

15. Grzebieta R. & Reznitzer G., Tram Interface crashworthiness, ICrash 2000 International Crashworthiness Conference 6-8 September 2000, London.
16. Short A., Grzebieta R.H., Reznitzer G., and Arndt N., Bicyclist with Pedestrian Impacts, Proceedings 5th Int. Crashworthiness Conf. ICRASH2006, Bolton Institute U.K., Athens, Greece, July 2006.
17. Corben B, Senserrick T, Cameron M & Reznitzer G; Development Of The Visionary Research Model - Application To The Car/Pedestrian Conflict. Monash University Accident Research Centre Report No. 229, December 2004.
18. Anderson, J., et al., "Influence of Passengers During Coach Rollover," Cranfield Impact Centre Ltd., ESV Proceedings, Nagoya, Japan, Paper No. 216, 2003.

Making a Safer Systems Approach to Road Safety Work

"Damned if we don't" – Exciting Times, 2009 and Beyond

By Paul Hillier, ARRB Group

This article comments on two seminars on road safety held in Sydney shortly before Christmas, before putting forward for broad discussion some of the key messages from a number of recent road safety related documents and journals.

Introduction

In the lead up to Christmas I attended two events hosted by the Sydney Chapter of ACRS. The first was an insightful presentation by Jeanne Breen from the UK providing a commentary on progress with Vision Zero in Sweden, as well as road safety capability review techniques being used by the World Bank in rapidly developing and mechanising countries. A healthy and interesting debate ensued regarding some of the contemporaneous issues in Australia and how best we might overcome them.

This session was complemented a few weeks later by presentations from Dr Soames Job of RTA and Professor Raphael Grzebieta of University of NSW. Information was imparted regarding recent achievements in reducing the road toll and in securing positive road safety outcomes. The presenters provided their personal insights into the opportunities and challenges ahead in making further gains. Again, the need to keep moving forwards, through the implementation of a Safer Systems approach, came across as a common message.

This will require coordination and interaction on a multi-disciplinary and multi-agency basis - a considerable challenge of course, but the presenters hoped that major break-throughs would be made in 2009 and beyond. These are exciting times for road safety professionals, with a realistic chance to aspire to, and achieve, much more than consolidation of past gains.

The recent *Towards Zero: Ambitious Road Safety Targets and the Safe System Approach*, published by the OECD's International Transport Forum provides positive and practical guidance on the implementation of a Safe Systems approach

and meeting ambitious, stretch targets, such that as a profession we have moved from an historical 'no win' position of often being "damned if we did something, damned if we didn't" to a position where we have requisite levels of knowledge, skills, tools and experience at hand that will rightly leave us 'damned if we don't' act together to implement Safe Systems.

Shortly ahead of completing this article, I received the inaugural issue of *Vision Zero International* technical journal, which provides an amazing Aladdin's cave of information regarding latest actual, and likely and possible future, developments in vehicle technology and in-vehicle safety systems. The potential of these technologies to spearhead future reductions in the road toll is obvious and vast. However, an over-reliance on the features, such that progress in other areas slowed or was curtailed, would be unfortunate and ultimately misguided. The potential for a raft of measures to co-exist and complement each other must surely be even greater.

How do you Assess an Organisation's Capability in Road Safety ?

The presentation given by Jeanne Breen, an internationally renowned Road Safety Consultant, based in the UK, provided her personal thoughts as a review team member on a high-level review of road safety management in Sweden in 2007. It was shown how an established World Bank assessment framework was used in the undertaking of the review. The main finding was that Sweden's road safety management capability and associated systems were at a highly advanced phase of development when benchmarked internationally.

However, it was also recognised that even the Swedes require a degree of institutional strengthening to support the crusade towards Vision Zero, not least the strengthening of the lead agency role, the setting of further interim targets, and further key stakeholder co-ordination and co-working to keep momentum going.

The Swedish Road Administration's commitment to the review actually taking place was also noted and encouraging, helping to emphasise the importance of not resting on one's laurels as an organisation or group of stakeholders, regularly appraising progress and conducting fine tuning. The World Bank assessment framework was explained as a highly effective tool that has worked well throughout the world, and ultimately pinpoints and encourages development areas towards rapid growth in the delivery of effective and accountable Vision Zero activity. It was explained how developing countries are able to make useful short term gains through adopting national and international best practice, but more sustainable gains can only come from a shift towards protective systems and safer vehicle fleets and compliant travel behaviours.

An RTA Perspective on Implementing and Encouraging a Safer Systems Approach

The presentation given by Dr Soames Job was of particular interest to me as a resident of NSW and a driver of around 40,000km a year on the state's roads. I took away the following key points, concepts and challenges from the presentation:

- It is important to look back at what has been achieved, but also to consider and plan for future challenges;
- Partnering with key stakeholders and external agencies will be crucial to a true Safe Systems approach. This stimulated me to think of the successes of the Highways Agency in the UK and more locally, Queensland Department of Main Roads (to name just two), in becoming active mentors to, and partners with, local road agencies. Notwithstanding past and current levels of interaction, I consider that this is perhaps an area that the RTA could elevate to being a major component of the implementation of a Safe Systems approach in NSW;
- Recent developments within the RTA have elevated Road Safety awareness. There is now road safety representation on the organisation's Executive, driving the function's mainstreaming. The establishment of the Centre for Road Safety, around a Safer Roads, Safer Vehicles, Safer Drivers model, also seems to have stimulated positive results (more later);
- Whilst the treatment of 'blackspots' has been extremely important in NSW, there is an emerging change of approach, with the focus being on crash analysis in identifying and addressing routes where the most severe crashes are occurring, ie. the highest risk routes;
- A co-ordinated, multi-disciplinary approach will continue to be crucial, eg. engineering, behavioural and enforcement issues all being addressed, but in a joined up way;
- The RTA continues to invest in the analysis and research of key and emerging issues. A recent initiative is looking at crashes taking place at curves to determine whether common characteristics can be identified for the curves where fatal and serious incidents occur, such that mitigation measures can be developed;

- There will be significant expectation regarding 'Safer Vehicles', with pedestrian protection and rollover crash worthiness being examples of potential significant gains. In addition, it was reported that the NSW state government had recently introduced a co-ordinated fleet policy. It was hoped that this would show a 'lead' to other organisations as well as ensuring that a number of vehicles with high levels of safety features would subsequently find their way onto the second hand car market. In addition, the RTA is considering its stance on vehicle modifications, further legislating against modifications that have an adverse effect upon a vehicle's handling;
- 'Safer People' will also be a key focus of the Centre for Road Safety. Significant past successes, such as the 'pinkie' campaign against speeding, will encourage further anti-speed campaigns aiming to socially alienate and de-glorify speeding. In fact, it is recognised that a broader reduction of speed across the network will play a major role. Over-represented groups in crash statistics, such as young drivers, will continue to receive co-ordinated attention, with deliberate attempts being made to reduce the number of in-car distractions faced by drivers within this demographic.

A Learned Perspective on Developments in Road Infrastructure and Vehicle Engineering Professor Grzebieta's presentation focused on infrastructure and vehicle engineering issues, with the following key points catching my eye:

- There has been a period of impressive successes, but the profession must keep striving for positive road safety outcomes. The importance of road agencies working together was reinforced, with universal support being given the support of strong initiatives;
- Understanding and acceptance need to grow that the Safe Systems principle is fundamentally about recognising that humans do not have a high tolerance to physical force, and accordingly devising and implementing active and passive systems to protect occupants of vehicles travelling at survivable speeds. Reducing the speed of impacts is all important. We must do all we can in educating and encouraging engineers and designers to do all they can to consider errant vehicles and above all, prevent them from striking unguarded structures / infrastructure;
- Engineering features such as clear zones and wire rope safety fence (WRSF) have given excellent road safety outcomes (eg. Professor Grzebieta stated that the introduction of WRSF in the Melbourne area had reduced trauma by some 90%). However, there is a need to consider and where necessary, challenge, historical provision and to assess whether the science behind, and pertinent codified standards originally derived for, a particular item remain applicable and robust. Standard design criteria developed for items such as crash barriers have historically been very useful and have provided a level of confidence in provision, but we must now go further to

learn more about what happens in real life incidents with as much certainty as we can muster through active research and incident investigation, ideally at the scene of incidents. Similarly, we need to always recognise that it is possible to place some engineering features incorrectly or at an inappropriate location or situation, with a negative outcome being possible, despite the best of intent;

- Contemporaneous engineering issues such as roadside trees / poles and road edge drop off, still require further consideration and practical solutions through a combined agency approach. Similarly, further work towards ‘self explaining roads’ will derive nothing but positive benefits;
- Vehicle engineering issues were also discussed, with the need for Australian Design Rules to more appropriately consider high risk, real life scenarios, such as vehicle roll-overs and resultant outcomes such as the ejection of occupants. Vehicle compatibility (and vehicle aggressivity) will remain key issues, and it was stressed that more can be done in improving the survivability of side impacts and indeed, pedestrian impacts;
- The case for intelligent safety systems on vehicles, such as ABS, ESC, traction control etc is compelling. Intelligent Speed Adaptation (ISA) looms large on the horizon as a potential colossus in preventing road trauma, and it is certain that more will become known regarding this interesting technical area during the year, not least at the first national conference on ISA being hosted by RTA in Sydney in November, 2009.

I left the ACRS seminar encouraged and heartened by the fact that the profession still had ‘shots to fire’ in further reducing the road toll, and that notwithstanding the challenges faced, all within the profession have an opportunity to make a positive personal contribution and encourage others to do the same....an inspiring message to take into 2009 and beyond !

The Christmas Road Toll Provides Further Encouragement

Whilst it is of course true that every incident on our roads is a negative occurrence, sometimes with associated trauma, pain and suffering, the reductions in the 2008 Christmas road toll should serve as further encouragement that as a profession we are improving in a number of key areas and getting better at selling our road safety message. The apparent hardening of public attitudes toward those involved in street racing is a good example of the latter. However, it is similarly true that with success comes a need for further and on-going improvement and success, and often the law of diminishing returns can come into play.

As the Christmas period came to a close, followed by a return to work, further interesting reading material came into my possession.

Towards Zero – Ambitious Road Safety Targets and the Safe Systems Approach

The author considers this OECD resource, developed under the leadership of Australian, Eric Howard, to be a most excellent and comprehensive document, providing practical and sensible guidance on some of the aspects of the Safe Systems approach that perhaps had been difficult to comprehend given traditional approaches or had been previously without guidance. The document is a credit to the working party involved, which includes a number from our profession in Australia.

I focus within this article on guidance within the OECD publication in the following four areas, given the contemporaneous professional issues we face within Australia in 2009 and beyond:

- Aspirational goals versus SMART targets – I am sure that many have been brought up on a diet of SMART targets and key performance indicators, and therefore may have found the concept of a long term aspirational goal (ie. Vision Zero) took a little time to sink in and truly appreciate. The main issue I have grappled with is how to encourage and ensure genuine accountability under Vision Zero. However, the OECD document comes to the rescue here, explaining the concept of setting and achieving ambitious (stretch) targets over a defined interim period that contribute towards the longer-term aspirational goal. This subtle difference ensures that all ‘keep their eye on the ball’ over time and that there are no easy excuses for failing to contribute to a wider goal;
- It is encouraging that the continued importance of ‘understanding crashes and other risks’ is formally recognised as one of the key components of the Safe Systems approach. For a number of years now, I have advocated an approach whereby the in-depth investigation of crashes allows patterns and trends to be identified, such that the lessons learnt from such incidents can help practitioners devise control and mitigation strategies, policies and practical measures. In short, as we all recognise, prevention is much better than cure.

A particular area that I believe needs more attention is in the investigation of incidents involving commercial vehicles, and actively working with commercial fleet operators so that they can learn from unfortunate occurrences to keep their personnel and vehicles on the road, in safety. I have recently corroborated the need for further work in this area with an engineer based in Melbourne working within a major international insurance company, who expressed that even the most pro-active fleet operators often lack the training and skill set required to conduct thorough internal investigations, identify residual risks and put in place effective mitigation strategies;

- Identifying the range of key stakeholders in successfully implementing a Safe Systems approach – this is covered comprehensively on page 115 of the OECD document so it is not intended to repeat the material here, apart to provide a summary that the key stakeholders are “....all

actors that professionally influence the design and functionality of the road transport system". The traditional road safety playing field is widened to include new target groups, and a silo mentality frowned upon, such that the power of a "we are all in this fight together" approach can be harnessed ("there is power in a union" a songwriter once wrote !). A truly positive interaction between government departments and national, state/regional and local road agencies is to be encouraged and I believe that this should involve active dialogue and workshopping on the challenge of achieving a Safe System together during the course of 2009 and beyond;

- The need for vision and innovation (as well as learning from the 'tried and trusted') – the document identifies the importance of having a vision ("It is not necessary to specify all the actions required to implement a Safe System approach, but it is necessary to reach a common understanding of what is to be achieved") and in that way recommends that a long term vision (likely to be over decades) with a very high level of ambition will transform and enliven policy and ultimately change community's view of the inevitability of road trauma.

Whilst it is recognised that 'tried and tested' strategies and practices will work well for some and can be replicated, a degree of imagination and forward thinking is also essential (especially within the most developed countries where large road safety gains are proving hard to maintain). This concept is articulated within the OECD document, which states "...that achievement will require interventions that are some steps removed from prevailing best practice and will require the development of altogether new, more effective interventions" and that "Part of its value lies in driving innovation".

This is some comfort to me, given that I gave a paper encouraging innovation in road engineering at the ARRB Conference in Adelaide in August 2008, within which I challenged the audience to consider the industry's aversion to risk and reliance on following national codified standards to the letter, regardless of the environment and conditions faced locally. I believe that areas where low technology solutions are desperately needed should ideally lead the race, eg. the quest for low cost engineering measures such as barriers made from recycled materials and/or engineering features to drag or trap vehicles safely to help mitigate the perennial problem of single vehicle run off roads on rural areas. I also believe that many of today's safety issues may only be truly addressed when practitioners adopt and evaluate innovative measures and solutions and find things that are fit for purpose and resource tolerant, yet work effectively.

A challenge, yes, and I think that we will need to be a lot braver than we are now in communicating our failures as well as our successes (which incidentally was an approach adopted by the Institution of Civil Engineers in UK recently, who issued

an entire journal on the topic of actively 'learning from failures' in structures). Similarly, I am also keen to promote that codified standards will only move 'forwards', reflecting change and sharing and promoting innovative solutions if practitioners put forward success stories for consideration, inclusion and ultimately, wider adoption. There is simply no point, or efficiency, in a large number of road agencies effectively re-inventing the wheel.

End of Year Road Toll Statistics - Yet Further Encouragement

The 'end of year' road toll statistics were also long awaited and were again positive, with (at the time of writing) the states of NSW (where a landmark target of less than 400 fatalities was achieved), Victoria and South Australia all having returned their lowest annual road tolls in decades, and other states and territories returning healthy reductions.

As with the Christmas road toll earlier, I believe that the 'end of year' results are a tonic and testimony to, the immense efforts throughout the year of a large number of road safety professionals and enforcement personnel around the country. It is hoped that such encouragement will also strengthen resolve to keep going and work even harder at achieving further reductions in our road toll - the profession has an underlying pride and integrity that nothing less would do [if any proof of this valuable trait is needed the author encourages all to remember the common air of frustration in the profession at the plateauing (rather than reduction) of fatalities on our roads in the years preceding 2008]. Indeed, I thought it was very noticeable that all of the announcements of record low state road tolls for 2008 were also accompanied by commentary on issues to be addressed and mitigating measures that will be introduced during 2009, ie. "there's more to do and it starts now".

Vision Zero gets its own Technical Journal !

I speculate that if anyone had predicted a few years ago that the Vision Zero concept would have its own technical journal publication, then their sanity might have been questioned. However, a technical journal it now has, with the arrival of the launch issue of Vision Zero International in January 2009, and what an interesting and informative read. 'Well done' to all concerned (nb. the author has no alignment to, or involvement with, the publication).

The first issue, entitled "Safe At Any Speed" provides an amazing Aladdin's cave of information regarding latest actual, and likely and possible future, developments in vehicle technology and in-vehicle safety systems (albeit with a host of acronyms, both current and emerging, to come to terms with and remember !....ESC, WHIPS, CAMP, HANS, ABS, ISA, ASR, IVBSS, DSS and ADAS to name but a few).

I encourage all to take the time to read through the current publication themselves, but was particularly taken by the following specific items:

- Volvo's City Safety initiative based on providing in-vehicle safety systems with the potential to be particularly effective in urban environments and driving conditions, but which have a functionality that is fully accepted by all drivers (pages 20-26);
- The need to ensure that drivers still receive feedback from their vehicle's systems to ensure that an influx of safety technology does not lead to drivers taking appreciably more risks (John Miles, pages 46-49);
- The emergence of a raft of technologies aimed at improving a driver's visibility and detection of emerging obstacles, particularly in the hours of darkness;
- Improvements in in-vehicle safety technology impart a challenge to tyre technologists to develop tyres that are "in sync" with those technologies to ensure that safety benefits are optimised. Two of the immediate responses have been: to work towards 'intelligent tyres' that collect and relay information about the level of friction between the tyre and road surface; and to develop in-road scanners capable of measuring tyre profiles and tread depths at traffic speeds at high risk locations to learn more about in-service levels of tread depth. Additionally, Tyre Pressure Monitoring Systems (TPMSs) are likely to become a feature in all vehicles in the future;
- The on-going development of ADAS (Advanced Driver Assistance Systems), using digital maps in real time to provide key early warning indicators to the driver of his/her inability to operate safely, due to known road environment features/characteristics, emerging hazards, or detected adverse driver behaviour (pages 107-109);
- The importance of more actively using data from in-vehicle 'black boxes' (Event Data Recorders or EDRs) in the investigation and reconstruction of crashes (pages 91-93). This development is pleasing, as I, and colleagues at ARRB, have been alerting road safety professionals of this emerging technology for a while now, and further coverage of this issue is healthy; and
- The emergence of an International Standard on Traffic Safety, which has met with a glowing endorsement: "...I am also really happy with the new ISO 39001 management standard for traffic safety, for those organisations that wish to eliminate health losses as a result of traffic accidents. This is a milestone in the history of traffic safety" (Claes Tingvall, page 9).

Perhaps the key feature of the publication is that the potential of the in-vehicle technologies to spearhead future reductions in the road toll is obviously vast, but I (and indeed the publication itself) would urge a degree of caution; in that over-

reliance on in-vehicle features alone, such that progress in other technical areas was postponed or even halted, would be unfortunate. The potential for a raft of positive measures to complement each other across the three headlines of Safer Roads, Safer People and Safer Vehicles must surely be even greater. Indeed, the following robust quote struck me as being particularly interesting on this aspect: "If you just throw technology at it [the road safety problem], you may come up with the wrong answer because technology alone isn't going to do it" (Sue Cischke of the Ford Motor Company emphasising that there is more to the challenge than simply providing advance vehicle technology, page 33).

Closing Remarks

I would like to close by simply offering the following 'call to arms' by the Rt Hon Lord Robertson, Chairman of the Commission for Global Road Safety:

".....The Safe Systems approach can and should guide the policies of any and every country.....we want to see a decade of sustained global action taking place between the years 2010-2020 to implement these solutions.....

.....We have an opportunity to make a breakthrough on road safety. We must take it"

Here's to a further landmark year in 2009!

Author Profile

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