

New Zealand and the Safe System Journey
“Safe System - Driving Delivery: a professional challenge”

IPENZ Conference
 DUNEDIN,
 April 16, 2013

Eric Howard,
 WHITING MOYNE

Some Context: A Global development priority

Improving global road safety* - linked with:

- broader vision of sustainable development
- priorities addressing poverty reduction and
- achievement of Millennium Development Goals.

Reflects shift in concept of country development

from:

- narrow focus on income and spending

to:

- inclusion of education and health, and social, cultural and political participation.

* Bliss, 2013

Global development priority (cont'd)

- In low and middle-income countries the sheer scale of health losses from road crashes makes road safety a development priority.
- Of particular concern is that road deaths and injuries are a growing crisis for young people; especially young men.

Bliss, 2013

Global development priority (cont'd)

- Global Burden of Disease findings* for 2010 indicate that for the global population road deaths were the **8th leading cause of death**
- For the age groups 10 - 14 years, 15 – 29 years, 20 – 24 years and 25 – 29 years; road deaths are **1st or 2nd leading cause of death**
- Without sustained new initiatives, more than 75 million deaths* and 750 million serious injuries could be anticipated with some certainty over the first 50 years of the 21st century.

* Bliss, 2013

Safe System - Driving Delivery: a professional challenge
Safe system and New Zealand

- New Zealand adopted innovative *Safer Journeys* road safety strategy in 2010
- Established *safe system* approach as basis for improved road safety performance. *Safer Journeys* Action Plan 2 recently published.
- Need to building understanding of what a *safe system* actually means and what is required to achieve it: Substantial challenge for all road safety and road transport professionals.
- All have a special responsibility to develop these insights and to grow our understanding.

Safe System - Driving Delivery: a professional challenge

- In what ways is our current road network unsafe?
- What is safe system about?
- What is NZ doing?
- What should NZ transport professionals be doing to contribute - going forward?

Safe System - Driving Delivery: a professional challenge
In what ways is our current road network unsafe?
 Some comparative examples



Safe System - Driving Delivery: a professional challenge

In what ways is our current road network unsafe?

- Safety usually squeezed out by economic interest, reaction to inconvenience and lack of awareness
- Impacts often fall disproportionately on more vulnerable - young, old, marginalised

Safe System - Driving Delivery: a professional challenge

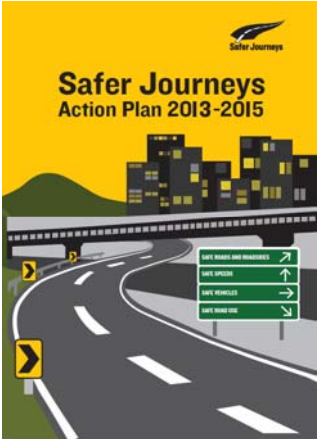
What is safe system about ?

- A philosophical shift in mindset is called for - to understand safe system – it is not a tweaking of the 3 E's!!
- It provides the opportunity for substantial innovation


Safe System
 Basis for *Safer Journeys* Strategy and Action Plans



Safe System: What is it about?

Safe System: What is it about?



Directions

- By 2020 – demonstrable progress in NZ in creating a safe road system
- By 2016 – Safe System Approach to be accepted and followed as approach for improving road safety.
- Shift in public understanding, perception of, and demand for road safety is needed.

Safe system: What is it about?

When road users cannot be killed or seriously injured on the network

- Human life and health are paramount
- Individuals have a right to survive
- People make mistakes: Crashes always likely to happen, even with continuing focus on prevention
- People are vulnerable: Seek to manage forces in injury crashes to levels human body can tolerate: (ie., minimising severity of injury in crashes) - to survivable levels

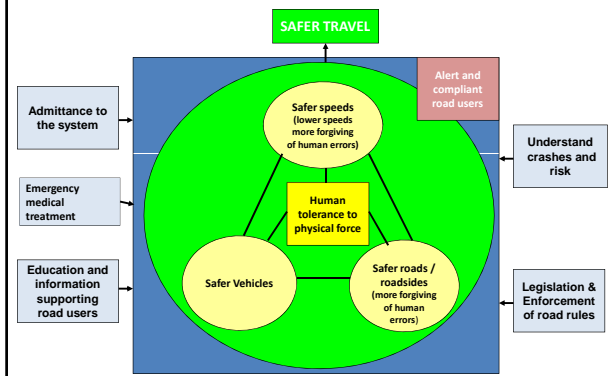
Safe system: What is it about?

When road users cannot be killed or seriously injured on the network

- Forgiving road network: reducing the prospect of human error leading to death and serious injury.
- A shift from **blaming the road user** - to a **shared responsibility** by all contributors to/ designers of the system

Road users should not die because of system failings.

Safe System



Safe system: What is it about?

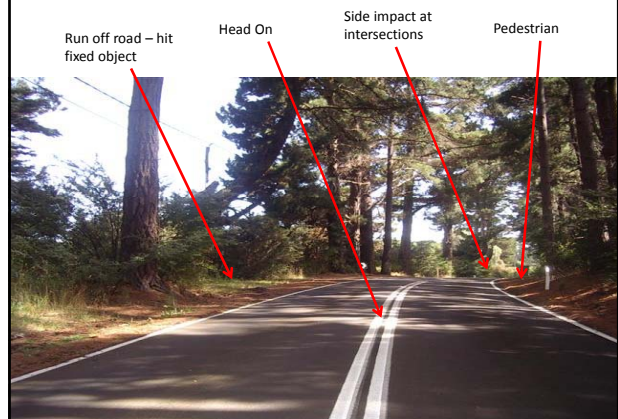
Safe System – a framework for long term elimination of serious casualties.

- Achieving understanding – by professionals, decision makers, has been steady but slow to date
- Need to engage the decision makers and expose them to the logic, the research, the evidence which this approach is built upon
- Assist their recognition that there are many 'levers' for action available across all elements of the road transport system
- Transportation, Engineering, Land Use professions, including decision makers, slow to recognise that as **system designers**, have responsibility:
 - to understand what fundamental safety on road network is
 - to work progressively to deliver it through, for example:
 - Revisiting road investment principles
 - Innovative existing road retrofits
 - Conduct of speed limit reviews
 - Require land use planning impacts on network safety to be addressed

Safe system: What is it about?

- Acknowledge prevalence of human error leading to casualty crashes
 - CASR research into casualty crashes in rural SA:
 - >50% fatal crashes and > 80% serious injury crashes did not involve illegal behaviour
- Need to recognise substantial role that accepted travel speeds played in crashes:
 - Quality of infrastructure vs. travel speed that is safe – two sides of one coin in overall safety
- Understand interactions between safe system elements in a crash and the **four** major crash types

Major fatal and serious injury crash types



Safe System

Recognise the accepted practices/ ways of operating in the community that make the current system unsafe.

Have relied on 'perfect behaviours' by a driver/ rider; but

- Acknowledge that some drivers will have alcohol in their system (below legal limits) when driving
- Recognise existence of driver fatigue
- Note permissive attitude to speeding
- Recognise that society has traditionally placed convenience above safety in travel

Conditioning by environment;

- eg. growing up in rural areas in decades past, loss of life on the road was part of price for necessary mobility!

Safe System

Recognise the current practices/ ways of operating by authorities that make the current system unsafe.

- Inadequate graduation of novice driver exposure to risk as they gain experience
- Permitting too low a licensing age
- Permitting imports of new vehicles - less than 4 star ANCAP rated
- Permitting land use development without considering (and offsetting) negative impacts on safety on adjacent network
- Permitting inappropriate travel speeds for safety characteristics of length of road and roadside (head on crash risk, intersection crash risk, pedestrian crash risk, run off road crash risk)

Safe System: what is it about?

Shared responsibility and system providers / designers

- Changed view of responsibilities away from a "blame the road user" emphasis
- Understand key factors involved in crash causation and outcome severity.

System managers/ designers: Roles include:

- Providing roads/ deciding investment priorities
- Providing vehicles
- Setting speed limits
- Making road rules and road laws
- Deciding land use planning outcomes (flows and access)
- Using network

Safe System

Shared responsibility and system providers / designers (2)

System managers/ designers: Further roles include:

- Entering contracts for supply of transport services
- Enforcing compliance with road rules
- Employing drivers to use the road network in their work
- Operating emergency health system
- Providing injury insurance coverage
- Taking bureaucratic and political decisions
- Operating professional bodies which set expectations
- Operating motoring clubs/ industry associations/ other stakeholder groups which do (or do not) advocate and lobby for improved safety

Safe System

Reworking the system to make crashes survivable

- Completely new design philosophy (new and retrofit) for roads/ streets
- Speed limits related to biomechanics and road crashworthiness
- Integrated model for safe traffic
 - ✓ Safety of Infrastructure
 - ✓ Travel Speeds
 - ✓ Behaviours
 - ✓ Vehicle safety and
 - ✓ Interactions between above

Safe System

Reworking the system to make crashes survivable

Safer Infrastructure

- Build on national road network wide crash risk assessment (Kiwi Rap outcomes -NZTA/ AA)
- Not all roads are the same, not all roads have same level of crash risk
- Extend analysis to local government



Safe System

Reworking the system to make crashes survivable

Safe travel speeds

- Sensitive issue – appropriate travel speed for inherent safety of infrastructure
- Understand there are concerns about fairness around enforcement approaches
- Leave aside compliance issues for a moment, & focus on why crash risk is so sensitive to travel speed: ie., what is an appropriate travel speed for a section of road?

Safe System : What is it?

Safe System – Crash types and indicative fatality risk at speeds: (from P. Wramborg, 2005)

Safe travel speeds

Safe System: What is it?

Reworking the system to make crashes survivable

Safe system: safe travel speed principles

- Vulnerable road users not exposed to vehicles at speeds exceeding 30 km/h. Separate or reduce speeds to 30 km/h in higher pedestrian activity areas and 40 km/h in urban areas
- Car occupants not exposed to other vehicles travelling at speeds exceeding 50 km/h at intersections.
- Car occupants not exposed to oncoming traffic at speeds exceeding 70 km/h
- Car occupants not exposed to road side at speeds exceeding 50 km/h if road side contains trees or other narrow objects

Safe System: What is it?

Reworking the system to make crashes survivable

Interaction between safe system elements: key example: **Infrastructure safety quality/ and travel speed**

- A “safe” travel speed depends on the infrastructure safety standard and the context.

Safe System

Safe travel speeds

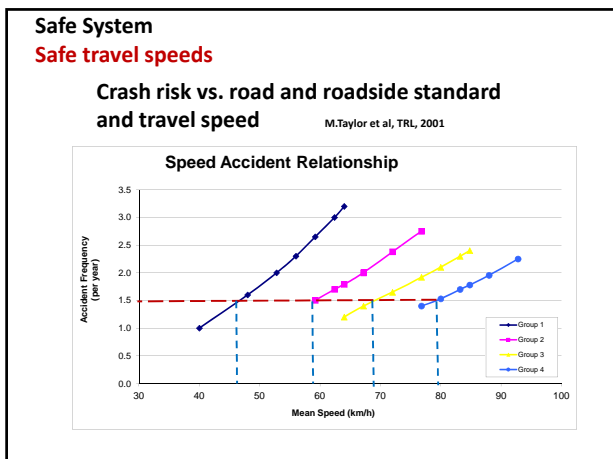
Crash risk due to various infrastructure standard levels and travel speeds M.Taylor et al, TRL, 2001

Crash risks and travel speed: insights for speed limit setting

Crash risk drawn from (a) road and roadside standard and (b) travel speed (Taylor et al, 2001)

Four groupings of road sections described as follows:

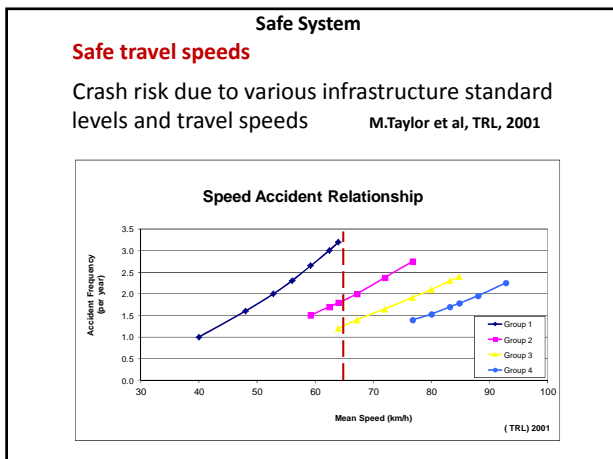
- **Group 1:** very hilly, high bend density, low traffic speed. **These are low quality roads.**
- **Group 2:** high access density, above average bend density, below average traffic speed. **These are lower than average quality roads.**
- **Group 3:** high junction density, below average bend density and hilliness, above average traffic speed. **These are higher than average quality roads.**
- **Group 4:** low density of bends, junctions and accesses and a high traffic speed. **These are high quality roads.**



Crash risks and travel speed: insights for speed limit setting
Crash risk drawn from (a) road and roadside standard and (b) travel speed
 (Taylor et al, 2001)

- Summary of results

- Accident frequency increased rapidly with mean speed – 10% increase in mean speed = 26% increase in injury accidents.
- Accident frequency varied between the four "Road Quality" Groups. Highest on Group 1 roads, about half, a third and a quarter on roads in Groups 2, 3 and 4 respectively.
- Density of sharp bends (those with bend warning sign) and minor crossroads influence frequency of All injury accidents.
- Accidents increased by 13% and 33% respectively for each additional bend or crossroad per kilometre.



Safe System
Safe travel speeds

The crucial role of travel speed management:

Understand the relationship between increases in speed and the increase in crash risk.

Extensive international research confirms that:

- Small changes in mean speeds - result in measurable and significant changes in crash outcomes
- Severe crashes (serious injuries and deaths) are much more sensitive to speed changes than crashes in general

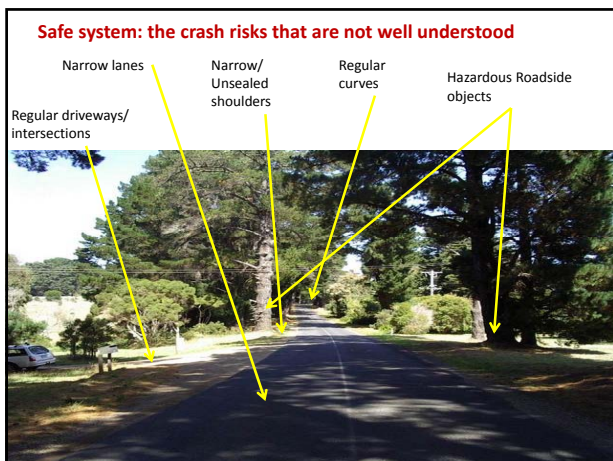
Safe System
Reworking the system to make crashes survivable - Safe travel speeds
Relationship between speed changes and changes in casualty rates (Elvik et al 2004)

Change in mean speed	Speed reduction			Speed increase		
	-10%	-5%	-1%	+1%	+5%	+10%
Change in:						
Deaths	-38%	-21%	-4%	+5%	+25%	+54%
Serious injuries	-27%	-14%	-3%	+3%	+16%	+33%
Other injuries	-15%	-7%	-1%	+2%	+8%	+15%

Speed variation has greater effect upon more severe crashes

Speed Management in Australia and Overseas in the context of the Safe System -
Safe system elements in Australia – a scorecard

SAFE SYSTEM ELEMENT	Good OECD Practice	Aus. Practice	Scope for major improvement in Aust.
Fatality rates per vehicle	Green	Yellow	
Fatality rates per population	Green	Yellow	
Road user compliance: Legislation/deterrence programs	Green	Green	
Learner/ novice driver programs	Green	Green	
Vehicle safety standard	Green	Yellow	*
Safety Technology in vehicles	Green	Yellow	**
Infrastructure safety standard	Green	Red	***
Safe Speed limits	Green	Red	***



Safe System & Speed Management

Maximising mobility consistent with safe travel

- Perceived down side of lower travel speeds is increased travel time (often less in reality than theory)
- Traditional approach – road authorities have striven to *improve safety while maintaining desired mobility*
- New thinking , inherent in the practice of leading road safety jurisdictions (*Towards Zero*, OECD/ITF 2008) is that we need to *maximise mobility consistent with safe travel*
- **This is a fundamental shift in thinking - inherent to a safe system approach**

Reworking the system to make crashes survivable
“managing the interactions between road infrastructure, vehicle systems and travel speeds to reduce risk of crash outcomes which would result in serious injury”

At intersections:

- Roundabouts with advance signage to reduce crash severity
- 50 km/h or lower speed limits to reduce crash likelihood and severity
- Vehicles with head protecting side airbags to improve survivability in side impact crashes
- Advance electronic warning signage/ reduce speed of approach

Safe system: Compliant road user behaviours

Adequate enforcement to reduce:

- speeding
- drink driving
- drug driving
- non wearing of seat belts & helmets
- unlicensed driving

Safe System

Policy issues: Legislation and Enforcement

- Reduce BAC limit to 0.05 for > 25 years
- Review BAC limits for under 25 years
- Extending interlock mandation
- Mobile camera ramping up
- Reduced enforcement tolerance
- Demerit point system
- Safer novice drivers:
- Higher licensing age
- Strengthened graduated licensing system
- Strengthen penalties for offences

Safe System – safer vehicles

Safer Vehicles

- Inform community why vehicle safety matters
- Build consumer demand for safety
- Fleet operator commitment (incl. govt.!)
- Influencing vehicle suppliers
- Targeting inappropriate vehicle advertising
- Mandating safety features for new vehicle registration, eg., ESC; head protecting air bags
- Used car safety ratings
<http://rightcar.govt.nz/used-car-safety-ratings.html>

howsafeisyourcar.com.au

What should NZ be doing? - implementation

Have set a platform (safe system)

- Safer Journeys Action Plan 2
 - Undertake safe system signature projects
 - *project design to include evaluation and communication work streams* – vital for learning from program
 - Establish a safe system partnership program
 - Reframe the road safety conversation
 - Develop and implement a safer speed program
 - Have analysed crash risk on national network
- What are issues and way forward in devising a treatment program?**

What should NZ transport professionals be doing? – re implementation

1. Engage in policy level debates:

- seek improved outcomes for valuation of life,
- review practice of offsetting lives and injuries saved against aggregation of minor time savings to determine net economic benefit.

2. **Benefits** : **Support development of : Costs**

- innovative crash reduction treatments/ related actions and
- business case development to obtain sustainable funding

3. **Support / play a lead role in advocacy activity to the public around safe system;**

- to build awareness of benefits and
- to foster readiness to accept change.

What should NZ transport professionals be doing? – re implementation

High level issues and detail level issues

- EEM:
 - The value of aggregated individual small seconds of time saving vs. value of lives saved / injuries avoided
 - What are the ethics of that approach?
 - Only justification could be that we did not know any better in the past!
- Value of statistical life.
 - Now some NZD 3.7m. Undervalued/ Out of date.
 - Increases resisted previously (would have changed investment priorities). Update, give safe infrastructure a fair shot.

To the industry: high level and detail level issues; decision makers and “soldiers”

- Do you have a comprehensive view of the role of engineering in road safety?
- How well do you understand safe system?
- How do you regard the trade off inherent in the use of BCR's to determine competing road investment priorities – between infra safety improvement on one hand and capacity and amenity improvement on the other (with incidental safety improvement).
- Should all road project options answer the question - what are the road safety benefits of this option compared to others?
- Do you consider the value of life used is too low in NZ (willingness to pay)?
- Do you support an early objective assessment of the value of life?
- The role of ethics in this conversation
- Do you seek to influence what funding is available, how the available pie is allocated to support improved safety outcomes and how the optimum safety benefit can be delivered?
- Do you support adequate monitoring and evaluation, R and D and knowledge transfer to improve safety outcomes?

Safe System - Driving Delivery: a professional challenge

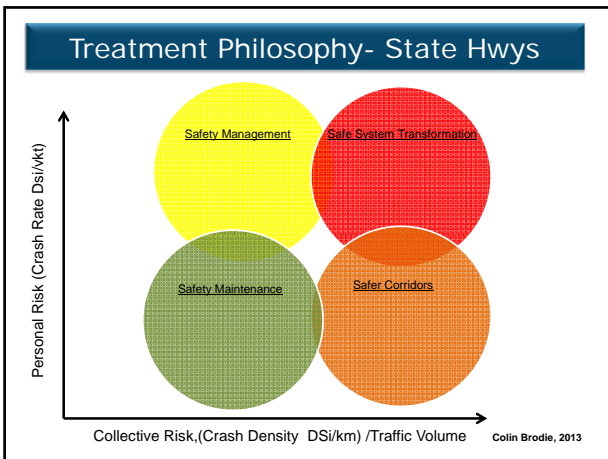
Address the need:

- at a transport policy level:
 - debate within our professional groups about the ethics of economic trade-offs of aggregated minor travel time savings against loss of life/ higher levels of serious injury in proposed projects
 - to at least agree and utilise supportable economic values for the benefits of serious casualty reduction
 - to advocate change from traditional thinking to give appropriate priority to infrastructure safety investment vs. other transport investment
 - work with LG planning authorities to secure ‘safety friendly’ land use planning policies
 - to inform our communities and elected members of the broad aspiration inherent in a safe system approach for NZ network - and its benefits

Safe System - Driving Delivery: a professional challenge

Address the need:

- to understand the safe system approach
- Understand the logic of the proposed approach to infrastructure safety improvement - and get behind it



Safe System - Driving Delivery: a professional challenge

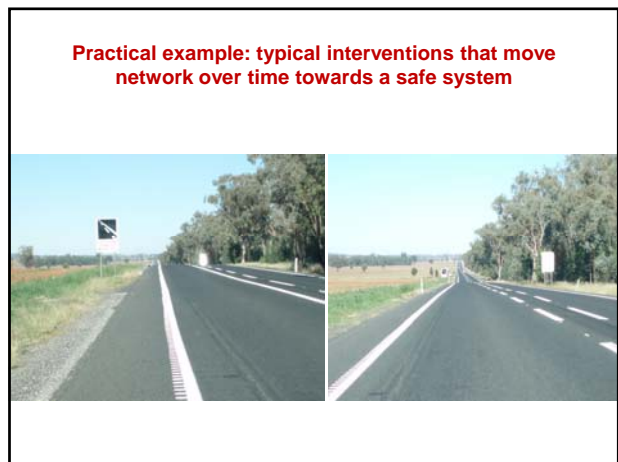
Address the need:

- New Zealand carrying out high quality analysis of road crash risks using safe system as basis.
- Develop high level program logic to estimate scale of required treatments, i.e., to plan to meet funding for High Risk/High Volume through to Low Risk/Low Volume treatment needs over time
- Need to develop and promote this approach as soon as possible now to decision makers in government and to the community

Safe System - Driving Delivery: a professional challenge

Address the need:

- Work with NZTA and LG to pursue co-ordinated/ collaborative effort at a detailed level:
 - develop demonstration projects, drawing on a number of safe system elements,
 - learn how to build bankable business cases for funding for safe system treatments, especially lower cost, which will deliver measurable crash risk reductions
 - plan implementation
 - deliver practical examples of typical interventions that safe system application entails, including a safer speed program



Safe System - Driving Delivery: a professional challenge

Playing a part in supporting measures to deliver reduced crash outcomes and achieve public acceptance of a safe system approach:

Through:

- assisting delivery of innovative broader scale projects (including safer infrastructure, safer speed limits, enhanced enforcement, community education, school based programs and improved emergency management of crash victims).

Supporting government efforts to :

- Encourage investment role by the ACC - will be critical to progressing infrastructure safety programs in the non RONS categories and vehicle safety promotion to the public
- Implement appropriate new policies (including improved legislation, enhanced sustainable funding, mechanisms for ongoing provision of safety information to the public and improved licensing and vehicle registration standards)

Safe System - Driving Delivery: a professional challenge

Increasing public acceptance of this safe system approach:

- countries such as Sweden have successfully demonstrated benefits of safe system approach
- now well understood by their public and government.
- few other countries have achieved this goal to date.
- New Zealand is in position to do so - if transport and road safety professionals have commitment to develop their in-depth knowledge and to pursue innovative, effective implementation and advocacy over next decade.

Implementation

- Need to develop skills, knowledge, expertise in consulting industry to deliver detailed (often customised) innovative lower cost solutions – crucial to faster implementation.
- Think about how you do business in this space!
- Investment strategy: BCR still key (High level and detail level!!!)
 - Mitigates treatment lengths along corridors.
 - Use speed limit reviews to generate greater crash reduction benefits, expand project lengths
- Misnomer of *system thinking* around *safe system*. Safe system has a strong set of innovative fundamental principles, it is not just a systems process approach. (High level)
- Build understanding through demonstration projects - need to build capacity in govt., but especially in consulting industry

Implementation

- Industry pushback? *“Just tell us what to do in detail and we will do it! i.e. give us the manual”*.
 - The “AASHTO followers”
 - Maintenance costs of interventions, eg., barriers
 - Need to learn latest research and think about application of principles.
 - Industry needs to face up to changing its thinking
- Need to challenge industry to shift approach and then devise detailed treatments to win community/ government decision makers support/ funding

Implementation

- Four key safe system elements (plus post crash care) - but safe system implementation doesn't rely on doing something in all four (plus one) elements in every project
- Pick and choose viable element actions, whether one or more

Implementation

- Key role for ACC for
 - safer vehicles information
 - infrastructure safety treatments plus speed limit reviews
- Business case development required to support ACC investment decision making

Safe system implementation

Summing up.

- Collaboration, industry and government working together at national, regional, local levels
- Need to develop skills, knowledge, expertise to deliver detailed/ often customised/ innovative lower cost solutions – crucial to faster implementation, big issue for industry!
- Actively contribute to key policy reviews
- Reflect on the safe system principles and work to inform the community about the safe system purpose and relevance - and the estimated benefits of the projects you wish to implement
- Learn from early steps/ efforts

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THANK YOU

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