collaboration between national and jurisdictional WorkSafe agencies is arranged to ensure that workplace education and auditing, inspector training and penalty structures address the issue of the vehicle as a workplace. It is estimated that four of every 10 workplace deaths occur each year on the road; in this context, government should provide active, ongoing support for the National Road Safety Partnership Program that supports commercial organisations to adopt safer work practices and policies, including the lease or purchase of services and vehicles.
- Government demands the highest-standard five star vehicles for its current fleet, and flags its requirements two years ahead that all light vehicles it purchases or leases must have auto-emergency braking for high speed and pedestrian detection, Lane Keeping Assist, top speed limited to 120km/h and Intelligent Speed Assist. Similarly, all heavy vehicles must have ESC, blind spot detection and rear under-run protection.
- Safe road use policies must be introduced to all government workplaces so that, as a condition of employment, employees commit (and sign to that effect) to driving safely. This includes being unimpaired by alcohol, drugs or fatigue; complying with all traffic laws including speed limits; avoiding distractions while driving (including mobile devices) and driving courteously. A similar policy is promoted within the commercial environment.
- Mechanisms to collaborate with state, territory and local governments to promote adoption of similar practices and policies at the regional and local level (where feasible). This includes the standards, guidelines and practices that bear directly upon the safety quality of the road network in terms of eliminating harm.

Achieving scale through collaborations with industry

The Construction Logistics and Cyclist Safety (CLOCS) program was launched by Transport for London in 2013 in response to large numbers of incidents involving construction goods vehicles and vulnerable road users. The construction industry in the UK has made great improvements in managing health and safety, and has dramatically reduced the number of people killed and injured.

Transport for London wants this approach applied more broadly to road safety. CLOCS has brought the construction and logistics industries together to revolutionise work related road safety, and ensure a road safety culture is embedded across the industry. A CLOCS type implementation was being pursued in Australia and was intended to be a feature of some significant infrastructure projects in the eastern states. It is understood that this initiative has now stalled and requires further stimulus to progress.

There is great potential for road safety leverage if government contracts build in safety expectations.[61]

Mainstreaming road safety presents significant opportunities. It can make a substantive contribution to reducing harm on Australia's roads by building a culture that rejects road trauma, and that is more tolerant of road user error. It entails grafting safety on to a range of existing programs and practices. A national road safety entity is well-placed to take this agenda forward and so strengthen the bond between mobility and safety.

Early evidence is emerging from Victoria that there is a significant performance boost from adopting Safe System Assessments (SSA). An independent evaluation of over 50 SSA was undertaken during 2017 on infrastructure projects in Victoria, typically between the $0.5m to $1.2b range. The evaluation compared the design that had been originally proposed and then assessed with an SSA. It was concluded that:

"Conservatively, an additional 60% to 100% saving in Fatal and Serious Injury crashes can be achieved by applying Safe System principles (via Safe System Assessments) to infrastructure development, design and delivery phases."

SSRIP team internal report (not yet published)

Other tools are emerging that can assess the harm likely to result from various intersection designs. Analysis of insurance claim data can also link crash type, vehicle and road attributes with injury costs.

Priority must be given to developing and improving these tools and frameworks to ensure that past mistakes are not being repeated, and that the focus remains on aspects of the system that are causing the most harm.

Consultation revealed that there was limited quality assurance in organisations to ensure that alignment with the Safe System was a part of core business.

Such systems need to be developed and implemented to magnify the response to the road safety problem. From a road agency perspective, a system called RoSMA being used in Western Australia was a notable stand out.

As noted in recommendation 6, there doesn't appear to be a plan for the political, economic and community skills needed to build the overarching management capacity, and it seems there is limited understanding of the technical, planning, social and engineering expertise—and the training needed—necessary over the next decade to ensure we can achieve the programs and projects needed.

As an indication, a scan by LinkedIn of its 10 million members in Australia shows the following distribution of government employees who specifically mention "road safety" as a headline in their job description:

Queensland	573
Victoria	491
New South Wales	464
South Australian	133
Western Australia	123
Australian Capital Territory	28
Tasmania	3
Northern Territory	2

A recent capacity review of road engineering by Austroads also identified issues relating to ongoing management and maintenance of the nation's roads, but not safety capacity.

The inquiry suggests a key future task should be a detailed analysis of current skills across all the relevant portfolios and an estimate of the future skills needed to achieve the transformation sought in road safety performance.

Road safety related quality assurance in a road agency
Main Roads WA – Road Safety Management (RoSMA)

While many road agencies have created specialist road safety programs, ROSMA stands out as a sustainable and holistic approach to integrating Safe System principles into the core business activities of a road agency. Developed by Main Roads Western Australia, the system focuses on reducing crashes that cause fatalities and serious injuries. Projects are captured through the corporate enterprise project management system and are reviewed through a gated process at each stage in the project life cycle. Submissions are assessed for alignment with Safe System principles and the activity can only proceed if approved.

The ROSMA system aligns with ISO39001 for Road Traffic Safety and uses the New Zealand Transport Authority's risk methodology. A suite of tools has been developed to assist staff with decision making. ROSMA sets harm reduction targets at a project level which are aligned with state and national road safety commitments.

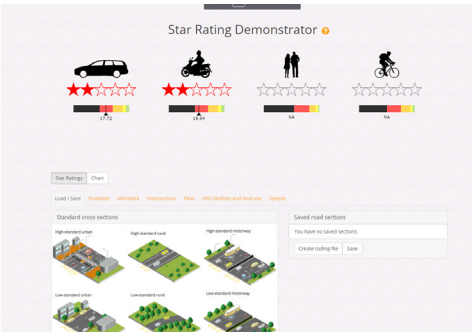
Importantly, the Safe System approach also requires change management amongst staff. Education and capacity building underpin its corporate process requirements.[62]

A range of established programs and tools are now used across Australia to support government road safety policy and implementation. Many of these tools are developed and supported by Austroads and similar entities. An example is the AusRAP program, a partnership between Austroads, ARRB, AAA and iRAP to undertake risk mapping, star rating and investment planning for safer road infrastructure in Australia.

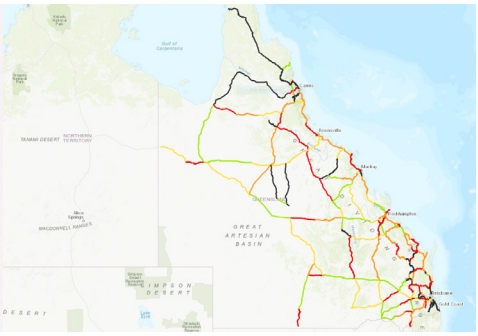
The program leverages iRAP's investment in global tools and standards, the independent oversight of the AAA, and integrates with local needs and expertise as part of Austroads, ARRB and jurisdiction level expertise. Over 100,000km of roads have already been assessed across Australia and transparent reporting of results is now expected as part of the national road safety action plan and reporting of KPIs.

The Safe System Assessment Framework is published by Austroads to assess projects for alignment with Safe System aspirations. The framework is scalable and can be applied from small to large projects. It needs to be used on all road infrastructure projects at all levels of government and within the private sector. While road safety audits can pick up specific design deficiencies, Safe System assessments are still required to ensure that a harm elimination agenda is being pursued. Ideally, an assessment would be conducted at the planning stage of a project and again towards the end of the project to counter the possibility of de-specification and diminishing safety effectiveness against delivery pressures.

AusRAP (AAA)



Star Rating Demonstrator (iRAP)



AusRAP QLD (RACQ)

11 Resource key road safety enablers and the Road Safety Innovation initiatives

Key actions:

- Identify key road safety enablers and specify roles, functions and accountabilities for action, with associated long-term (five year+) funding commitments that allow resourcing and impact certainty.
- Achieve scale with research organisations throughout the nation with funding for national collaborative projects that seek to address inherent dangers in the road system.
- Provide impetus for tertiary education and training on safety across multiple disciplines.
- Support Austroads and similar research and development entities to invest in road safety innovation initiatives that create new solutions aimed at harm elimination, and that support more efficient roll-out of existing initiatives that include monitoring outcomes.
- Support and evaluate major national demonstration projects and uptake plans that encourage rapid implementation of proven improvements.
- Provide stimulus to have road safety skills training embedded in tertiary undergraduate courses.
- Build on the Department of Foreign Affairs and Trade's Road Safety Capacity Report by developing an aid and trade investment strategy. This should integrate with Australia's broader support for countries in our region, our leadership in the education sector and the newly announced Indo-Pacific Infrastructure lending facility.

Road safety enablers

Road safety impacts every member of the community. All Australians use the road network as a pedestrian, cyclist, motorcyclist, vehicle occupant, truck driver or public transport user.

A range of non-government road safety enablers independently lead their own initiatives and also support government led actions. This includes the:

- Australasian College of Road Safety
- Australian Automobile Association
- Australasian New Car Assessment Program
- Australian Road Assessment Program
- National Road Safety Partnership Program
- Royal Australasian College of Surgeons
- Royal Australasian College of Physicians, and
- victims and advocacy groups such as SARAH, the Amy Gillett Foundation and various road user interest groups.

Organisations such as these play a key role in stimulating and supporting road safety action, communicating priorities across key stakeholder groups, consumer groups and the community, and undertaking independent and targeted road safety initiatives. They are generally lean and operate with limited budgets. The potential for these key road safety enablers to scale-up impact with relatively modest increases in long-term budget certainty is likely to represent a high return on investment for the National Road Safety Fund.

It is also apparent that the next generation of professionals are not receiving adequate training and education in road safety. Due to the multidisciplinary nature of road safety, knowledge and training has traditionally been obtained through post-graduate study or the workplace.

This situation must change and the exposure of tertiary students to road safety skill sets must become a national priority. With the discipline of civil engineering, a co-chair of the inquiry has been involved with the delivery of Safe Systems training to civil engineering undergraduates at the University of Adelaide for some years now, but is not aware of any other undergraduate courses in Australia that have similar detailed content.

A current project between VicRoads and the University of Adelaide is seeking to develop a curriculum that could be adopted nationally (and also in New Zealand) in tertiary institutions delivering engineering courses. There would be benefit in stimulating similar activity across other disciplines and institutions.

In addition to an operating entity, given the social and economic cost of road crash trauma there is a case for supporting independent policy research to provide the detailed background to support Australian Government leadership. This support could be for new entities or for current national road safety organisations. The Australasian College of Road Safety has made specific recommendations in Pre Budget submissions for such support to leverage existing programs. The government has supported or controls similar organisations in Defence (such as the Australian Strategic Policy Institute) and public policy (such as the Grattan Institute).

Australian Strategic Policy Institute

The Australian Strategic Policy Institute is a Commonwealth company that provides policy-relevant research and analysis to inform government decisions and public understanding of strategic and defence issues. Grant Funding in 2018 was $3.528m (continuous since 2002).[63]

Article example: Australia's strategic situation is deteriorating—is it time to revisit the Defence White Paper?

Australia's strategic situation is deteriorating. The 2016 Defence White Paper set out six drivers that shape our security environment. None has improved since the White Paper appeared, and most have worsened significantly. Informed decision making and public debate on these issues is essential to navigating them in order to keep Australia secure. To support this, the government needs to demand Defence provide greater public transparency in its planning and reporting.[64]

The Grattan Institute

The Grattan Institute is dedicated to developing high quality public policy for Australia's future. It was formed in 2008 in response to a widespread view in government and business that Australia needed a non-partisan think tank providing independent, rigorous and practical solutions to some of the country's most pressing problems.

The institute began with a $15 million endowment from each of the Federal and Victorian governments. BHP Billiton provided $4 million and the National Australia Bank $1 million. To safeguard its independence, the Grattan Institute's board controls the endowment. Funds are invested and Grattan uses the income to pursue its activities.

Grattan also benefits from significant support from companies and philanthropic organisations. Generous backing by the Myer Foundation for example, enabled the institute to launch a higher education program in 2011. Other Institutional affiliates support its programs, and ensure it has the funds to expand into new policy areas over time.

Road safety innovation and evaluation

Australia is a large country with a relatively low population and revenue base. We must be innovative to deliver key programs at a scale that matters to achieve road safety results. This innovation can take the form of road safety management initiatives (for example, TAC Insurance and Investment, and the National Road Safety Observatory) new technologies and products (such as Intelligent Transport Systems solutions, telematics, data collection techniques, vehicle technologies, enforcement technology, road and roadside furniture designs) and delivery techniques (including community education and training, barrier installation and maintenance equipment, drone enforcement). The innovation fund would provide seed capital to support and pilot new initiatives. Where successful, the innovations could be expanded across Australia.

The university and research sector in Australia is key to providing a foundation of educational excellence, innovation and evidence-based research and evaluation. The impact of all of the recommendations in this report should be monitored and refined as needed. Policy and investment decisions must be supported with sound research-backed analysis.

Some of Australia's existing expert research and education specialists include:

- Austroads
- the Australian Road Research Board (ARRB)
- Monash University's Accident Research Centre (MUARC)
- University of Adelaide's Centre for Automotive Safety Research
- the Centre for Accident Research and Road Safety at Queensland University of Technology
- University of NSW's Transport and Road Safety Research unit
- C-MARC at Curtin University
- the independent medical research institute, Neuroscience Research Australia (NEURA), and
- the George Institute.

Ensuring effective long-term focused funding for these and similar agencies will support innovation.

It will also remove the inefficiencies and duplication that currently exists as they compete for often small and short-term funding streams.

In addition to direct benefits of the research programs, the organisations will also have stronger foundations to support expansion to international markets, whether for undergraduate and post-graduate qualifications in road safety, or for the provision of services globally.

Road trauma impacts every country, with 60% of global deaths in the Asia-Pacific. The potential for Australia's road safety expertise to open up global markets for export expansion is clear. Whether through positive aid related partnerships with our neighbours and countries in the region that focus on saving lives, or through export related opportunities where Australian expertise and know-how helps improve road safety in a community, city, company or country overseas, Australia will benefit.

DFAT has already prepared a road safety capability statement summarising the capacity of Australia to help countries save lives globally. The wide range of partnership areas from education to enforcement, engineering to emergency care, are already recognised. They can and will be expanded with an associated scaling up of innovation and action across the country as part of the National Road Safety Fund initiatives. Road safety can become both a positive partnership program with countries in our region and good business. A win-win for all.

Australia's current innovation agenda does not focus on projects to reduce road crash trauma.

Boosting innovation and science

Embracing innovation, technology and science is critical to powering our economy, and to providing jobs and high living standards for all Australians.

The National Innovation and Science Agenda (NISA)[65] sets a focus on science, research and innovation as long-term drivers of economic prosperity, jobs and growth. A total of $1.1 billion has been committed over four years for 24 measures. These complement a broader government investment in science, research and innovation.

The agenda focuses on four key pillars:

1. Taking the leap: backing Australian entrepreneurs by opening up new sources of finance, embracing risk, taking on innovative ideas, and making more of our public research.

2. Working together: increasing collaboration between industry and researchers to find solutions to real world problems and to create jobs and growth.

3. Best and brightest: developing and attracting world-class talent for the jobs of the future.

4. Leading by example: the Australian Government will lead by example; embracing innovation and agility in the way we do business.

12 Life-saving partnerships with countries in the Indo-Pacific Region and globally as appropriate to reduce road trauma

Key actions:

- Establish an international road safety consultative committee that draws on the expertise of numerous Australian and international road safety specialists. The committee would inform DFAT of road safety priorities and strategies.
- Continue to support the United Nations Decade of Action for Road Safety and the Sustainable Development Goals with particular focus on the Indo-Pacific.
- Ensure all development projects using Australian finance and capital include minimum standards and outcomes that support the UN Global Road Safety Targets. Importantly, these must not increase death and injury on affected roads.
- Provide seed funding for targeted international road safety collaboration, research and demonstration programs and partnerships. These include the Global Road Safety Facility, Global Network for Road Safety Legislators, iRAP, GNCAP and the UN Road Safety Trust Fund.
- Participate in the Ministerial Conference for Road Safety being hosted by Sweden in 2020.

Despite an unacceptable level of road death and injury in Australia, we are one of the leading road safety performers in the Asia-Pacific. Our close neighbours including Indonesia, Papua New Guinea and the Pacific islands typically have death rates four to five times higher per 100,000 population than Australia. As a high-performing, high-income country in the region, Australia has a moral, economic and political imperative to support neighbouring countries to improve road safety. This cooperative approach to saving lives and leaving a legacy of safer roads, vehicles and programs in the region is a win-win for all involved.

In 2015 Australia endorsed the UN Sustainable Development Goal 3.6: Reduce Road Injuries and Deaths; By 2020, halve the number of global deaths and injuries from road traffic accidents.

In 2018 Australia was also a signatory to the United Nations 2030 Agenda for Sustainable Development, which includes 17 Sustainable Development Goals, and was recently represented with support from the Global Network for Road Safety Legislators at the UN General Assembly in New York, where the UN Road Safety Trust Fund was approved. Australia has a unique opportunity to be one of the first countries to commit funding to the UN Road Safety Trust Fund and support the catalytic action of the fund worldwide.

Historical support for the World Bank Global Road Safety Facility – and similar partnerships for infrastructure safety with iRAP in Vietnam, Indonesia and Papua New Guinea – has leveraged significant investment in safer roads. It has also supported the responsible use of Australian capital as shareholders of the major development banks active in the region.

There is a wide range of Australian capacity in road safety that extends across management, education, enforcement, engineering, emergency care and insurance, as outlined in the DFAT Road Safety Capability Statement.

Proactive aid programs that leverage this expertise to help the region reduce road trauma provide a valuable partnership opportunity focused on saving lives. The activity not only benefits other countries, it provides career experience for Australian professionals to enhance their knowledge and experience, and adds to the competence base of Australian road safety talent.

The link between road trauma and poverty reduction is clear. Families can be thrown into poverty for multiple generations as family members stop work or education to care for an injured loved one.

As the fifth largest shareholder of the Asian Development Bank, sixth largest in the Asian Infrastructure Investment Bank, and contributor to the World Bank and the Pacific Region Infrastructure Facility amongst others, Australia must demand minimum safety standards be applied to all development financing in line with the UN targets.

The newly announced Indo-Pacific Infrastructure funding initiative is also an opportunity to finance and support safe infrastructure in the region. A range of country partnerships can be promoted that support countries reaching the UN targets for existing roads, and build capacity of local in-country teams to become leaders in road safety in their country.

Australia helped improve road safety outcomes in many countries through a range of programs supported by organisations such as Australian AID, state government road agencies, universities, enforcement agencies, the International Road Assessment Programme (iRAP), the Global New Car Assessment Programme (Global NCAP) and others.

Extending the impact of these existing partnerships is recommended in addition to world-leading support for, and involvement in the UN Road Safety Trust Fund.

Global NCAP, with support from ANCAP, has adopted a Road Map for Safer Vehicles 2020. This recommends a timetable for UN Member States to apply the most important UN vehicle safety regulations. We propose that these regulations, or equivalent national performance standards, are applied initially to new models and then to all vehicles in production by—at the latest—the end of the UN Decade of Action for Road Safety in 2020. Apart from the obvious improvements in vehicle safety in developing countries, such programs benefit Australia by encouraging manufacturers to lift the safety performance of their fleets internationally, and subsequently as importers to Australia.

A world free of high risk roads: the business case for safer roads

At current levels, an estimated 15 million people will die and up to 500 million will suffer life-changing injuries on the world's roads between now and 2030. We cannot afford for this to happen. Achieving >75% of travel on 3-star or better roads by 2030 will save an estimated 467,000 lives every year and 100 million lives and serious injuries over the 20-year life of the treatments. A total of US$11,180 billion of benefits will be achieved with $8 of benefits in return for every $1 invested.[66]

UN TARGET 4 >75% of travel on roads that meet technical standards for all road users by 2030 (equivalent to 3-star or better)

	Low income	Lower middle income	Upper middle income	High income	ALL
Number of countries	31	45	51	50	177
CURRENT SITUATION					
Annual number of fatalities	195,569	423,148	472,563	116,331	1,207,611
Fatalities per 100,000 population	24.2	17.1	19.6	9.2	17.3
Annual number of fatalities and serious injuries	2,151,259	4,654,628	5,198,193	1,279,641	13,283,721
Annual cost of fatalities and serious injuries (% of GDP)	5.8%	4.2%	4.7%	2%	2.9%
WHAT CAN BE ACHIEVED with >75% of travel on 3-star or better roads for all road users by 2030*					
Annual investment as a % of GDP (2018)	0.14%	0.18%	0.12%	0.14%	0.14%
Reduction in fatalities per year	86,342	169,259	174,106	37,332	467,039
Reduction in fatalities and serious injuries (FSI) over 20 years	18,995,159	37,237,024	38,303,352	8,213,036	102,748,571
Economic benefit ($US)	$273bn	$1,335bn	$5,063bn	$4,507bn	$11,180bn
Benefit Cost Ratio	18	9	16	5	8

*Full assumptions and national snapshots are available at **vaccinesforroads.org**

Endnotes

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2 http://roadsafety.gov.au/nrss/files/0038-Michael-Griffiths.pdf
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Acknowledgements

The Hon Darren Chester MP, then Federal Minister for Transport and Infrastructure, initiated this inquiry on 8 September 2017. His passionate dedication to road safety is acknowledged. His resolve in calling for the inquiry and his commitment to the pursuit of the transformative change required to achieve significant enhancement in safety on Australian roads is commended.

The advocacy of the Australian Automobile Association in campaigning for an independent inquiry is noted. In parallel with many other organisations, their independent lobbying for better road safety outcomes is in the best interest of the nation and of all of us as road users.

Deputy Prime Minister Michael McCormack is acknowledged for sustaining the inquiry in the spirit with which it was initiated and for considering the recommendations of the report. Non-partisan Parliamentary endorsement and timely implementation of the recommendations of the inquiry will be necessary to significantly reduce the level of death and serious injury on our roads.

A great many individuals and organisations have devoted much time and effort to this inquiry. Although many are listed as part of the consultation process in the appendices, other contributions, interactions and supporting activity while not fully acknowledged, do not go unrecognised.

The panel assembled for this inquiry was exemplary in its combined experience, insights, professionalism and integrity. The pivotal role of the official advisors cannot be understated and this report stands as a testimony to their efforts.

Invaluable assistance was provided by Mr David Healy, with the support of the Transport Accident Commission in Victoria and Dr Joao Canoquena. Poignantly, the paramount importance of this inquiry was highlighted when Dr Canoquena's service was curtailed following his son's involvement in a car crash. Fortunately no long term physical injuries were sustained.

The assistance provided by staff at the Department of Infrastructure and Regional Development in coordinating meetings and logistics is acknowledged.

The panellists committed to undertaking this inquiry to make a difference and achieve a step change in the nation's road safety response. As the focus has been the disaster of future death and injury yet to come, a future acknowledgement is reserved for all those who will step up and ensure that the recommendations of this inquiry are pursued for years to come. Whether they are politicians, public servants, advocates, corporates, researchers or members of the public, we must all insist on the ethical imperative that harm from the road system is completely unacceptable and a transformation is required.

Our final acknowledgement rests with the families and victims of road crashes who have collectively endured decades of pain and suffering. Our thoughts and best wishes are with you. We must solve this problem not only for the current generation but future generations to come.

Appendices

List of Public Submissions

http://roadsafety.gov.au/nrss/inquiry.aspx

Consultations, meetings, forums and workshops

Transport and Infrastructure Council Meeting - Hobart

Transport and infrastructure ministers from the Commonwealth, States and Territories, New Zealand and the president from the Australian Local Government Association.

Australian Automobile Association Board meeting - Brisbane

Address and discussion with the AAA board

Parliamentary Friends of Road Safety - Canberra

Meeting in Parliament House with Members and Senators

National Road Safety Partnerships Program

Dedicated webinar on the road safety inquiry

Private sector road industry workshop - Sydney

Organised by Transurban and hosted by NeuRA

First discussion with Canberra based Stakeholder Organisations

Hosted at the Royal Australasian College of Surgeons with representatives from:

- Australasian New Car Assessment Program (ANCAP)
- Federal Chamber of Automotive Industries (FCAI)
- Australian Medical Association (AMA)
- Royal Australasian College of Surgeons (RACS)
- Australian Trucking Association (ATA)
- Australasian College of Road Safety (ACRS)
- Kidsafe (ACT)
- Australian Automobile Association (AAA)
- Public Health Association of Australia (PHAA)

Second discussion with Canberra based Stakeholder Organisations

Hosted at the Australian Automobile Association with representatives from:

- Australian Automobile Association (AAA)
- Australasian New Car Assessment Program (ANCAP)
- SARAH Group
- Australian Trucking Association (ATA)
- Public Health Association of Australia (PHAA)

Research Organisation group discussions and visits:

- Curtain Monash Accident Research Centre (C-MARC) [Perth]
- Centre for Automotive Safety Research (CASR) [The University of Adelaide]
- Monash University Accident Research Centre (MUARC)
- Centre for Accident Research and Road Safety – Queensland (CARRSQ) [Queensland University of Technology]
- Traffic and Road Safety (TARS) [University of NSW]
- ARRB Group [Melbourne]

Bicycle Forum - Melbourne

Hosted by the Amy Gillett Foundation

Regional Forum – Mackay

Organised by the Royal Automobile Club of Queensland with representatives from:

- Transport and Main Roads Queensland
- Mackay Regional Council
- Emerald Carrying Company
- Bicycle Mackay
- Road Accident and Awareness Group (RAAG)
- Queensland Police (proxy)
- Learn2ride
- Centre for Accident Research and Road Safety Queensland (CARRSQ)
- Royal Automobile Club of Queensland

Regional forum – Wagga Wagga

Hosted by Julie Briggs, CEO, The Riverina Eastern Regional Organisation of Councils (REROC)

- Local Riverina Area Local Government Road Safety Staff and Engineers
- Australian Local Government Association (ALGA)

Safe System Road Infrastructure Program, Vicroads

Address and discussion at a SSRIP team meeting

Transurban seminar

Address and discussion with staff linking in from several states in Australia and the USA

List of individuals and organisations that were consulted by the panellists

Dr Michael Schaper	AMA
Jamie Schnashall	AMA
Marilyn Johnson	Amy Gillett Foundation
Mary Lydon	ARRB Group
Blair Turner	ARRB Group
Michael Caltabiano	ARRB Group
Claire Howe	Australasian College of Road Safety
James Goodwin	Australasian New Car Assessment Program
Mark Terrell	Australasian New Car Assessment Program
Jason Smith	Australasian New Car Assessment Program
Rhianne Robson	Australasian New Car Assessment Program
Michael Bradley	Australian Automobile Association
Craig Newland	Australian Automobile Association
Adrian Beresford-Wylie	Australian Local Government Association
Kym Foster	Australian Local Government Association
Greg Hood, Commissioner	Australian Transport Safety Bureau
Stuart Godley (Aviation Safety)	Australian Transport Safety Bureau
Ben Maguire	Australian Trucking Association
Bill McKinley	Australian Trucking Association
Mellissa Weller	Australian Trucking Association
Nick Koukoulas	Austroads
David Francis	Austroads
David Bobbermen	Austroads
Leonie Pattinson	Austroads
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Susan Everingham	Centre for Road Safety, Transport for NSW
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Tahli Fenner	Department of Health, UN Health Section
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Stephanie Werner	Department of Infrastructure, Regional Development and Cities (DIRD)
Adam Sutherland	Department of Infrastructure, Regional Development and Cities (DIRD)
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Penny Nichols	Department of Stategrowth, Tasmania
Gary Swain	Department of Stategrowth, Tasmania
Dr Andrew Lee	Department of Transport WA
Sarah Leeming	DIRD - Infrastructure Investment
Greg Moxon	DIRD - Infrastructure Investment
Donna Wieland	DIRD - new technologies and environement policy area

Sharon Nyakuengama	DIRD - Vehicle Standards Safety Branch
Steven Hoy	DIRD - Vehicle Standards Safety Branch
Thomas Belcher	DIRD - Vehicle Standards Safety Branch
Tony Ockwell	Economist
Emeritus Professor Jack McLean	Former Director, Centre for Automotive Safety Research
Keith Wheatley	Former Federal Office of Road Safety staff
Denis McLennan	Former Federal Office of Road Safety staff
Mark Rosekind	Formerly the Administrator of the National Highway Traffic Safety Administration, United States
Susan Harris	Intelligent Transport Systems Australia
Stacey Ryan	Intelligent Transport Systems Australia
Ken Griffin	Linfox
Craig Olsson	Linfox
Nicholas O'Donnell	Linkedin
David Moyses	Main Roads WA
Prof Stuart Newstead	Monash University Accident Research Centre
Prof Max Cameron	Monash University Accident Research Centre
Peter Vulcan	Monash University Accident Research Centre
David Logan	Monash University Accident Research Centre
Trudy Minett	Motor Accident Commission, SA
Megan Cree	Motor Accident Commission, SA
Sal Petroccitto	National Heavy Vehicle Regulator
Geoff Casey	National Heavy Vehicle Regulator (NVHR)
Ian Johnston	National Road Safety Partnerships Program
Jerome Carslake	National Road Safety Partnerships Program
Jeff Potter	National Transport Commission
Colin Brodie	New Zealand Transport Agency
Lisa Rossiter	New Zealand Transport Agency
Harold Scruby	Pedestrian Council of Australia
Mike Stapleton	Queensland Department of Main Roads
Assistant Commissioner Michael Keating (Queensland Police)	Road Policing Network
Assistant Commissioner Glen Frame (Tasmania Police)	Road Policing Network
Commander Tony Fuller (Northern Territory Police)	Road Policing Network
Iain Cameron	Road Safety Commission WA

Bruce Corben	Road safety consultant
Kenn Beer	Road safety consultant
Eric Howard	Road safety consultant
Martin Small	Road safety consultant
Michael Griffiths	Road safety consultant
Charles Mountain	Royal Automobile Association, SA
Insp Anthony Fioravanti	SA Police
Michelle Baxter and staff	Safe Work Australia
Johan Strandroth	Swedish road safety expert
Phil Allan	The Rail Industry Safety and Standards Board (RISSB)
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Samantha Cockfield	Transport Accident Commission, Victoria
Michael Nieuwesteeg	Transport Accident Commission, Victoria
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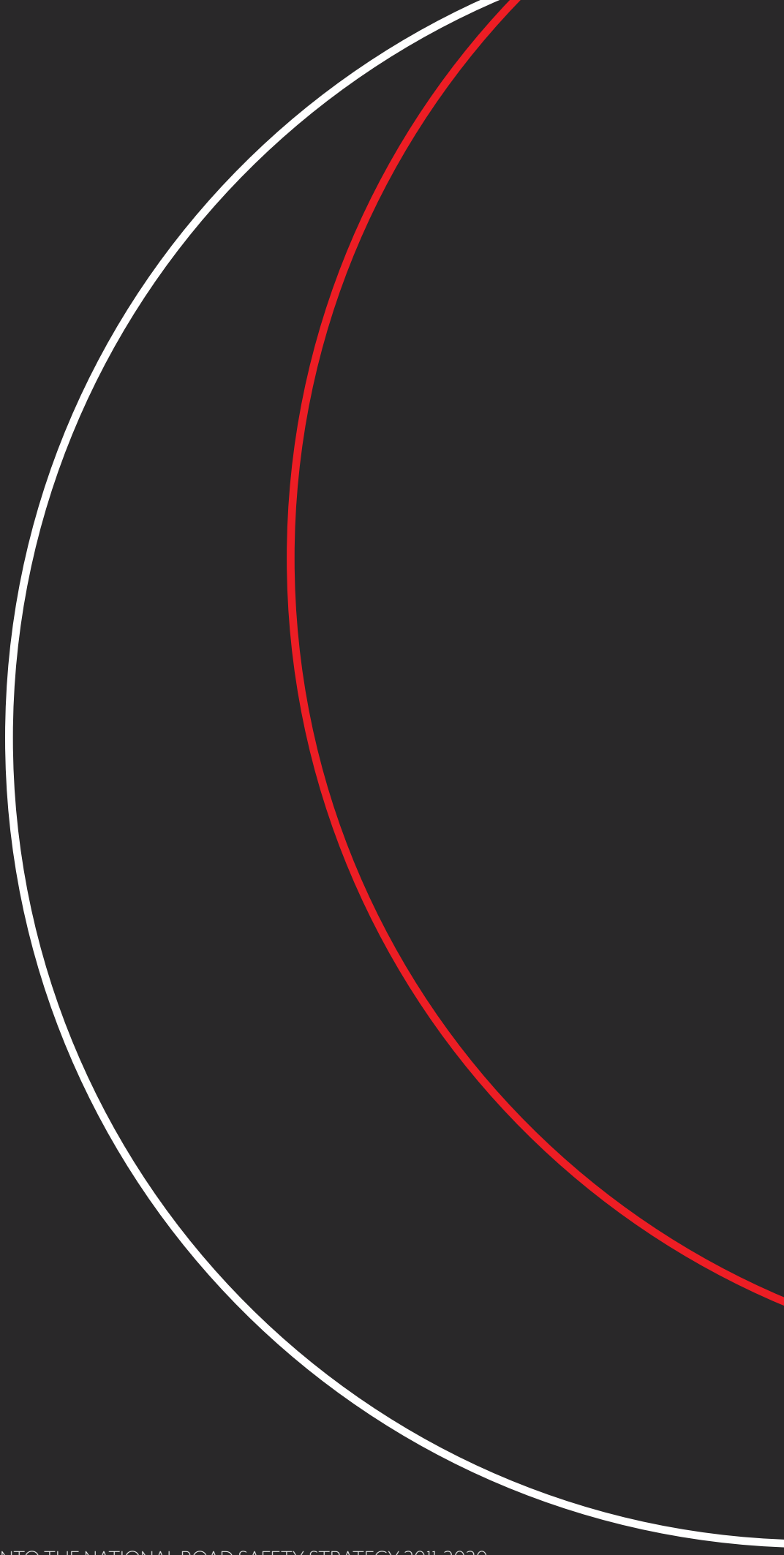
Professor Raph Grzebieta	Transport and Road Safety, University of NSW
Antonietta Cavallo	Transport for NSW
Liz Waller	Transurban
Prof Mark Stevenson	University of Melbourne
John Merrit	VicRoads
AC Doug Fryer	Victoria Police
Terri Anne Pettit	WA Local Government Association
Ian Duncan	WA Local Government Association
Soames Job	World Bank

Acronyms

AAA	Australian Automobile Association
ACRS	Australasian College of Road Safety
AEB	auto emergency braking
AEB	Autonomous Emergency Braking
AIHW	Australian Institute of Health and Welfare
AMSA	Australian Maritime Safety Authority
ANRAM	Australian National Risk Assessment Model
ANCAP	Australasian New Car Assessment Program
ARRB	Australian Road Research Board
ARTC	Australian Rail Track Corporation
ATA	Australian Trucking Association
ATR	Australian Trauma Registry
ATSB	Australian Transport Safety Bureau
BCR	Benefit cost ratio
BITRE	Bureau of Infrastructure, Transport and Regional Economics
CASA	Civil Aviation Safety Authority
CASR	University of Adelaide Centre for Automotive Safety Research
CLOCS	Construction Logistics and Cyclist Safety
COAG	Council of Australian Governments
ESC	electronic stability control
ESC	Electronic Stability Control
ETSC	European Transport Safety Council
EU	European Union
FORS	Federal Office of Road Safety
Global NCAP	Global New Car Assessment Programme
IRR	Internal rate of return
ISA	Intelligent Speed Adaptation
ISA	Intelligent Speed Assist
ITIM	NSW Institute of Trauma and Injury Management
KPI	Key performance indicator
LDW	Lane Departure Warning
LKA	Lane Keep Assist
MUARC	Monash University Accident Research Centre
NCD	National Crash Database
NEURA	Neuroscience Research Australia
NHVR	National Heavy Vehicle Regulator
NISA	National Innovation and Science Agenda
NRSPP	National Road Safety Partnership Program
NRSS	National Road Safety Strategy
NTC	National Transport Commission
ORR	Office of Rail and Road
RACS	Royal Australasian College of Surgeons
RIS	regulatory impact statement
SIRA	State Insurance Regulatory Authority
TAC	Transport Accident Commission
TIC	Transport and Infrastructure Council
TISOC	Transport and Infrastructure Senior Officials' Committee



INQUIRY INTO THE NATIONAL ROAD SAFETY STRATEGY 2011-2020