

SAFE SYSTEMS: A PRAGMATIC APPROACH TO INTEGRATING ROAD SAFETY AND ASSET MANAGEMENT

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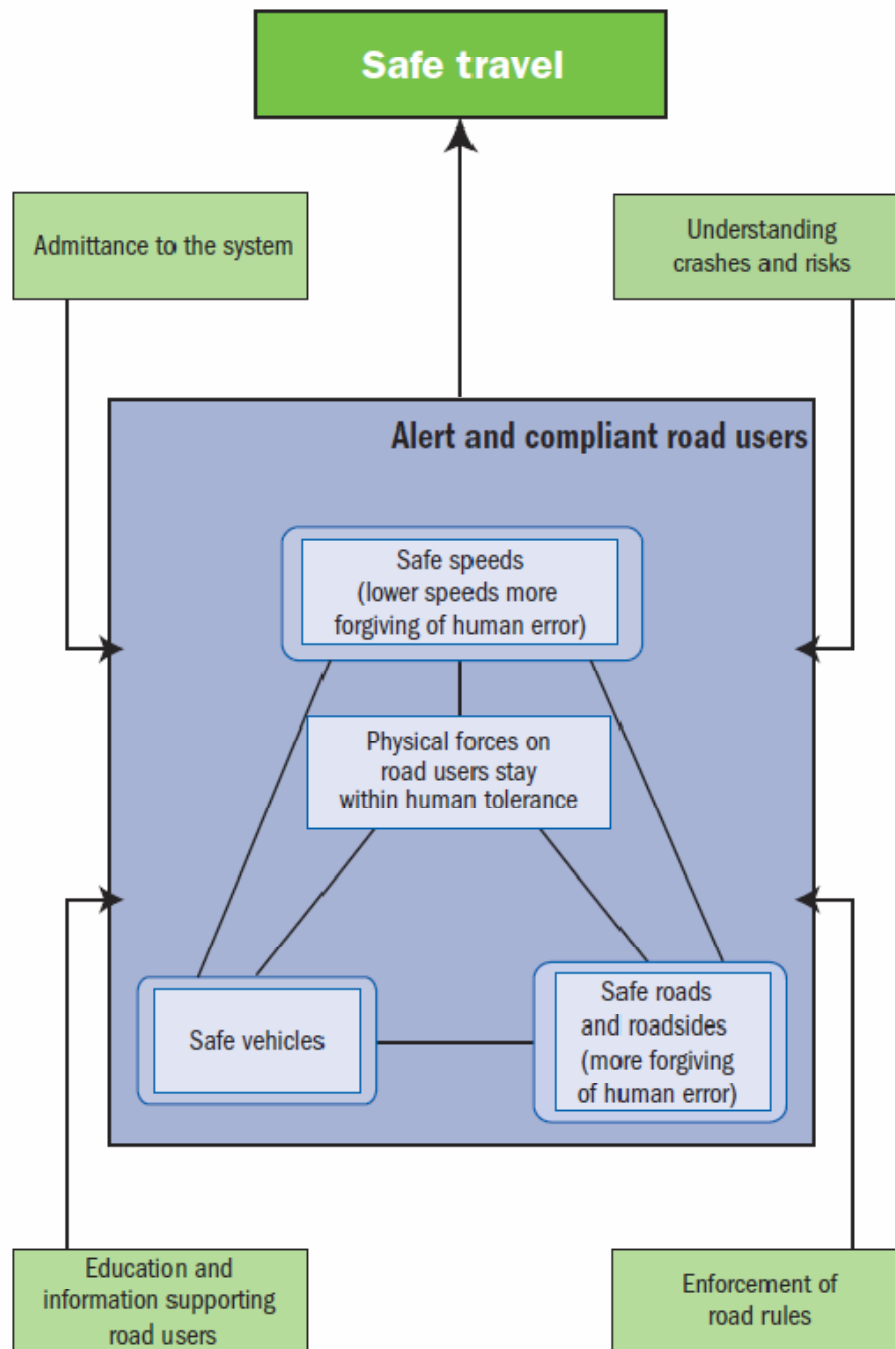
Background

- Key outcomes for improved road asset management include:
 - minimising the whole of life cycle costs , comprising vehicle operating costs, travel time and crash costs,in delivering appropriate road service standards to the community
 - assets are managed in a socially and environmentally sustainable manner to conditions appropriate for use
 - immediate and long term budget implications are explicit
 - risks associated with asset use are managed recognising the duty of care owed to the public
- Success requires practical, integrated solutions for network wide strategies and for programme development and delivery
- Road asset managers, planners and engineers can effect significant change

Overview

- Safe System approach
- Engineering based solutions
 - The role of speed management
 - Primary treatments
 - Supporting treatments
- Mainstreaming safety in road asset planning and management
- What do we need to do from here?

The Safe System approach



Safe System Framework

- 5 star driving
- 5 star cars
- 5 star roads
- 5 star speed limits

Safe System approach

- Road users will make errors
- Death and serious injury not acceptable
- Need to provide infrastructure that prevents fatal and serious crashes by reducing the incidence and severity of crashes
- There are limits to the forces the human body can withstand in the event of a crash
- Speed management has an important part to play in this

Speed limits – safe system

- Speed limits should take account of the biomechanical tolerances of humans

Crash type	Tolerance
Car/pedestrian	20-30 km/h
Car/motorcyclist	20-30 km/h
Car/tree or pole	30-40 km/h
Car/car (side impact)	50 km/h
Car/car (head-on)	70 km/h

Speed limits – safe system

- Suggested speeds to cater for human tolerance:

Type of road	Safe speed (km/h)
Roads with possible conflicts between cars and unprotected road users	30
Intersections with possible lateral conflicts between cars	50
Roads with possible head-on conflicts between cars	70
Roads where head-on and side conflicts with other road users are impossible	> 100

Engineering based treatments

Primary road safety treatments

Treatments that deliver Safe System outcomes – minimise deaths and serious injury

Supporting treatments

Treatments that provide a safety benefit, but don't necessarily reduce death or serious injury to 'near zero'

Intersection crashes

Survivable speed – 50 km/h

Primary road safety treatments

- *Grade separation*
- *Roundabouts*
- *Raised platforms*

Supporting treatments

- *Advance warning*
- *Traffic signals*



Intersection crashes

Survivable speed – 50 km/h



Roadsides – run-off-road crashes

Survivable speed – 40-50 km/h

Primary road safety treatments

- *'Clear zone'*
 - *Removal of roadside hazards*
 - *Frangible roadside structures*
- *Barrier systems*

Supporting treatments

- *Warning signs*
- *Shoulder sealing*
- *Audio-tactile edgelines*



Roadsides – run-off-road crashes

Survivable speed – 40-50 km/h



Head-on crashes

Survivable speed – 70 km/h

Primary road safety treatments

- *Barrier systems*

Supporting treatments

- *Shoulder sealing*
- *Audio-tactile edge and centrelines*



Head-on crashes

Survivable speed – 70 km/h



Pedestrian crashes

Survivable speed – 30 km/h

Primary road safety treatments

- *Separation*
 - *Grade separation*
 - *Footpaths*
 - *Raised crossings*

Supporting treatments

- *Warning signs*
- *Pedestrian refuge*



Pedestrian crashes

Survivable speed – 30 km/h



Motorcycle / cycle crashes

Survivable speed – 30 km/h

Primary road safety treatments

- *Separation*
 - *Off-road facilities*

Supporting treatments

- *On-road facilities*
- *Warning signs*



Motorcycle / cycle crashes

Survivable speed – 30 km/h



Mainstreaming safety in road asset planning and management

- Safety and maintenance integration
- Accounting for crash savings in network planning studies and capital projects
- Typical benefits

Safety and maintenance integration

- Safety implications of maintenance decisions
- Major areas of research for Austroads e.g.
 - Road management and the 'Duty of care'
 - Road surface (micro and macrotexture; rutting; roughness)
 - Signs
 - Line marking
 - Vegetation
 - Edge drop
 - Seal widening
 - Shoulder widening
- Tool required to integrate this knowledge
- Common data collection



Risk assessment approach

- Traditional approach in road safety is crash history based
- However, alternative approach developed and used for various reasons
- Suited to lower volume roads (especially where no clear pattern of crashes)
- Calculate risk based on road design features, and infrastructure present
- Calculate overall risk, or risk for specific groups
- AusRAP, iRAP, KiwiRAP, NetRisk

Further info on risk assessment and safety treatments:

iRAP Road Safety Toolkit - Microsoft Internet Explorer provided by ARRB Group Ltd

http://www.irap.net/toolkit/default.asp

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iRAP Road Safety Toolkit

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gTKP

global Transport Knowledge Partnership

iRAP

INTERNATIONAL ROAD ASSESSMENT PROGRAMME

Safer Roads Saves Lives

The World Report on Traffic Injury Prevention that was published in 2004 drew attention to the urgent need for action to reduce road traffic injuries globally. Its key conclusion is that in order to achieve safer roads a "systems approach" is needed. This means that the road system should be designed to accommodate and compensate for human vulnerability and frailty. The systems approach requires an understanding of the system as a whole and the interaction between its elements, and the identification of priorities and potential for action.

An essential element of the safe systems approach is the development of a road safety management system that can deliver:

- Understanding of a country's road safety issues;
- Involvement of all stakeholders and the wider road user community;
- Comprehensive strategy with targets for casualty reduction;
- A programme of interventions to address identified problems;
- Reviews of performance;
- Capacity building and availability of funding.

An important step in the development of a systems approach to address the road safety problem in a country is the setting up of a lead agency to take responsibility for making roads safe. Key tasks will involve analysis of the casualty problem in terms of crash rates, road user types, locations, and contributory factors in order to establish priorities for action and development of a programme of interventions to deliver cost-effective casualty reductions.

This toolkit is designed to assist with the development of programmes of road safety measures within a prioritised action programme. It provides valuable information that will assist in the choice of effective ways to reduce road traffic injuries. Whilst it can be used on its own to select measures to address specific problems that have been identified, it is not a substitute for the more systematic approach to road safety management and casualty reduction that is recommended in the World Report. A forthcoming report from the OECD provides detailed guidance on the achievement of targeted casualty reductions using a systems approach.

This website is being continually developed. If you have any feedback, please email this to the development team (iraptoolkit@arrb.com.au)

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Accounting for crash savings in network planning studies and capital projects

- Crash rates (by severity) for different road designs, e.g.
 - ‘Austroads’ Model Road States
- Section specific adjustment factors
 - Curves and grades
 - Speed zones
 - Traffic mix
 - Remote areas
 - Overtaking lanes

Australian examples of typical benefits

<u>Measures</u>	<u>Typical Benefits</u>
Optimum maintenance (sealed)	\$2 - \$3 net benefits per \$ RAC
Optimum maintenance with seal and cross section improvements	\$4 - \$9 net benefits per \$RAC
Improved ride quality from poor/very poor to fair	15% reduction in crashes
Blackspot programs	save 1.5 lives per annum per \$10 million spent
General infrastructure improvements	save 2 lives per annum per \$100 million spent
Possible diminishing returns due to – • Many easy wins already treated in targeted programs (BCRs of 14:1 reducing to 4:1) • Significant cost increases	

Challenges to implementation

- Cost
 - Primary treatments tend to be most expensive
 - Need to develop low cost primary treatments
- Timeframe
- Community and political support
- Mainstreaming within Road Authorities

Summary

- Safe System approach required
- Speed management very important
- Improvements to infrastructure can provide Safe System outcomes
- Primary treatments – need greater use of these
- Supporting treatments
- Network wide approach, in addition to blackspots, favoured
- Cost
- Integrated approaches deliver significant benefits