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ROAD SAFETY STRATEGY

In 2008, the state government, released its 12-year road safety strategy, *Towards Zero: Getting There Together* (Towards Zero), in which ambitious targets for reductions in people killed or seriously injured (KSI) on our roads, 40% or 11,000 people, across all road users were outlined. Targets of a 40% reduction were calculated on a baseline figure, using crash data across the years 2005-2007.

The Safe Vehicles cornerstone aims to promote the uptake of safer vehicles and key safety features, particularly by government and corporate fleets.

It is projected that during the lifetime of *Towards Zero*, KSI numbers under the Safe Vehicles cornerstone will be reduced by 2,900 (26%) and will save approximately \$1,740 million (Towards Zero, 2009).

WHAT IS THE PROBLEM?

In 2016, car ownership in WA increased by 38% (n=2,208,812) over the baseline figure (n=1,602,225) and is 10% higher than the Australian average (except NT) (RSC 2018).

The National Road Safety Strategy 2011–2020 outlines the intent of safe vehicles as:

Vehicles which not only lessen the likelihood of a crash and protect occupants, but also simplify the driving task and protect vulnerable users. Increasingly, this will involve vehicles that communicate with roads and other vehicles, while automating protective systems when crash risk is elevated.

Research predicts that by 2031 Perth's population will have grown to 3.3 million (WABN, 2017), an increase of 77%. This will increase the number of vehicles in the fleet using WA's road network. The vehicle fleet in WA is different to other Australian states. Australian Bureau of Statistics (2008) reported that the 2003–07 period recorded four-wheel drive sales in WA of 19.4% compared to 17.9% when all other Australian states are considered. Scully and Newstead (2007) estimated that 11.5% of vehicles purchased since 1997 in WA that were involved in crashes in which the driver was injured were four-wheel drive vehicles, compared with 8.2% of vehicles for all Australian states.

Driving characteristics vary markedly between WA and other states. A 2009 Australia Transport Safety Bureau interrogation revealed 55.5% of fatalities in WA were due to single vehicle crashes compared to 48.5% of fatalities in other Australian jurisdictions (ATSB, 2009).

Calculations show that approximately 681,647 (43%) light passenger vehicles registered in WA in 2017, were manufactured prior to 2007 (ABS, 2017). The average age of the Australian vehicle fleet is around 10 years (WA 2016, 10.5 years – RSC 2018). This means that for those vehicles that are in the average age bracket will be missing some of the major safety features introduced within the last 10 years. Older vehicles are generally used by higher-risk motorists, such as those in regional or remote WA and novice drivers, and this presents a greater issue for road safety. According to Newstead et al, vehicles manufactured in 2007 have an injury risk about half that of vehicles manufactured in 1987.

Australasian New Car Assessment Program (ANCAP) reports that older vehicles (built prior to 2001), account for 20% of the current registered vehicle fleet but are involved in 36% of all fatalities compared with vehicles built between 2012–17 account for 31% of the fleet but are involved in just 12% of fatalities. The rate of fatal crashes per registered vehicle for the oldest vehicles is four times higher than that of newer vehicles (ANCAP, 2017).

The concept of safe vehicles extends beyond cars and includes motorcycles and trucks. WA has proportionally more motorcycles and heavy vehicles compared to other Australian jurisdictions, 6% and 4% respectively (RSC, 2018).

Regional and remote areas of WA experience a disproportionate number of vehicle accidents. Single vehicle run-off road crashes are a significant problem and the use of Electronic Stability Control (ESC) would be expected to result in a reduction in loss of control crashes (NRSS, 2015). The rate of take up of ESC in regional and remote areas is seen as a priority, however this is unlikely to happen quickly due to lower rates of investment in regional and remote areas.

WHAT IS THE SUPPORTING RESEARCH AND EVIDENCE?

In the mid-20th century, vehicle design was very much focused on pedestrian rather than occupant safety. Vehicle design, for the accommodation of road safety rather than functionality, has come a long way in the last 50 years. In 1962, H.H. Wakeland reported to the Fifth Stapp Conference (early car crash conference – established in 1959), on a study called "Systematic Automobile Design for Pedestrian Injury Prevention". His report was very much in favour of design changes for pedestrian safety, however, they were not to interfere with such things, like:

- Free passage for cooling air and horn sound
- Sealing of interior against rain and proper run-off
- Resistance to casual damage and ease of cleaning.

Although vehicle functionality remained top of the design list, pedestrian safety was not ignored. Early versions of pedestrian front-end safety devices were circulated, and two devices were put forward. In 1970, the 'pedestrian inflatable bumper' was mentioned as state-of-the-art by Severy (1970), while 1974, Baird and Jones proposed another pedestrian safety feature, as shown in figures 1 and 2:

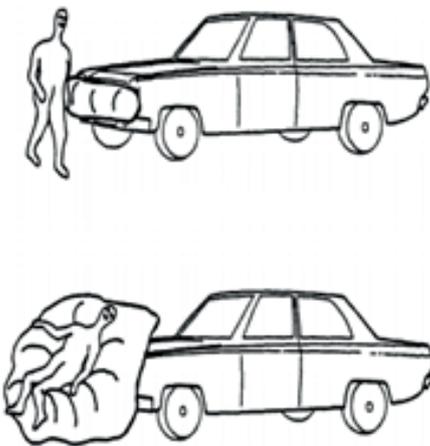


Fig 1: Inflatable design to prevent running over pedestrians

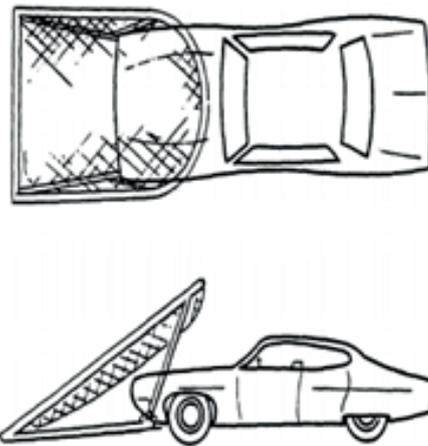


Fig 2: Preliminary concept of a deployed pedestrian arrestor device

Both devices seem primitive now, however the thought of pedestrian safety was an issue designers realised was becoming more important.

The safe vehicle cornerstone of Towards Zero focuses on improving the safety of the vehicles on the road system by:

- Promoting safety features that reduce the likelihood of a crash (and reduce the impact of the crash on vehicle occupants as well as pedestrians and cyclists)
- Encouraging consumers and businesses to purchase safer vehicles
- Implementing mandatory safe vehicle procurement in Government fleets and recommending additional safety features to be considered (Road Safety Commission website).

Since the 1960's safety advancements have concentrated on either occupant safety, or the safety of the vehicle to prevent injury to the occupant. Figures 3 shows the effect of safety feature advancements on KSI numbers in America. It is estimated that improved vehicle safety technology has saved around 600,000 lives between 1960-2012 (Kahane, 2015).

Note: 1970 – 112 million licensed drivers/2009 – 210 million licensed drivers (USA) Dept. of Transportation 2011.



Fig 4: Structural makeup of a modern car

- **Passive safety features**

- Figure 5 shows built-in safety features, such as airbags, ABS, ESC, seat belts and seat belt pre-tensioners, help prevent or manage the forces of impact. All are crucial features

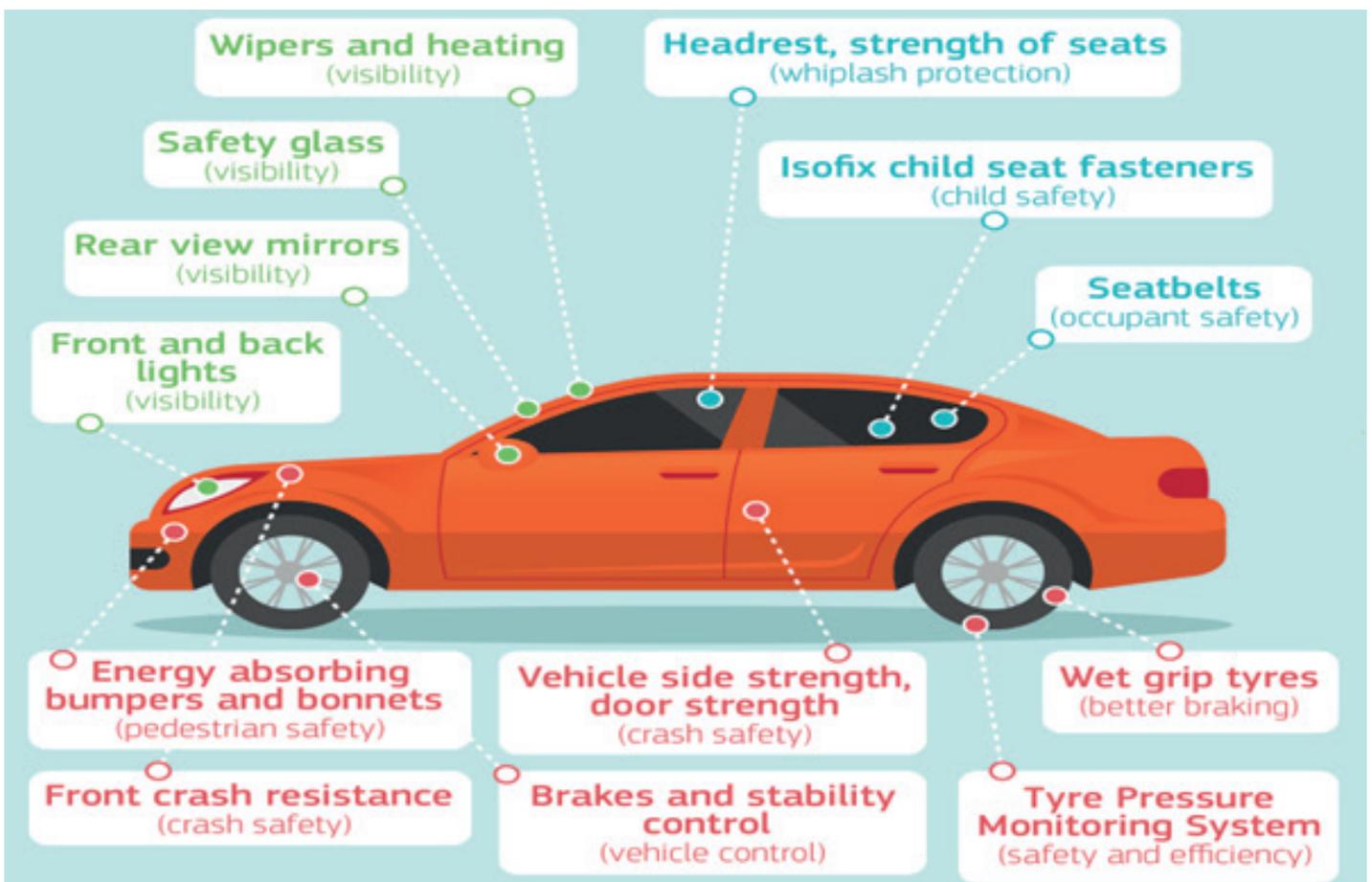


Fig 5: Passive safety features in a modern car

- **Safety assist technologies**

- Figure 6 indicates the 'field of view' of semi-autonomous and autonomous safety technologies which assist the driver in avoiding or reducing the severity of a crash. These include blind spot monitoring (BSM), AEB, active lane keep assist (LKA) and intelligent speed adaptation (ISA).

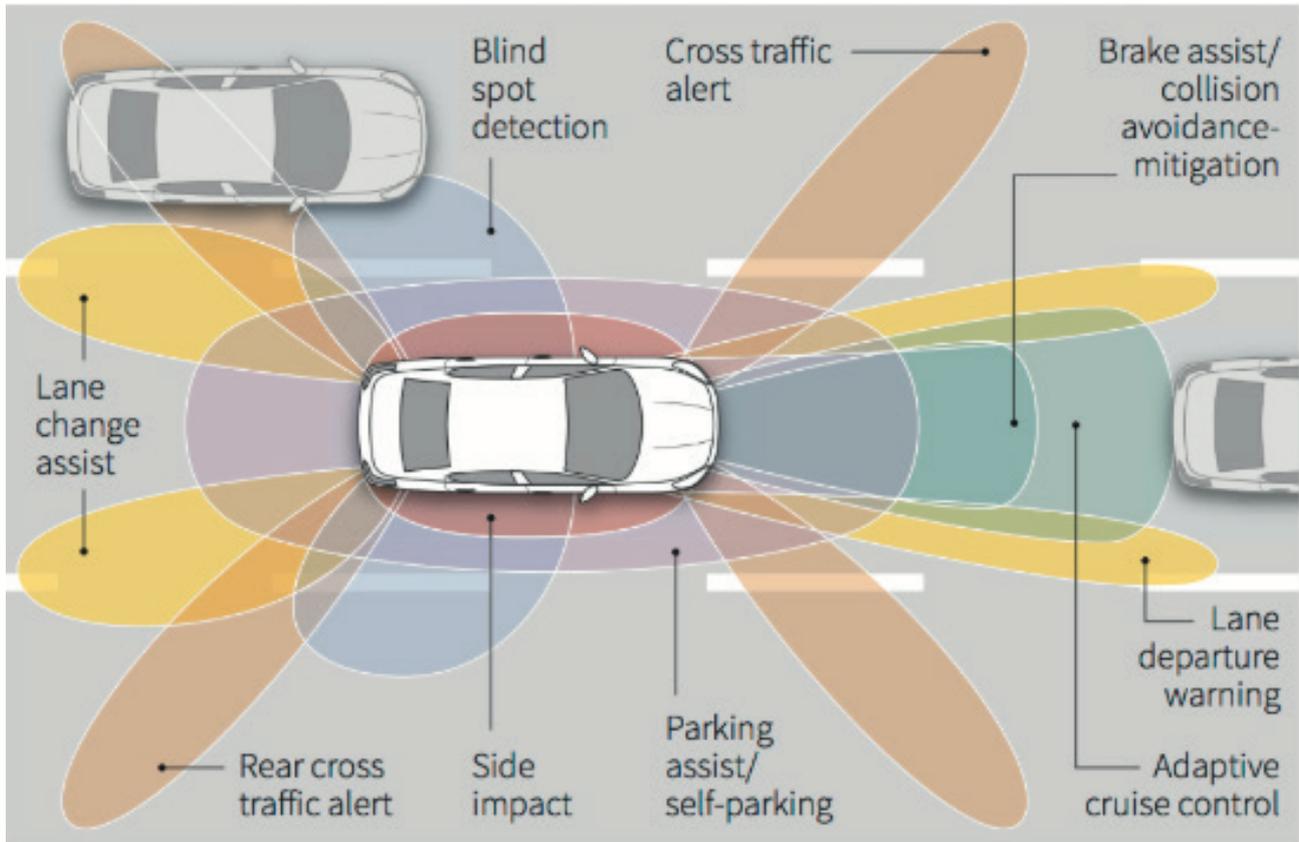


Fig 6: Active safety assistance technologies

Safety features fall into one of two categories, primary safety features or secondary safety features. Primary safety features reduce the crash risk and consist of:

- ESC
- AEB
- ISA.

Secondary safety features reduce the severity of injuries or reduce the risk of injury when a crash occurs and consist of:

- Airbags (curtain/driver knee/seat belt/head protection)
- Seat belts
- Rollover occupant protection systems.

Modern cars, fitted with a high level of secondary safety features, along with select crash avoidance technologies, are collectively known as Safe Vehicles (Palamara, 2018).

Vehicle Road Safety Research Group

The Vehicle Safety Research Group is a consortium of 16 government road authorities and motoring clubs from Australia and New Zealand, with representation by the Commission.

The consortium oversees a major program of research undertaken by the Monash University Accident Research Centre focused on vehicle safety monitoring and evaluation.

A primary focus of the Vehicle Safety Research Group program has been developing consumer advice on vehicle safety that rated the relative safety performance of light vehicles (Used Car Safety Ratings, which uses real world crash data to determine the rating score). The ratings system developed covers both the role of the vehicle in determining injury outcomes in the event of a crash (secondary safety) and, more recently, the contribution of vehicle design and specification to crash risk (primary safety). Secondary safety assessment covers not only how the vehicle protects its own occupants from injury in a crash (crash worthiness), but also the injury risk posed to other road users with which the vehicle collides (aggressivity).

Analysis has also been extended to look at average ratings by year of vehicle manufacture. This analysis clearly showed the effects of the introduction of Australia Design Rules (ADRs) – mandatory safety equipment and performance standards – in improving occupant protection performance and provided a mechanism for assessing the impacts of vehicle safety policy changes more broadly.

The VSRG also has a dedicated focus on research across the following themes:

- Ratings and fleet analysis
- Evaluation of new technology
- Vulnerable road users
- Fleet modelling
- Policy development and advocacy.

Government and corporate safety policies historically concentrated on the employee's driver training and education (Western Australia Road Safety Council, 2001), however there is now a drive to ensure safety starts with the vehicle fleet to ensure vehicle occupants are afforded contemporary safety technologies as well as comfort. Murray et al. (2002), revealed that fleet safety literature and examples of fleet policies very much focused on improving the safety culture of a workplace and encouraging safe driving practices among workers.

In Western Australia, statistical modelling of the potential reduction in road injuries from an optimal uptake of safe vehicle technologies in the corporate and government vehicle fleet sector estimated that over 3,000 serious injury casualty crashes could be saved in isolation of other initiatives over a 12-year period (Corben, Logan, Fancuilli, Farley & Cameron, 2010).

Regional and remote drivers have an increased likelihood of crashing in older, less safe vehicles (Watson & Newstead, 2009) and are more vulnerable because they frequently drive on less safe roads and at higher speeds (CARRS-Q, 2012). Run-off road crashes tend to occur more frequently in regional or remote areas and are more likely to result in death or serious injury.

The Australasian New Car Program (ANCAP), is a body that analyses the crash data of cars under controlled crash conditions. The analysis is then rated, through a star system, and published as a safety rating (the more stars, the better

the safety aspects of the car). Since 1993, over 590 passenger and light commercial vehicles sold in Australia and New Zealand have been awarded and ANCAP safety rating of between 1 to 5 stars (ANCAP, 2018). As well as safety rating new cars, ANCAP publishes data for used cars under the Used Car Safety Rating (UCSR), using the same star system to indicate the safety rating. Figure 7 shows the minimum requirements a vehicle needs to achieve a 5 star rating in 2018-2020:

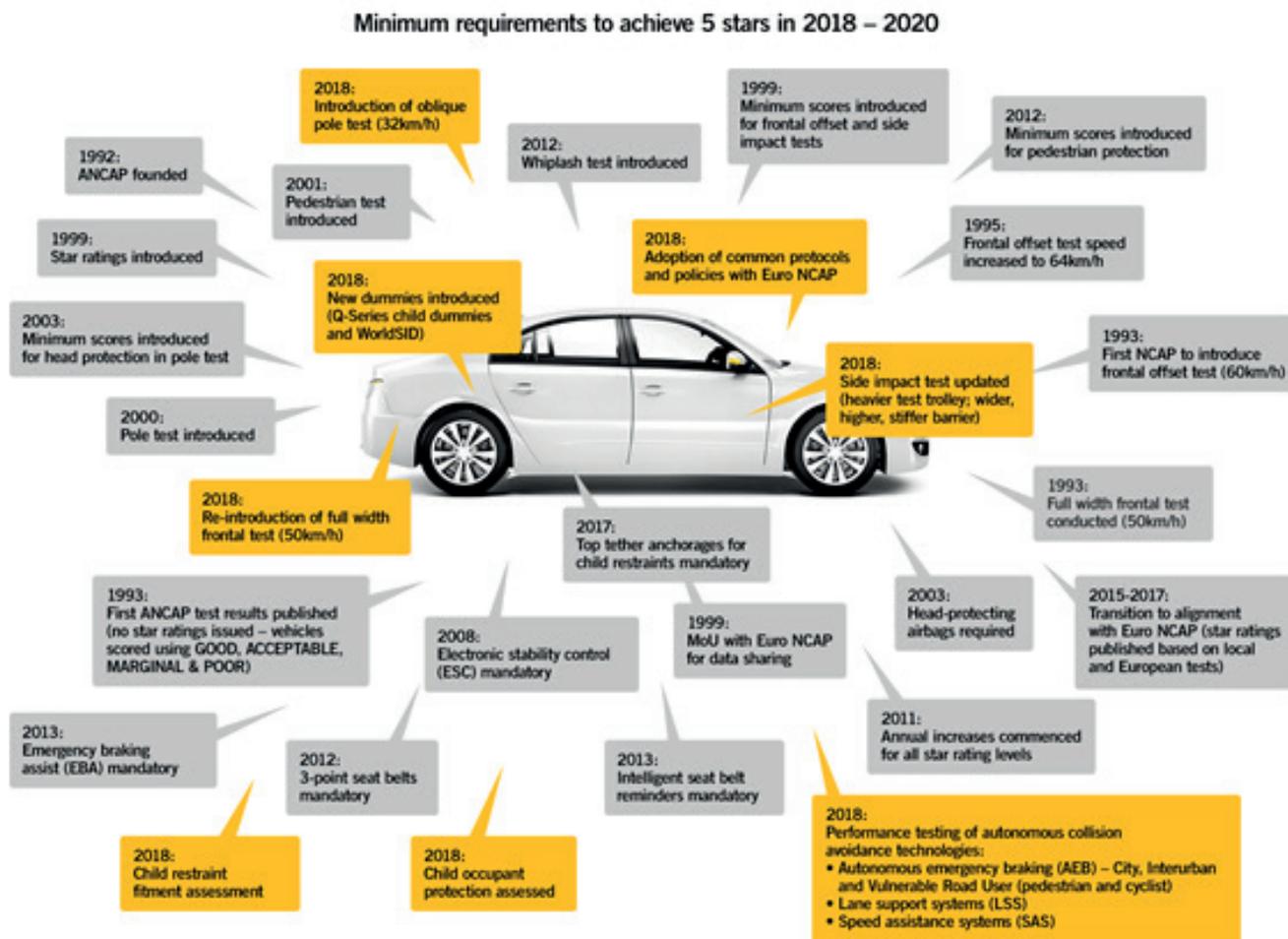


Fig 7: Progression of ANCAP safety testing and mandatory vehicle requirements

Studies have shown that safe vehicles (fitted with secondary safety features and crash avoidance technologies), have the capacity to reduce the incidence of road-related death and serious injury (ITF, 2016; Kahane 2015; Page et al. 2009). Australian research indicates a drop-in road trauma between 26 and 40% if each motorist upgraded their vehicle to the safest in its class (Newstead, 2004). The Road Safety Commission (the Commission) is a member of ANCAP.

Australian research suggests that improvements in vehicle safety and design over a 15 year period have contributed to a 75% reduction in the risk of death or serious injury for vehicle drivers (Anderson & Searson, 2014). Vehicles fitted with ESC have been shown to reduce single vehicle fatal crashes by around one third (Insurance Institute for Highway Safety 2006).

MotoCap (Motorcycle Clothing Assessment Program) undertakes research and testing to provide motorcyclists with information about the levels of injury protection provided by riding gear available in Australia and New Zealand.

WHAT ARE THE COUNTERMEASURES?

Legislation

General

Road Traffic (Vehicles) Act 2012

Road Traffic (Vehicles) Regulations 2014

Road Traffic Code 2000

- April 2015 – *Road Traffic Code 2000*; amended to increase penalties for non-use of seatbelt and motorcycle helmet
- May 2018 – *Road Traffic Code 2000*; amended to clarify age limits for child car restraints

The Australian Design Rules (ADRs) cover the minimum safety requirements for vehicles.

Vehicle standards nationally are administered under the Motor Vehicle Standards Act and Regulations, 1989 (Cwlth).

Motorcycle safety design has improved the situation for riders by introducing various technology safety enhancements. Anti-Lock Braking System (ABS), which allows riders to apply the brakes with force, without the brakes locking up and causing the motorcycle to lose control. A recent Australian study into the benefits of ABS found that ABS could assist in 93% of motorcycle crash situations (B. Fildes, et al. 2015).

Other technologies available which address stability, traction and the braking properties of motorcycles are:

- Combined braking systems – front and back brakes work together
- Amplified braking systems – comparable to braking assistance in cars
- Rear wheel lift off protection – detects when the rear wheel has lifted off the surface of the road and removes the front brake temporarily
- Brake by wire – improves ABS results
- Electronic traction control – prevents rear wheel skids
- Motorcycle stability control – electronically combines braking while cornering in emergencies
- Anti-hop clutch system for smoother and more consistent acceleration.

ANCAP now insist on new vehicle models having a minimum standard of safety features. Vehicles are assessed against four key areas:

- Adult Occupant Protection (AOP)

Considers the level of protection offered by the vehicle to adult occupants seated in the front and second row in the most common types of serious injury crashes

- Child Occupant Protection (COP)

Evaluates the level of protection offered to child occupants seated in appropriate child restraints in the rear seats. The ability to effectively accommodate a range of child restraints is also assessed

- Vulnerable Road User Protection (VRU)

Assesses the design of the front of the vehicle to minimise injury risk to a struck pedestrian. Vehicles are also assessed for their ability to actively avoid or mitigate impacts with pedestrians and cyclists

- Safety Assist (SA)

Evaluates the presence and effectiveness of active safety technologies fitted to the vehicle which assist the driver in preventing or minimising the effects of a crash.

Vehicles undergo a series of controlled crash situations and to achieve the maximum five star rating, a vehicle must perform to the highest level across all crash tests and assessments.

Crash avoidance technologies have advanced over the last 20 years to a point where their fitment now significantly contributes to the safe vehicle's ratings assigned to new and used cars. Some of the key primary and secondary advancements are:

Primary Safety Features

<p>Electronic Stability Control</p>		<p>Helps drivers avoid crashes by reducing the danger of skidding or losing control because of over-steering. Becomes active when a driver loses control of the car. Computers control individual brakes and help to bring the car safely back on track</p>
<p>Autonomous Electronic Braking</p>		<p>Alerts a driver to an imminent crash and helps the driver use maximum braking capacity of the car. AEB will independently brake if the situation becomes critical and no human response is made</p>
<p>Adaptive Cruise Control</p>		<p>Detects the distance and speed of the preceding vehicle and maintains an appropriate following distance</p>
<p>Lane Departure Warning/ Lane Keeping Assist</p>		<p>Assist and warn drivers when the unintentionally leave the road lane or change lane without indication</p>
<p>Blind Spot Monitoring</p>		<p>Detects and warns of vehicles that cannot be seen by the driver when behind and to one side of the vehicle</p>
<p>Fatigue Warning System</p>		<p>Analyses the characteristics of the driver and identifies signs of inattention or drowsiness. If either is detected, the driver is warned</p>

Secondary Safety Features

Improved Vehicle structural integrity and crumple zones



Side, front and rear compartments are strengthened. Crumple zones absorb the crash impact to protect passengers. Intrusions beams included in doors to provide extra strength

Seatbelts and seatbelt pre-tensioners



Pre-tensioners tighten and reduces slack in seatbelts to protect occupants from rapidly moving forward in the event of a crash

Seatbelt reminder systems



Remind passengers to wear seatbelts

Airbags



Protect all passengers from striking other parts of the car in a frontal and side on crash. All seatbelts are designed to be used in conjunction with seatbelts and not as a substitute

Education

The state government recently (October 2018) launched the Safe Vehicles campaign, aimed at those who are considering purchasing a new or used car. The Minister for Road Safety reminded Western Australians to research the ANCAP and UCSR websites to make a more informed decision before choosing a car:

“The few minutes it takes to consult the Used Car or ANCAP Safety Ratings is worth putting your family in a safe vehicle and protecting them from road trauma.” – Michelle Roberts, WA Minister for Road Safety

The decision to launch the Safe Vehicles campaign in October was to coincide with young adults leaving school. A second round of the campaign will be launched in January 2019 which coincides with the start of university. The launch dates of the campaign are unashamedly targeted at young adults (and parents of young adults) as they often drive older cars without new vehicle safety features (63% of cars owned by 17-25 year old metropolitan drivers were rated 1-3 stars, compared with 61% for same aged rural/remote drivers and 70.5% for 26+ year old rural/remote drivers) (Palamara, 2018).

October 2018 also saw a campaign building on the vision of no road deaths and serious injuries called “Not on my Road.” Various commercials have been aired in the run up to Christmas, with one dedicated to the wearing of seatbelts.

The Commission works with and helps to fund education programs, such as School Drug Education and Road Aware (SDERA) in providing education programs and materials to young children and adults in the form of written material and presentations. The Smart Steps package is aimed at young children and teaches the basics of road safety and how to be a safe passenger, whereas, Keys for Life is for young adults and is presented through workshops and written material.

The Royal Automobile Club WA (RACWA) runs community education programs, which provide education to young children of primary school age (Teaching around the Roads), programs for year 10-12 students (On the Roads) and seniors programs.

Community Engagement

For the duration of Towards Zero, there have been various approaches to engaging with the community.

- 2008 – Promotion of ESC
- 2010 – Know what you are getting into – campaign which promoted the ANCAP safety rating and informed consumers that not all cars perform the same in a crash
- 2010 – WA Stars on Cars – ANCAP star rating information supplied at dealerships
- 2012 – Stay in Control with ESC – Campaign aimed at raising public awareness about how ESC helps to regain control of a vehicle when the driver has lost control
- 2013 – Consult the Stars – This campaign encouraged potential buyers to check the ANCAP star rating before deciding which car to buy
- 2014 – Safer Cars Save Lives – Another campaign to raise awareness about vehicle safety
- 2014 – Government fleet adopted the ANCAP 5-star rating for all light vehicles
- 2016 – Consumer Guide to Safer Vehicles – A guide to help those who drive in regional or remote WA in choosing the right vehicle for the environment they live and work in.

WHAT IS THE FUTURE FOCUS?

The Commission will continue to focus on improving vehicle safety and the update of safer vehicles through; evidence-based research, policy design, education, safety campaign, etc. Areas of focus include:

- Continued monitoring of the percentage of new vehicles sold in WA that are fitted with specific safety features, such as ESC, side and curtain airbags and active head restraints
- Roll out of specific plans to address the ageing fleet of WA. The Remote and Regional Action Plan and aims to address the over representation in crash statistics of regional and remote areas, and to consider the precursors to regional and remote crashes, resulting in fatalities and serious injuries. Recommendations from the plan will attempt to provide solutions to address the issue. The Commission is considering which actions can be realistically achieved
- A new road safety strategy is due for release in 2020. Lessons learned from the current *Towards Zero* plan will be incorporated into the new strategy to address existing gaps found during the life of the current strategy
- Continued work with ANCAP to ensure more stringent testing is conducted to enable more manufacturers to include better technological measures to aid driver and passenger safety
- More targeted education campaigns encouraging the public to consider safety as paramount when purchasing a new or used vehicle
- Input into expert panels addressing autonomous vehicle concepts and studies
- Monitoring of existing vehicle standards and recommending updates when necessary.

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