



ANCAP

Crash testing for safety

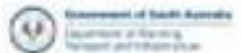
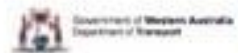
AUSTRALASIAN
NEW CAR ASSESSMENT
PROGRAM

NEW CAR SAFETY INNOVATIONS ANCAP RATINGS

Michael Paine - ANCAP Technical Manager



Transport
for NSW



Outline

- Background on crash testing by ANCAP
- Improvements in vehicle occupant protection
- Technologies to avoid serious crashes



ANCAP Background

- ANCAP began crash tests 21 years ago (56km/h full-frontal)
- 60km/h frontal *offset* test introduced in 1993 (first in world)
- Increased offset test speed to 64km/h in 1995
- Stakeholders now include all state and national governments of Australia and New Zealand, all motoring clubs (eg NRMA) and several insurers
- Independent - incorporated in 2007



ANCAP Background

- Aligned with Euro NCAP in 1999 (Euro NCAP started in 1997)
- Three types of crash test assess protection for front occupants

Injury Outcomes

Frontal Offset

Driver



Passenger



Side Impact & Pole

Driver



ANCAP Background

Frontal offset at 64km/h – click image to view video



ANCAP Background

Mobile Deformable Barrier at 50km/h – click image to view video



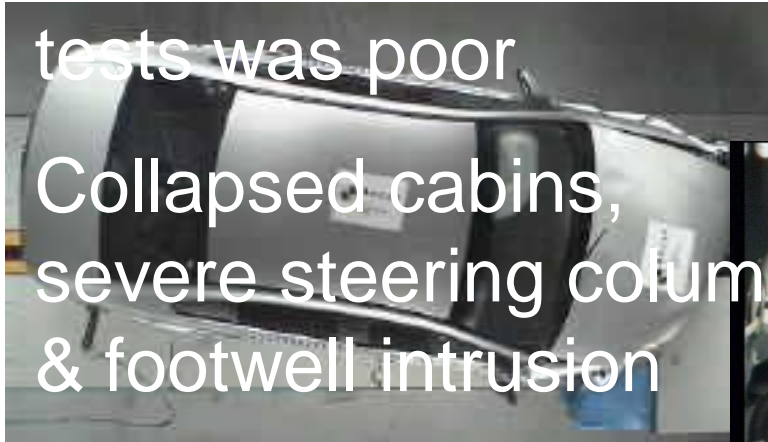
ANCAP Background

Side Pole impact at 29km/h – click image to view video



ANCAP Background

- In the 1990s vehicle structural performance in most offset crash tests was poor



- Collapsed cabins, severe steering column & footwell intrusion



- Most would rate 1 or 2 stars under the current system



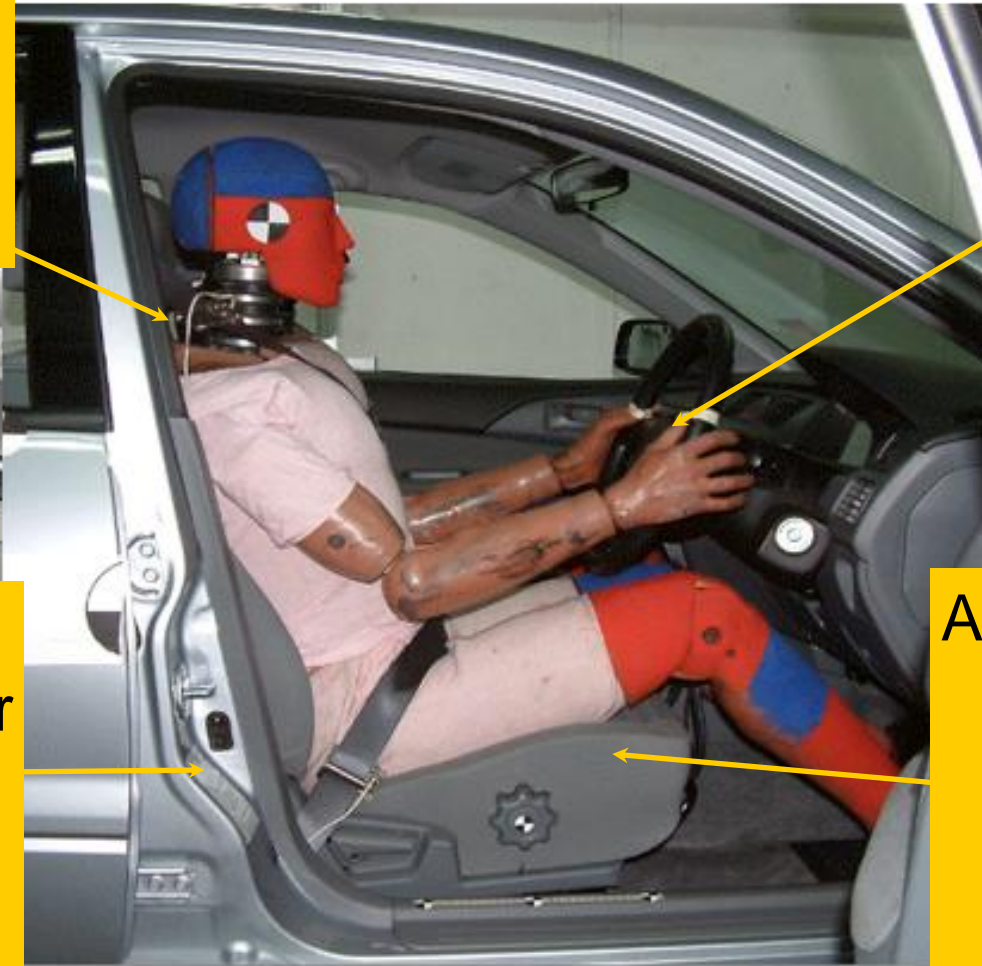
Restraint systems innovations

Seat Belt
Load Limiter
Reduces
peak load
on chest

Frontal airbag
Cushions
head and
takes some
loading off
the chest

Seat Belt
Pretensioner
Removes
initial slack
in system

Anti-submarining
seat pan
Takes some
loading off
abdomen



Risk of Injury >> Score

Head

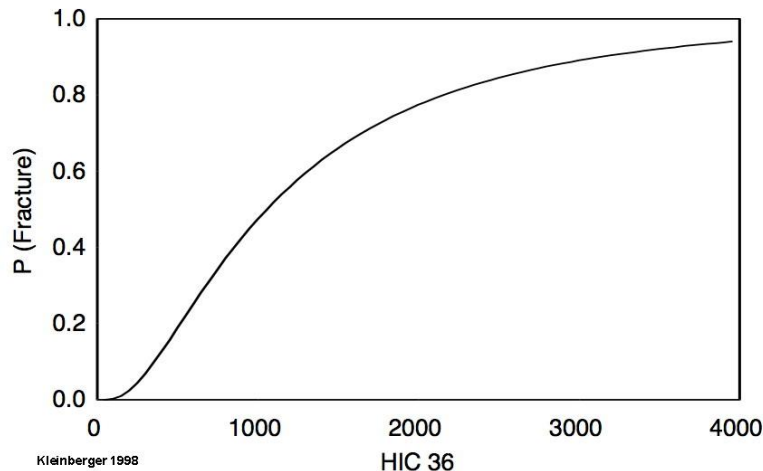
deceleration
in “HIC”
Serious
injury risk

1900 = 84%

1500 = 56%

1000 = 20% (score 0)

650 = 5% (score 4)



Head-protecting side airbags needed for 5 stars

ANCAP Research 29km/h Pole Tests in 2004 (Coxon 19th ESV)

Click image to view video



HIC 512

HIC 7552



ANCAP

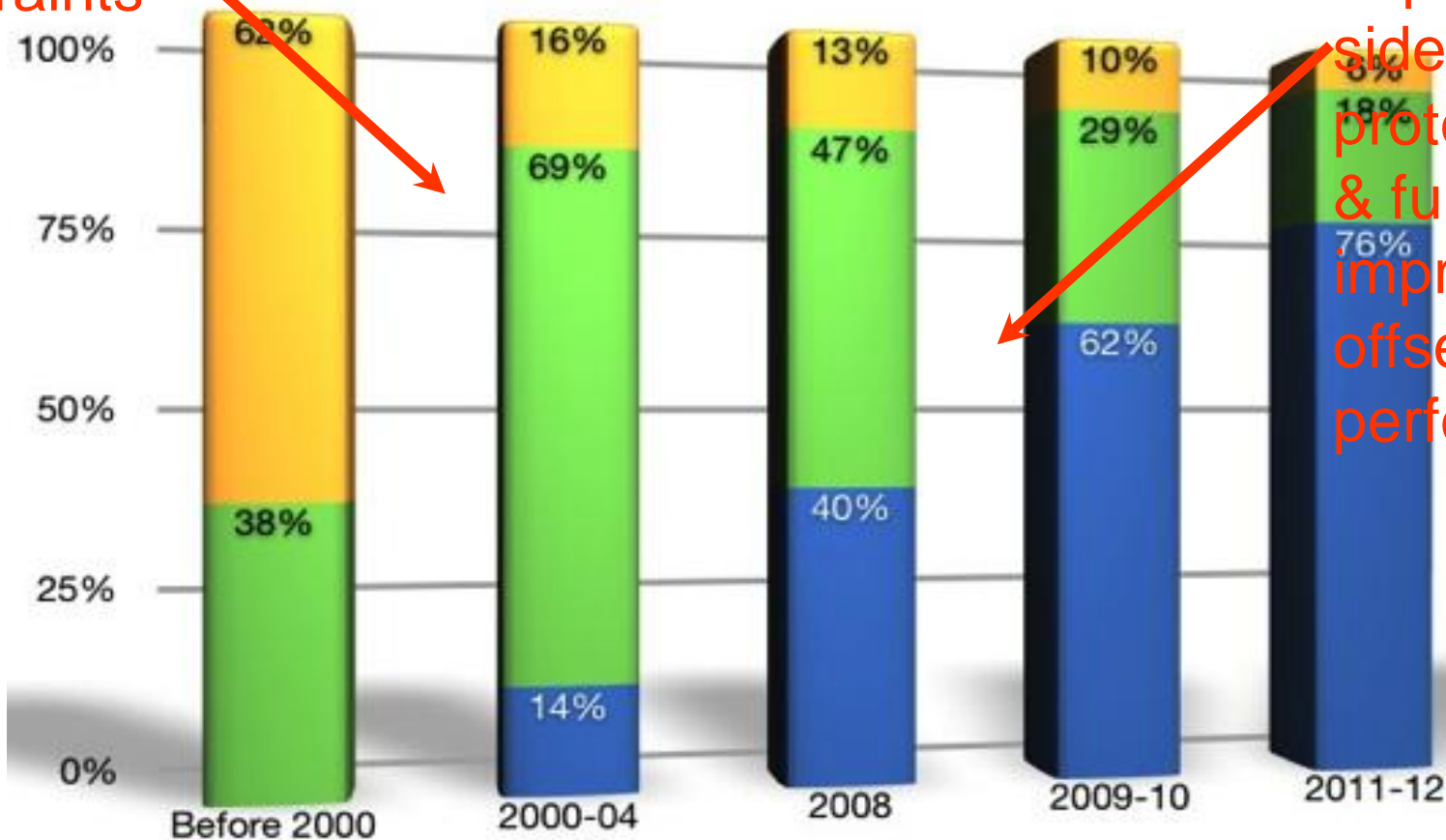
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ANCAP Trends - Vehicle Models

Improved structure
& occupant
restraints

Improved
side
protection
& further
improved
offset test
performance



Year published by ANCAP

■ 5 Stars

■ 4 stars

■ 3 stars or less

5-star vehicles are available in all categories



Cars

SUVs

Commercials

FLEET PURCHASING POLICIES

- From July 2011 all cars purchased by the Australian government must have a 5-star ANCAP rating and all light commercial vehicles must have at least a 4-star rating
- BHP Billiton recently announced a global 5-star vehicle policy



Tracking model crashworthiness

- Used Car Safety Ratings include an estimate of the risk of serious injury to the driver in a Police-reported crash
- Injury risk is expressed as "crashworthiness": ***the number of seriously injured drivers per 100 reported crashes.*** Takes into account influencing factors such as age of driver
- UCSR are available for vehicle models built from the mid-1980s to 2010 (the limit of available crash data)



Tracking model crashworthiness

- ANCAP commenced crash testing in 1992. Ratings out of 5 stars are available for new models from 1999 (Euro NCAP method)
- Estimated star ratings can be calculated for models released between 1995 and 1999 based on the offset crash test results



Tracking model crashworthiness

- Over the past 15 years most models have improved their ANCAP star rating
- USCR scores are available for these models and so the effect of a change in star rating can be evaluated
- Method:
 - Identify model changes (sometimes names change)
 - Determine ANCAP star rating and UCSR crashworthiness rating
 - For models rated prior to 1999, estimate star rating from offset test score (nearly all pre-1999 models are 3 stars or less because the offset test score was less than 8.5 out of 16)
 - Calculate the change in crashworthiness for the improvements in star rating

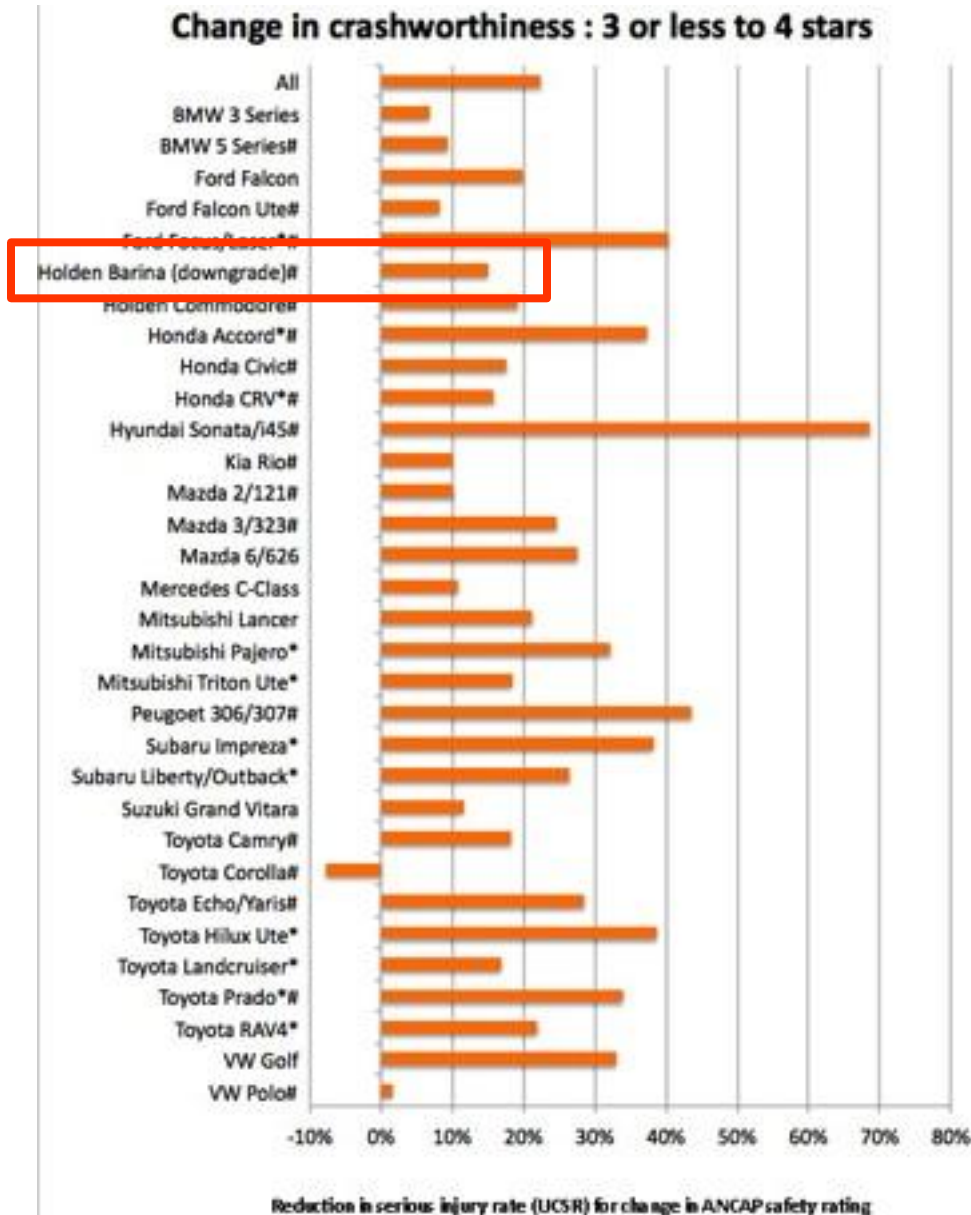
Tracking model crashworthiness

 35 models could be tracked in this way

	YEAR RANGE 1	ANCAP 1	UCSR 1	YEAR RANGE 2	ANCAP 2	UCSR 2	YEAR RANGE 3	ANCAP 3	UCSR 3
BMW 3 Series	92-98	3	3.41	99-06	4	3.18	05-10	5	1.51
BMW 5 Series#	96-03	3	2.25	04-10	4	2.04			
Ford Falcon	98-02	3	3.27	03-07	4	2.62	08-10	5	1.38
Ford Falcon Ute#	00-02	3	2.57	03-08	4	2.36			
Ford Focus/Laser*#	95-97	2	4.9	02-05	4	2.92			
Holden Barina (downgrade)#	05-10	2	4.13	01-06	4	3.51			
Holden Commodore#	97-02	3	3.38	02-07	4	2.73			

(Extract from appendix to ESV paper)

3 stars or less to 4 stars

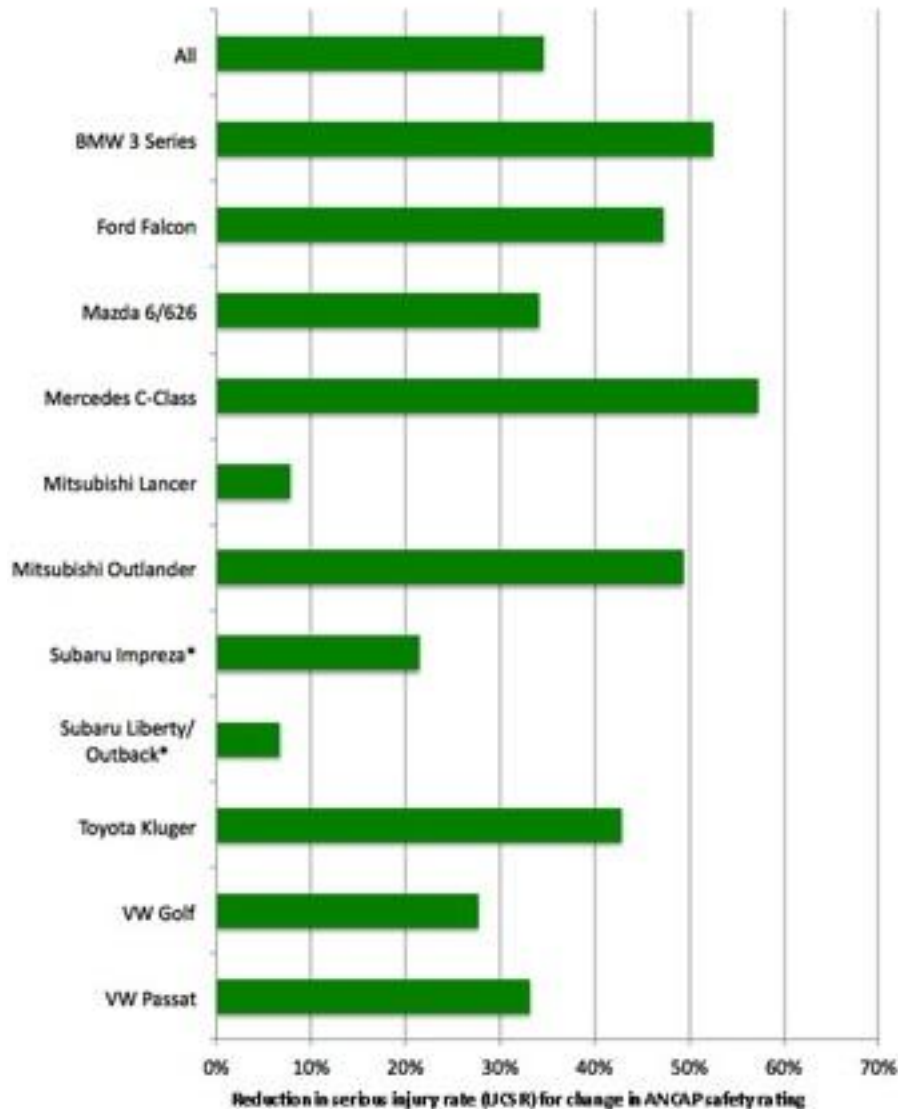


32 models
Average UCSR
improvement 22%

Barina NCAP rating
dropped in 2005 (4 to
2 stars) and so did
UCSR

4 stars to 5 stars

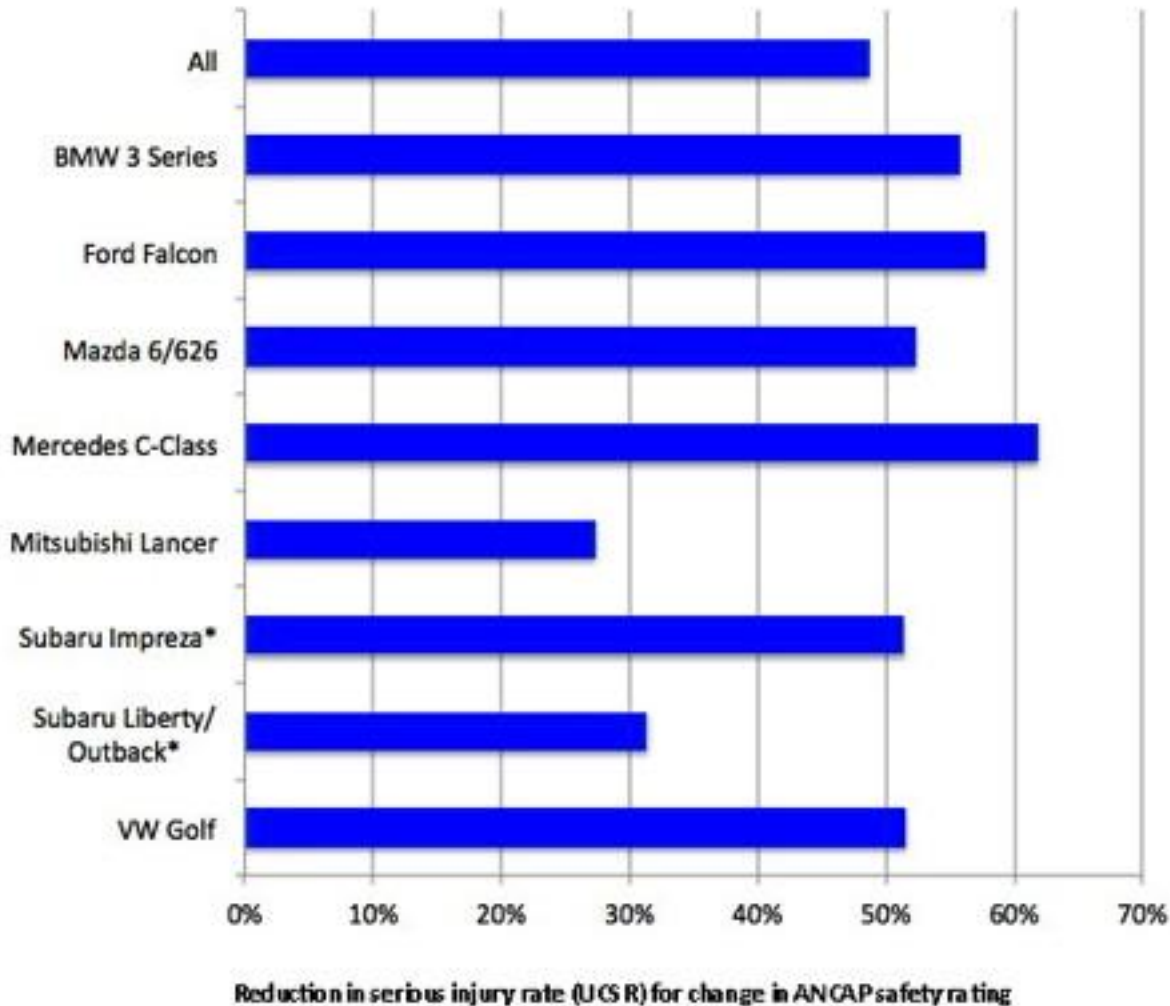
Change in crashworthiness: 4 to 5 stars



11 models
Average UCSR
improvement 35%

3 stars or less to 5 stars

Change in crashworthiness: 3 or less to 5 stars



- 8 models
- Average UCSR improvement 49%

Examples - Ford Falcon

2001



Frontal Offset
Driver



Passenger



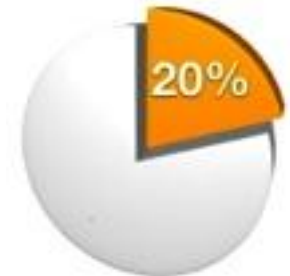
Side Impact
Driver



FALCON01



UCSR 3.27



2003



Frontal Offset
Driver



Passenger



Side Impact
Driver



FALCON03



UCSR 2.2



2008



Frontal Offset
Driver



Passenger



Side Impact & Pole
Driver



FALCON08



UCSR 1.38

Examples - BMW 3 Series

1997



UCSR 3.41

1999



UCSR 3.18

2006



UCSR 1.51

Examples - BMW 3 Series

1997



"if all young drivers involved in crashes were driving the safest car available, rather than the cars they usually drove, the road fatality and serious injury rate could be reduced by more than 80 per cent."
(MUARC 2009)

1999



2006



**4 OUT OF 5 WOULD NOT HAVE
DIED**

3.41

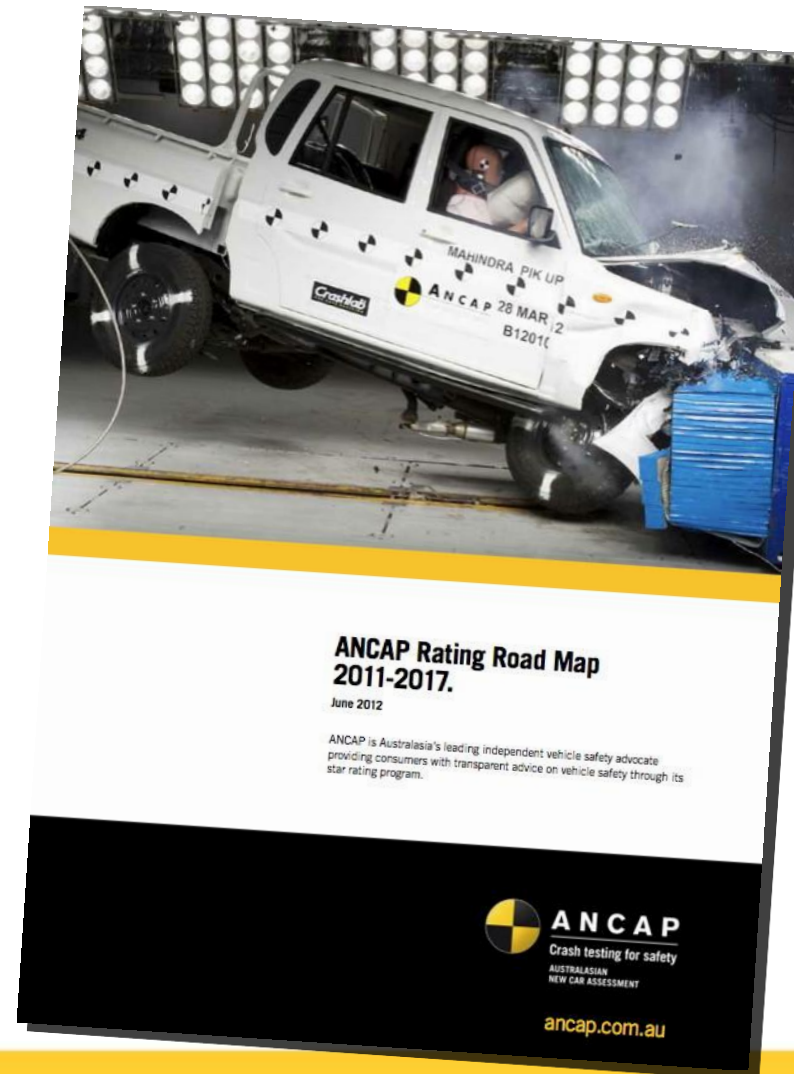
3.18

53%

.51

ANCAP ROAD MAP

- Raises the bar for each star rating - including minimum requirements for pedestrian, whiplash & roof strength
- Encourages uptake of a wide range of *Safety Assist Technologies* (SAT) - both passive and active
- Developed in consultation with the auto industry



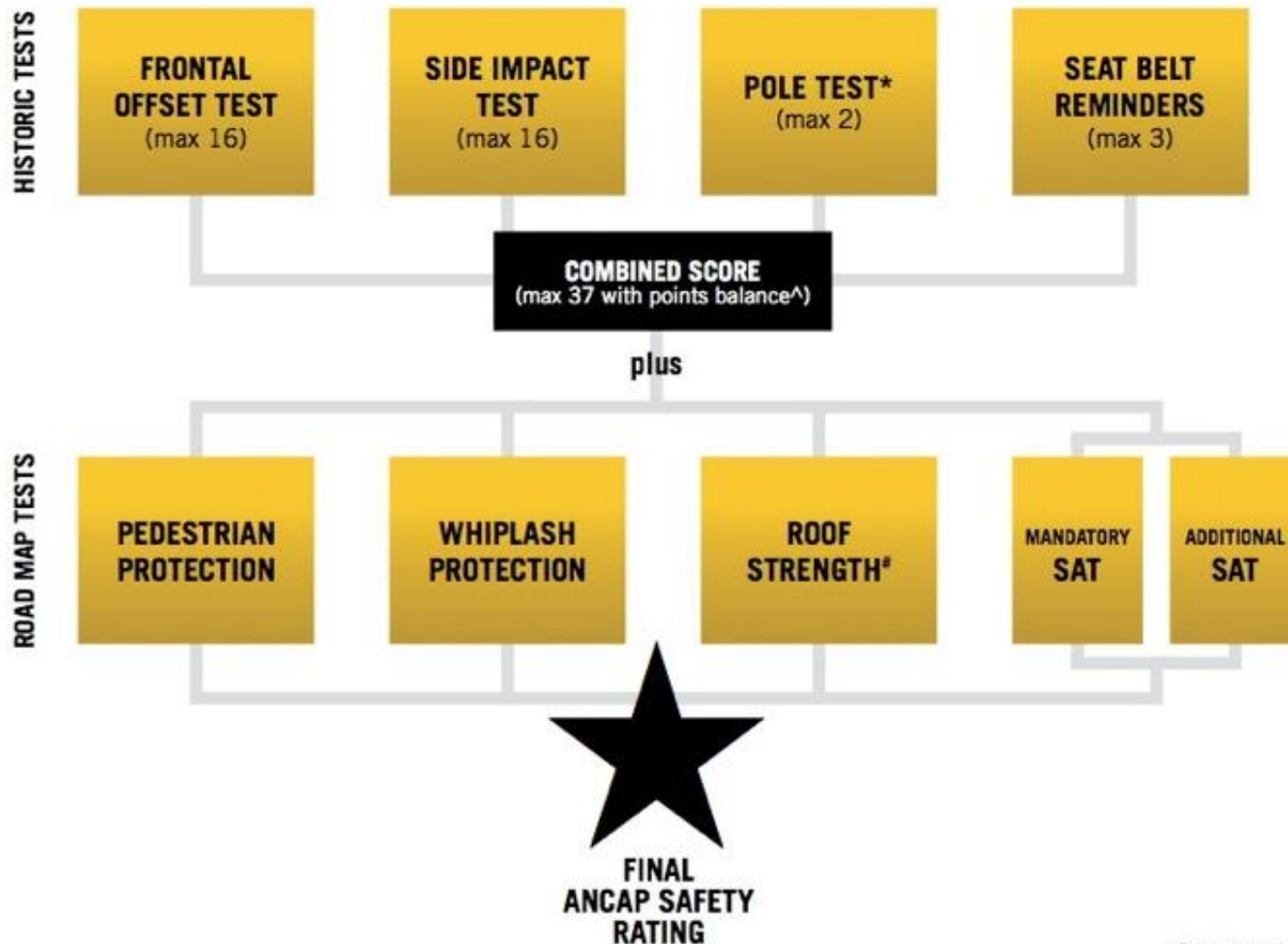
ANCAP ROAD MAP



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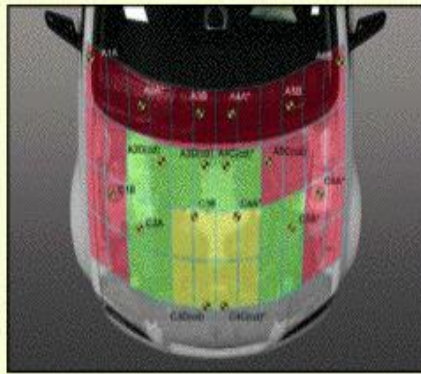


* Pole test required to achieve 5 star rating.

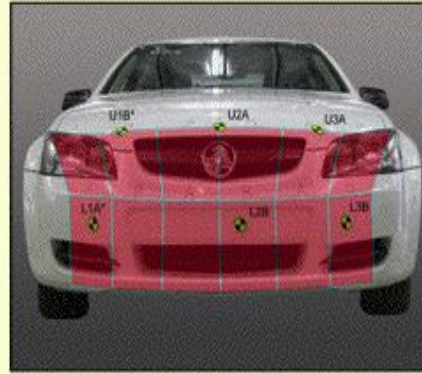
[^] Minimum points required for each star rating.

[#] Roof crush testing will be introduced in 2014.

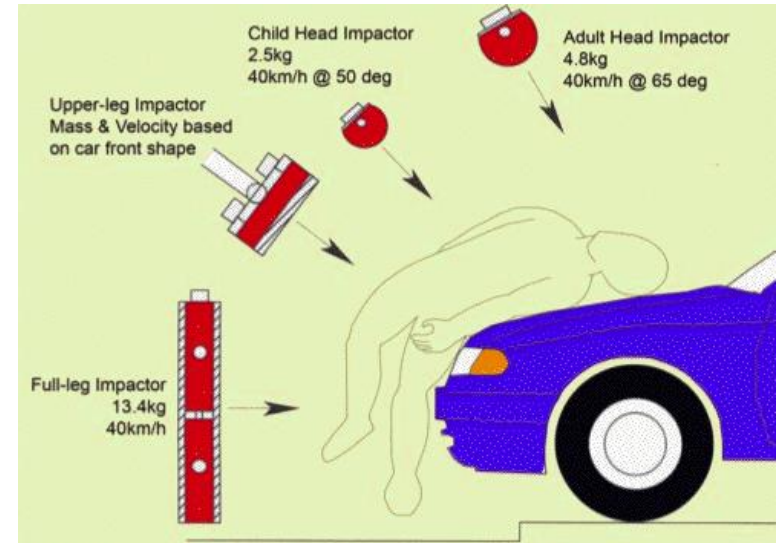
Pedestrian Protection Tests



Child and adult head impact



Adult leg impact (upper and full legforms)

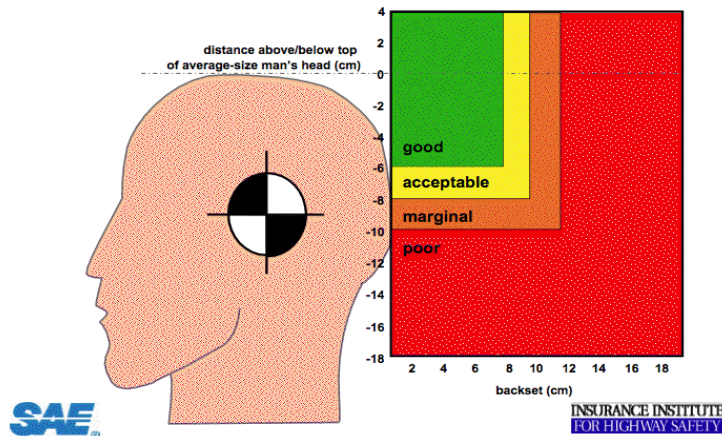


< Click image to view video



Whiplash Protection

Geometric seat and head restraint evaluations



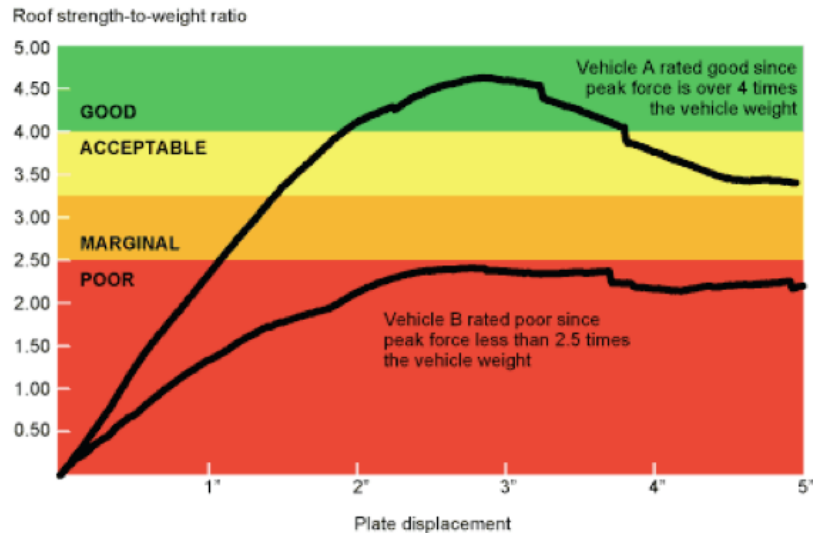
Click image to view video >



Roof Strength Rating

Australia has a similar rollover problem to the USA. IIHS roof strength rating is being introduced

Click image to view video



Sample data comparing test results for vehicles rated good and poor



A result of at least “marginal” (SWR ≥ 2.5) required for an ANCAP 5-star rating from 2014.



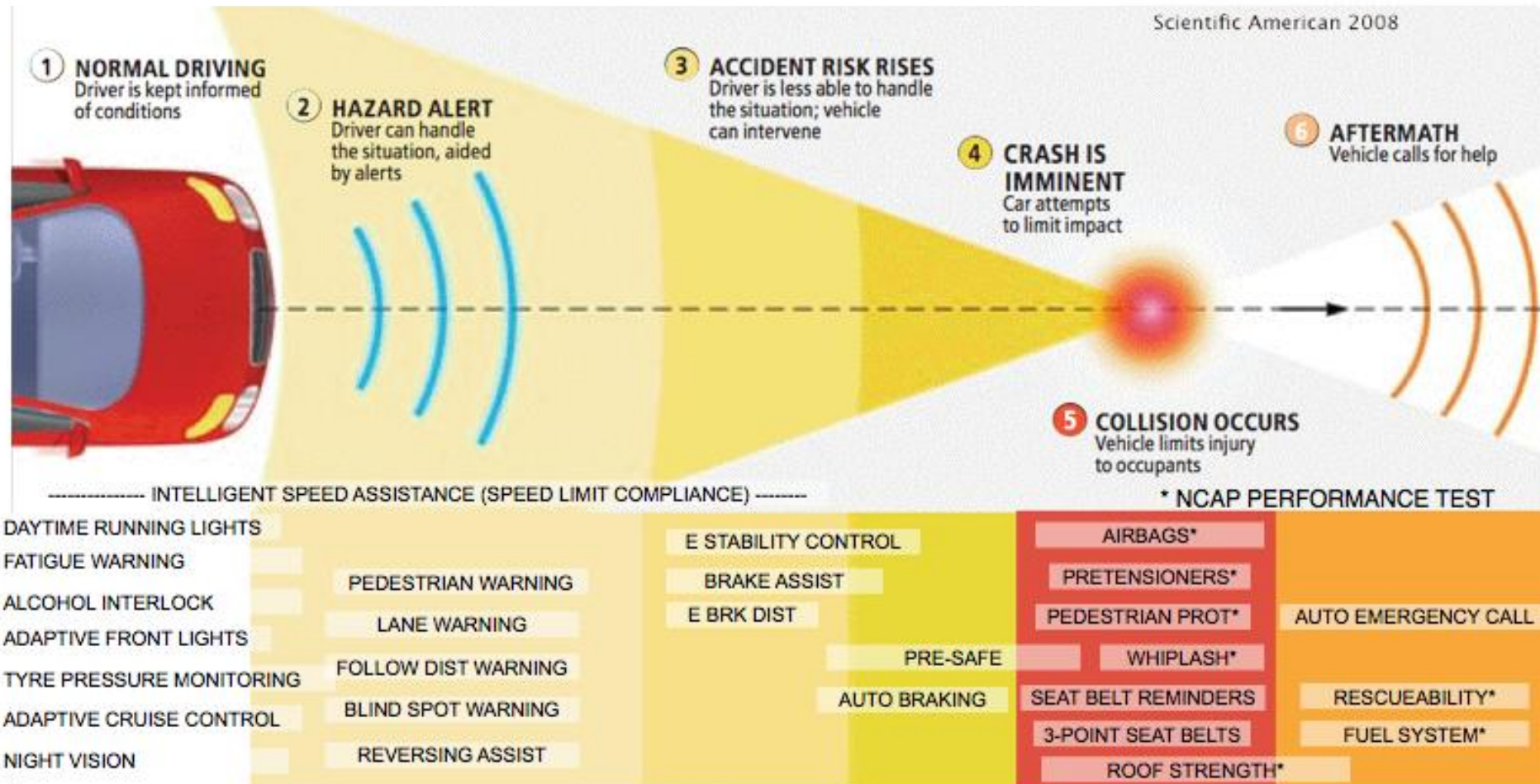
Roof strength test results

A

2009 models

EXAMPLES OF SAFETY ASSIST TECHNOLOGIES (SAT)

Each counts as 1 SAT if standard, 0.5 SAT if optional



MANDATORY SAT (5 STARS)

- Front seat head-protecting side airbags from 2004 (pole test required)
- ESC from 2008 (announced June 2007)
- 3-point seat belts from February 2011 (published in 2011 Road Map)
- Seat belt reminders for both front seats and emergency brake assist from January 2013 (published in 2011 Road Map)
- Head-protecting side airbags for 2nd row seats from 2014 (published in 2011 Road Map)
- Seat belt reminders for 2nd row seats from 2015 (published in 2011 Road Map)
- Next??

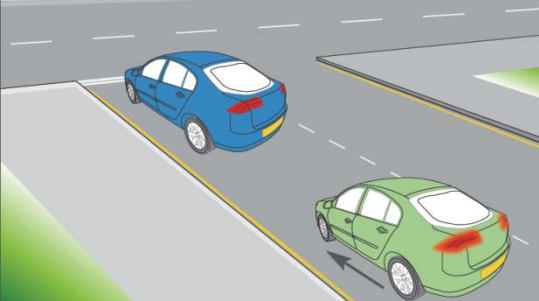
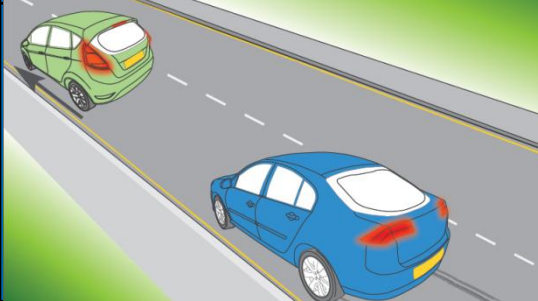
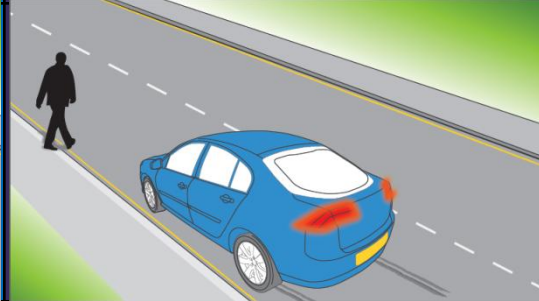


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Autonomous Emergency Braking (AEB)

City	Inter-Urban	Pedestrian
		
Car-to-Car Rear Static target	Car-to-Car Rear Moving target	Car-to-Car Rear Static and walking targets

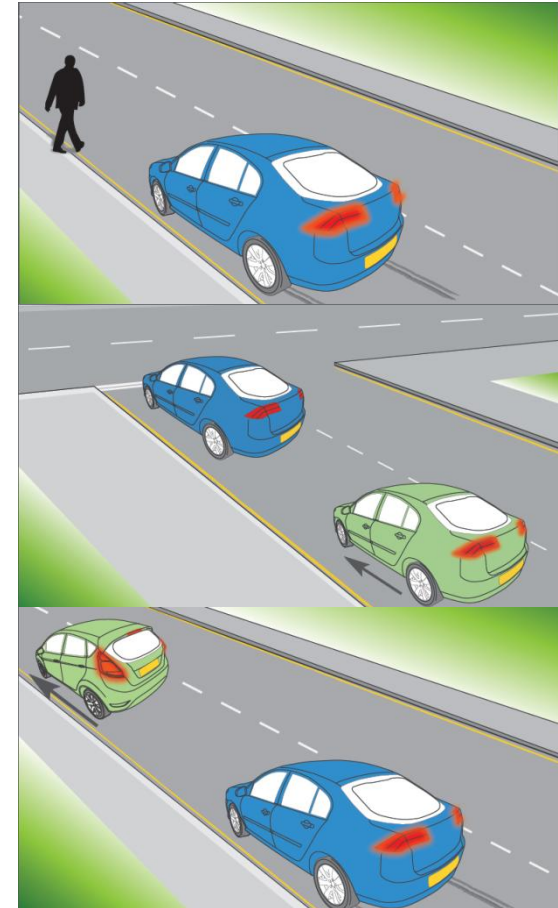
Thatcham

-  Detects objects in path of vehicle
-  Alerts driver to hazard
-  Applies brakes (strongly) if beyond human intervention
-  Diagram illustrates 3 types of AEB

Estimates of Potential Benefits

Lives and injuries saved **across Europe**

- 2,700 fewer pedestrians killed and injured annually
- 160,000 fewer whiplash injuries annually
- 271,000 crashes will either be mitigated or avoided altogether



Thatcham

Pedestrian AEB

Click image to view video



Thatcham

City AEB

Click image to view video



Thatcham

Inter-urban AEB

Click image to view video



Thatcham



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Australian AEB Research

- In 2012 CASR conducted an evaluation of the potential safety benefits of “forward collision avoidance technology” (FCAT) for Austroads.
- AEB was the major technology evaluated
- Report published in April 2012
- Major benefits for Australia



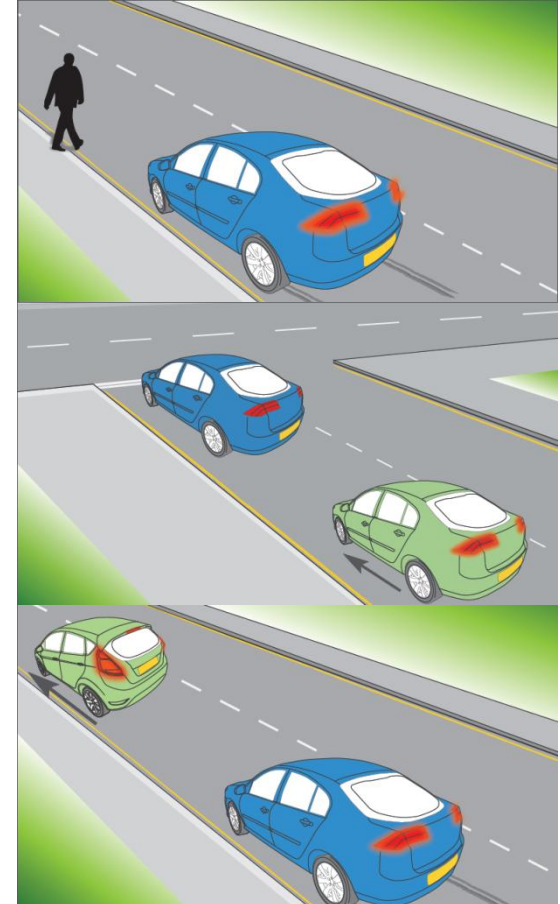
Global NCAPs and AEB

- Overseas AEB systems are available on many brands of car
- AEB performance tests are close to being finalised by a European consortium of insurers, Euro NCAP and car manufacturers
- AEB is being strongly encouraged by Euro NCAP under its Safety Assist scoring system
- IIHS expected to require AEB for its Top Safety Rating soon. Found reduced insurance claims for Volvo XC60.



ANCAP and AEB

- Has been an optional SAT since 2011
- 2012 Road Map introduced a pedestrian rating concession for vehicles with Pedestrian AEB (e.g. marginal protection instead of acceptable or good, if pedestrian AEB fitted)
- Looking at ways to encourage early take-up



DAYTIME RUNNING LIGHTS

-  Fitted to all GM cars in the USA since the mid 1990s
-  Under European regulation dedicated bright white DRLs mandatory for cars from 2011
-  In a 2003 GM study dedicated DRLs were found to be much more effective than headlights



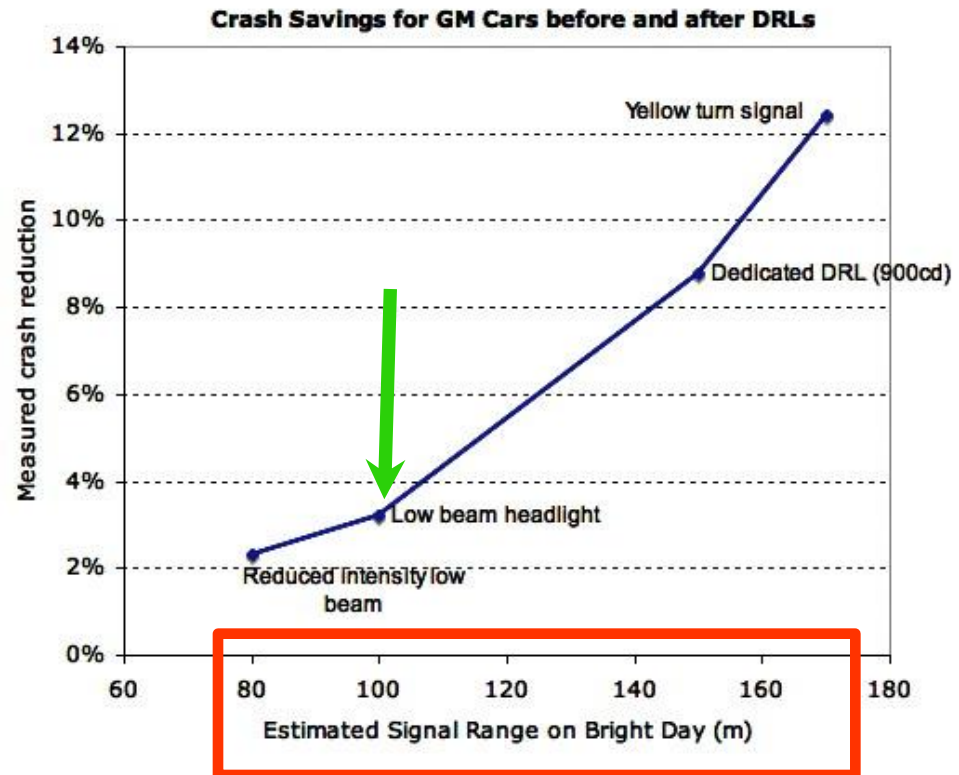
Table 3. Effectiveness of DRLs on GM cars
(from Thompson 2003)

DRL Type	Change in Collision rate
Dedicated DRL (900cd)	-8.76%
Low beam headlight	-3.23%
Reduced intensity low beam	-2.31%
Reduced intensity high beam*	-4.86%
Yellow turn signal #	-12.4%



DAYTIME RUNNING LIGHTS

- GM findings are supported by photometric theory
- At best, headlights are marginally effective on bright, cloudy days
- GM study was one of the few to look at different effectiveness
- Most DRL accident studies have been based on use of headlights or older style DRLs
- Not surprising that they found a “latitude effect”



DAYTIME RUNNING LIGHTS

- Euro NCAP not interested in DRLs since they are required by regulation in Europe
- Any cars intended to be sold in Europe will have dedicated DRLs
- Many models now sold in Australia have DRLs
- Fitted to some performance vehicles in Australia
- Looking at ways to encourage early uptake



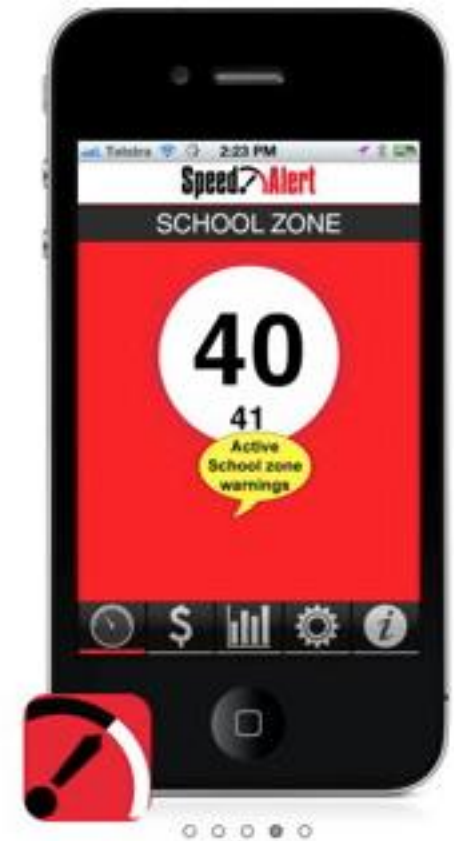
SPEED ASSIST SYSTEMS

- Last year Euro NCAP published a protocol for assessing “speed assist systems”
- The Safety Assist rating encourages intelligent speed assist (ISA) systems that “know” the speed limit and inform the driver of speeding. Systems that also limit the vehicle speed are encouraged
- Several models in Europe now have these features



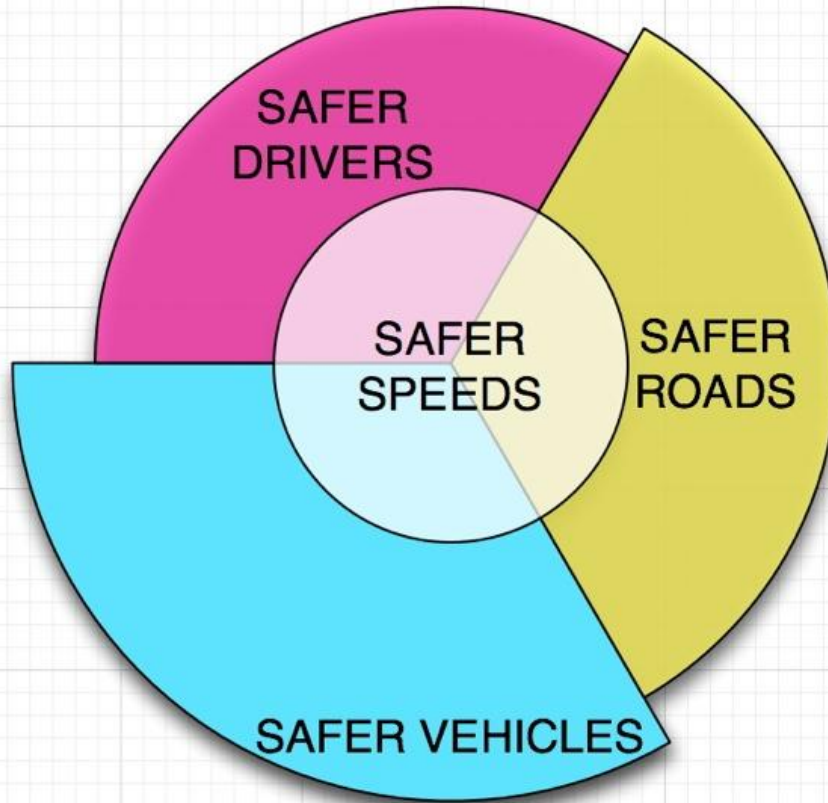
ISA and ANCAP

- ISA has been an optional SAT from 2011
- Monitoring developments in Europe with introduction of more advanced ISA on some cars
- Monitoring the the Australian Intelligent Speed Assist Initiative (AISAI) - setting minimum standards for ISA, preparing an integrated national approach.
- Monitoring the Transport NSW Navsafe initiative for rating ISA functionality in sat-navs and smartphone apps.
- Looking at ways to encourage early uptake



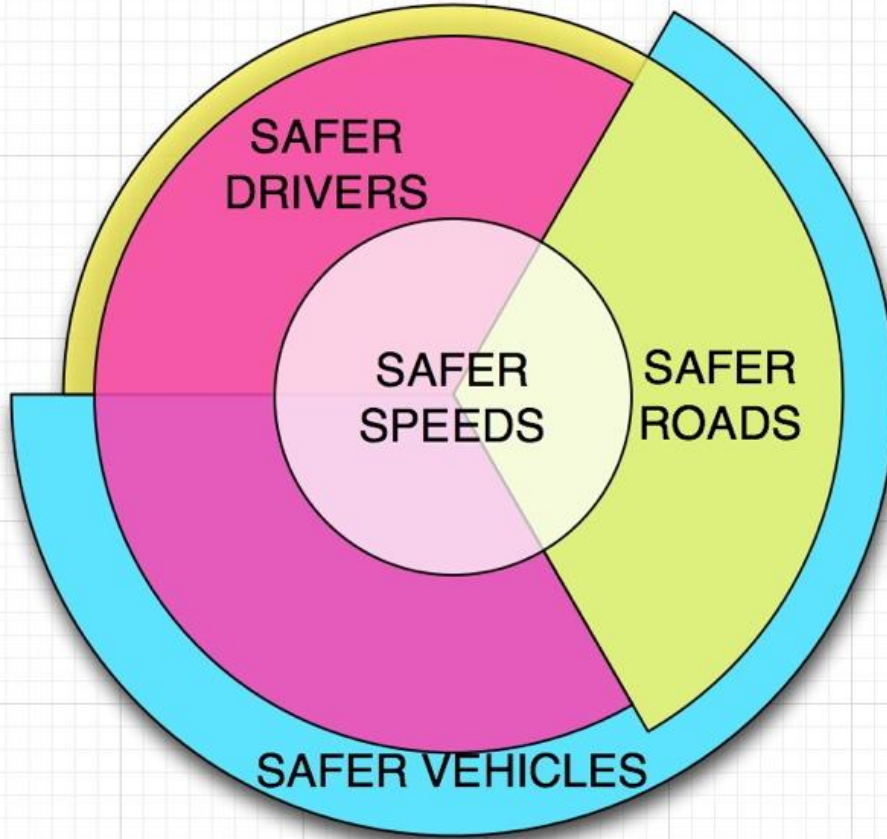
POTENTIAL BENEFITS

SAFE SYSTEMS APPROACH



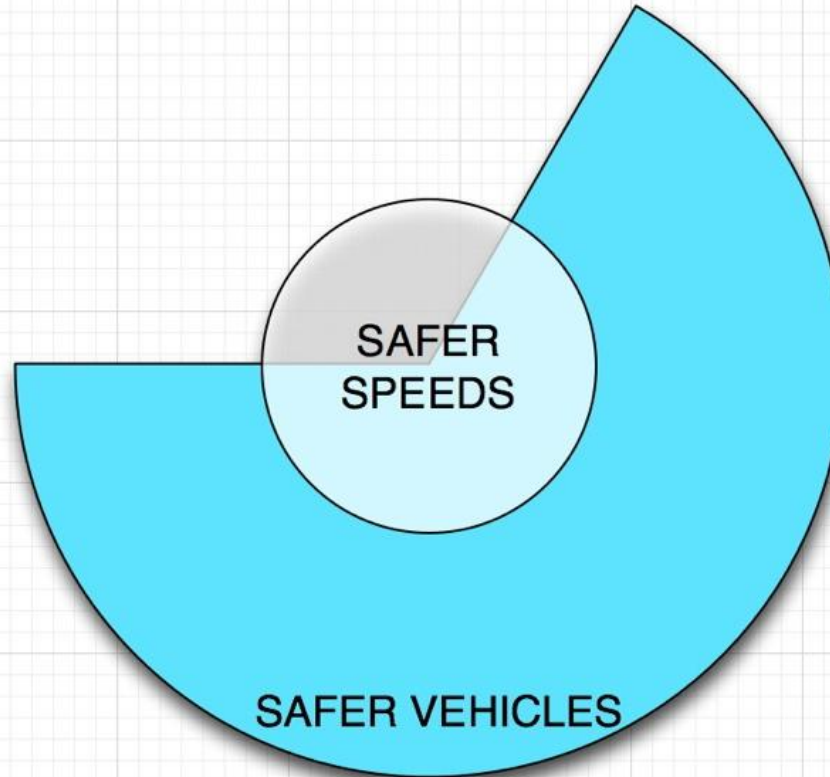
POTENTIAL BENEFITS

CONSIDERABLE OVERLAP



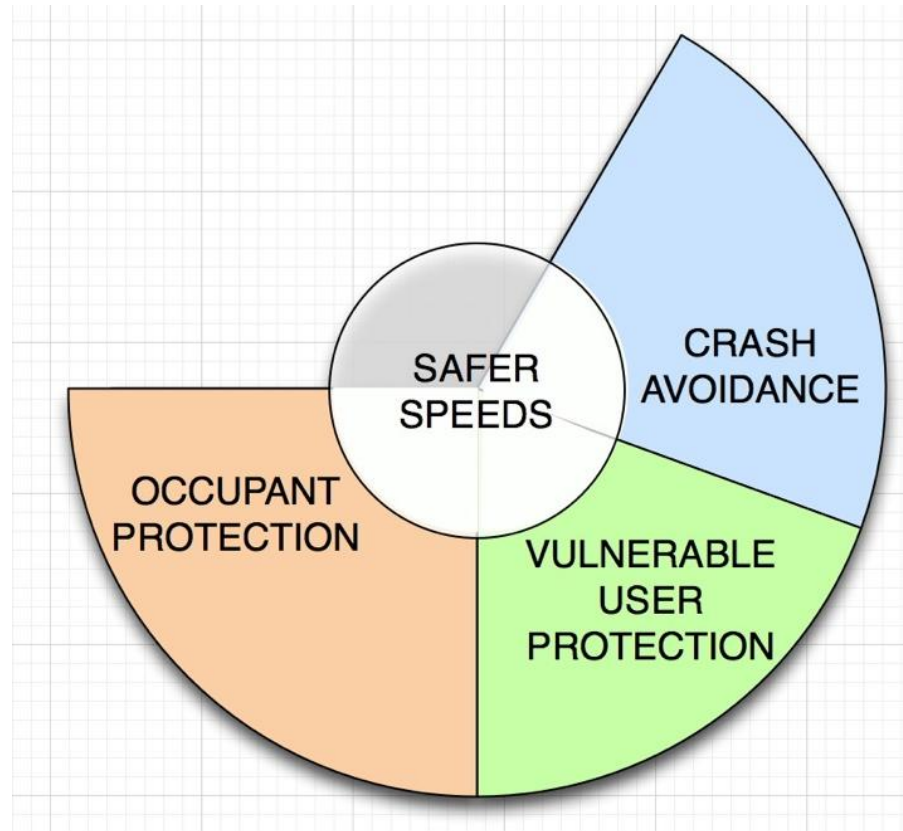
POTENTIAL BENEFITS

SAFER VEHICLES COULD ADDRESS
ABOUT 2/3RDS OF SERIOUS CRASHES

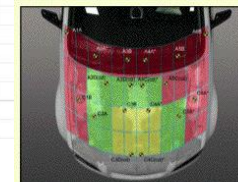
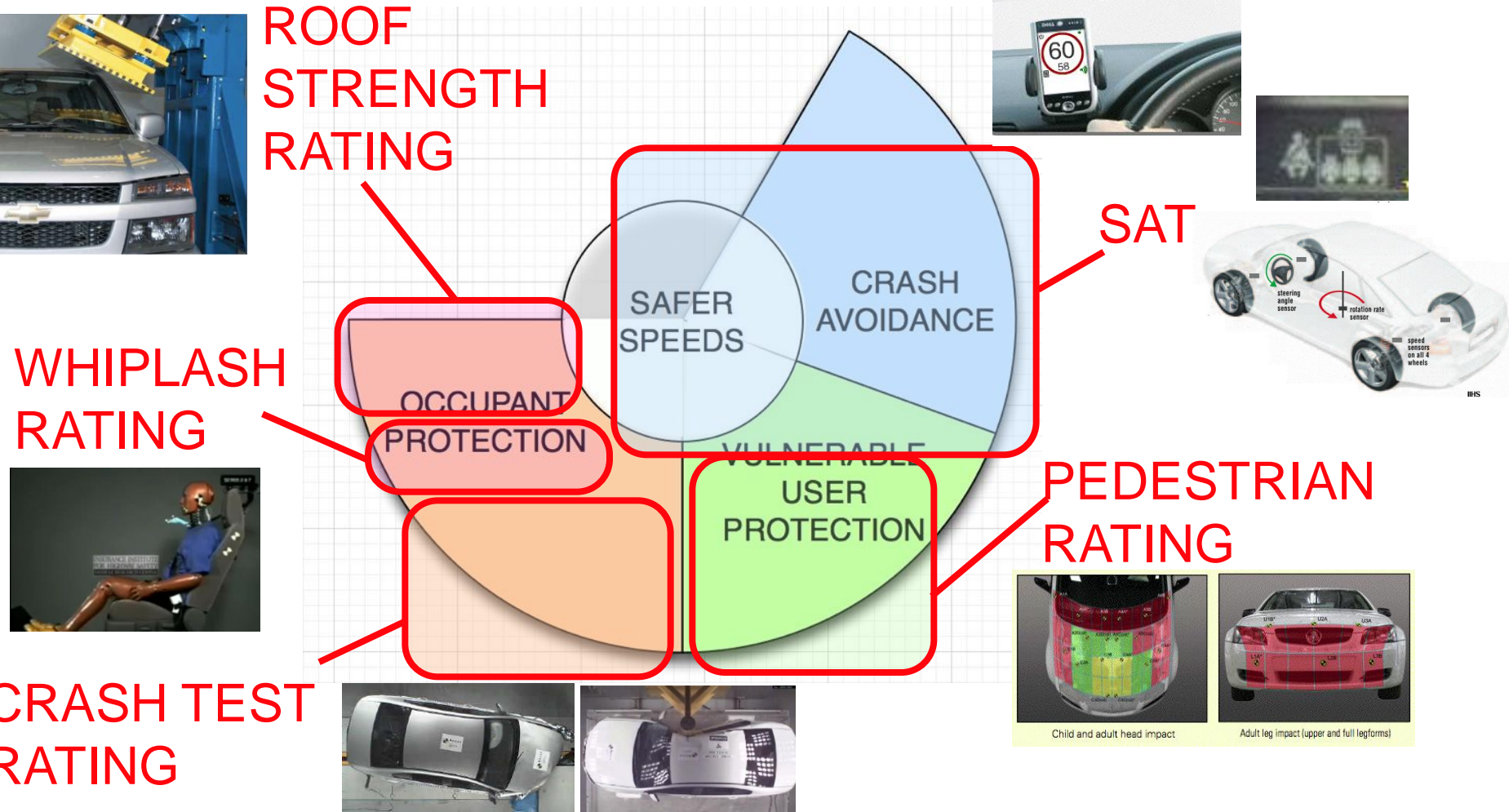
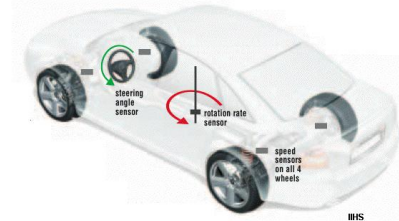


POTENTIAL BENEFITS

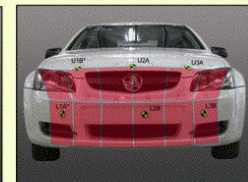
TYPES OF VEHICLE COUNTERMEASURES



COMPONENTS OF THE ANCAP ROAD MAP



Child and adult head impac



Adult leg impact (upper and full legforms)

Conclusions

- Clear reduction in the risk of serious injury to the driver each time that a model improves its ANCAP safety rating.
- In the past few years many models have improved to a 5 star ANCAP rating.
- Based on the popularity of 5-star models a remarkable reduction in serious injury risk can be expected from these newer models.
- Still room for improvement with occupant protection: intelligent restraint systems, adult occupants in rear seats, rollover protection ...
- Several promising new technologies to help avoid crashes



ANCAP

Safety ★★★★★

Accept nothing less.



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**Promoting
Safer Cars**
IN THE UN DECADE
OF ACTION

