



A Sidra for Road Safety

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Why do we need better Safety Analysis Tools

- We still rely too much on judgement in road safety– while engineering judgement is important the more informed we are the better our decisions
- If we had better tools we would better understand the safety consequence of our projects – we do a lot of modelling of travel time benefits because we have good models (like Sidra)

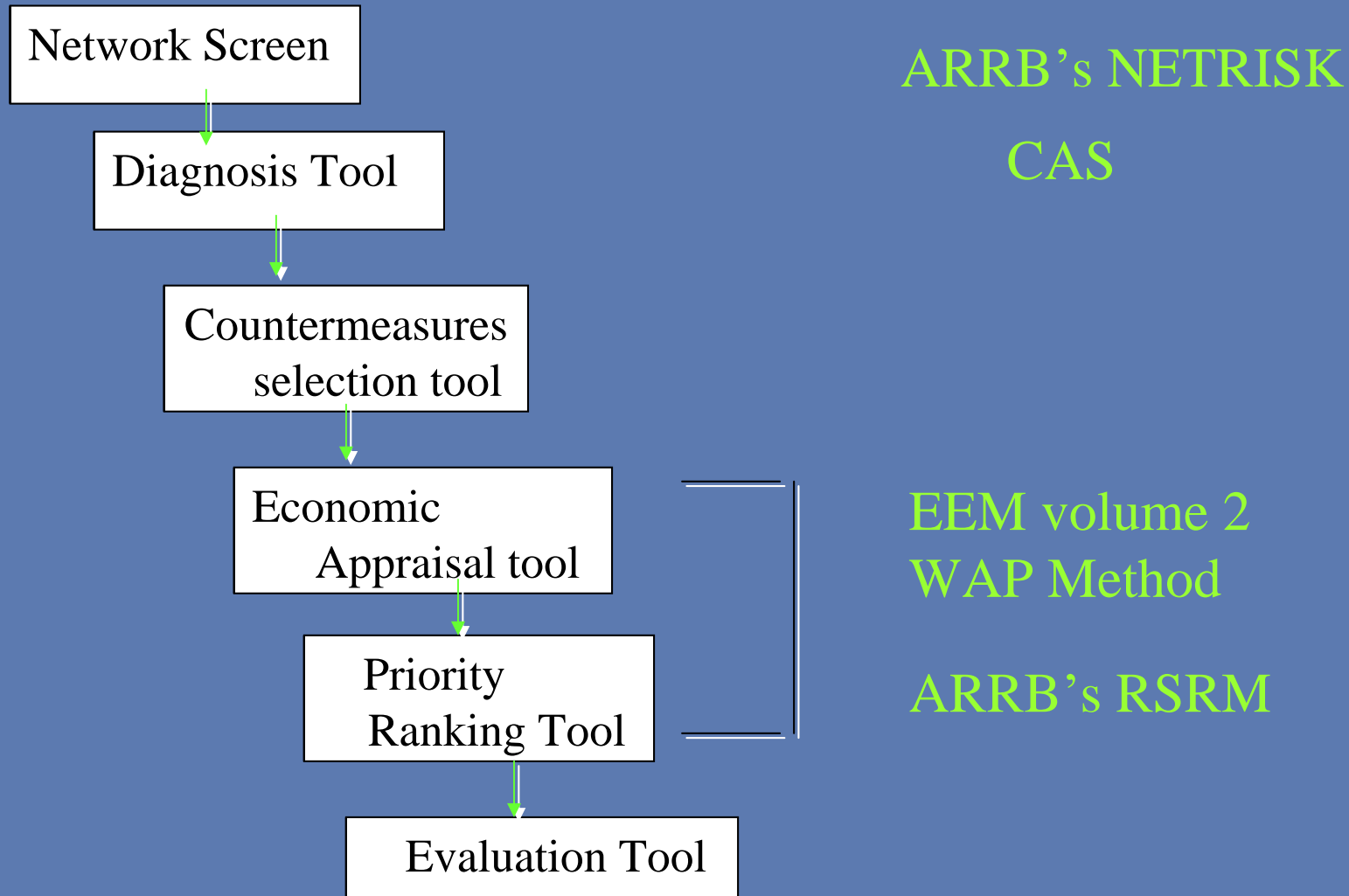


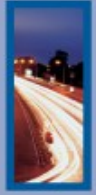
Applications of Safety Analysis Tools

- Development of road safety programs (SafetyAnalyst & NetRisk/RSRM)
- Risk mapping and performance testing
- To evaluate safety impacts of road network improvements (SafeNet) or upgrades to rural roads (IHSDM)
- To evaluate the safety impacts of new developments (SafeNet)



Safety Analyst Software (USA)





Roadway Segment Crash Models (SPFs)

- Rural two-lane roads
- Rural multilane undivided roads
- Rural multilane divided roads
- Rural freeways-4 lanes
- Rural freeways-6+ lanes
- Rural freeways within interchange area-4 lanes
- Rural freeways within interchange area-6+ lanes

- Urban two-lane arterial streets
- Urban multilane undivided arterial streets
- Urban multilane divided arterial streets
- Urban one-way arterial streets
- Urban freeways-4 lanes
- Urban freeways-6 lanes
- Urban freeways-8+ lanes
- Urban freeways within interchange area-4 lanes
- Urban freeways within interchange area-6 lanes
- Urban freeways within interchange area-8+ lanes



Ramp Crash Models

- Rural diamond off-ramp
- Rural diamond on-ramp
- Rural parclo loop off-ramp
- Rural parclo loop on-ramp
- Rural free-flow loop off-ramp
- Rural free-flow loop on-ramp
- Rural free-flow outer connection ramp
- Rural direct or semidirect connection

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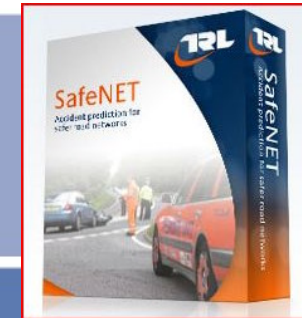


NetRisk

- **Stage 1** involves a Network Level Assessment, to focus attention upon high risk sections of the network
- **Stage 2** involves the detailed investigation at the Project Level of the high risk sites, to locate and analyse specific hazards and preferred treatment options.
- NETRisk Road Network Safety Assessment method includes:
 - urban mid-block
 - urban intersection (major/minor)
 - sealed rural mid-block
 - unsealed rural mid-block
 - rural Intersection (major/minor).



SafeNET - Safer Road and Junction Design



- SafeNET is primarily designed for use by Traffic Engineers who require a better understanding of the safety performance of 1) an existing road network or 2) the implications of design changes to the network at some point in the future.
- SafeNET can be used to
 - Identify junctions or roads that are performing worse in safety terms than would be expected (**Network Screening**)
 - Evaluate **planned developments** and enhancements to the network
 - Improve the management of road works and diversion routes
 - improve the **targeting of remedial work**
 - Improve **predictions of the benefits** that would result from the remedial work



SafeNET

- SafeNET 2 is capable of modelling road networks which can include:
 - Roundabouts and Mini-roundabouts
 - Traffic signal junctions
 - Urban and rural priority T-junction
 - Urban and rural crossroad and staggered junctions
 - Urban single carriageway roads and Urban roads including minor junctions
 - **Traffic calming measures**
 - COBA models for Urban and Rural junctions
 - Modern rural single and dual carriageway road Links
 - **Motorway links**
 - COBA models for Urban and Rural road links
 - Rural and Urban Speed models

Rural T-Junction

Junction Information

Junction Number	17	Junction Name*	GreenLa/Track1
Model Level	3	Area or Group*	2
Number of Arms	3	Total Injury Accidents*	
		Number of Years*	

Arm Information

	Entry Link Number	Name*
Major Left	121	Green La (N)
Major Right	163	Green La (S)
Minor	151	Track 1 (W)
Arm D		
Arm E		
Arm F		

Arm Data Junction Data OK



SafeNET – Data Requirements

- The minimum amount of data:
 - Traffic flow
 - Link Length (for links only)
- To improve their accident forecasts, the user can input increasing levels of data for:
 - Geometric data, including junction curvature, sighting distance, entry width
 - Flow data for different modes (Pedestrian, Motorcycles)
 - **Traffic Calming including, Speed Cameras, Chicanes, Humps, Signing and Marking**
 - **Road works**
 - Number of minor junctions
 - Time Trend Modelling (taking into account of changing driving legislation)

Results [Estimated Casualties per Year]

Print Title SafeNET Output

Roundabouts
Mini-Roundabouts
Traffic Signals (4-arm)
Traffic Signals (3-arm)
T-junctions (Urban Priority)
T-junctions (Rural Priority)
Crossroads (Urban Priority)
Ordinary Urban Roads
Composite Urban Roads
Rural Roads
- TOTALS -

136/196 - Fore St (W): Level 2
175/145 - Brick (W): Level 1

Results for Whole Road-

	Fatal	Serious	Slight
Single Vehicle Accidents:	0.02	0.17	0.63
Shunt/Lane-Changing Accidents:	0.00	0.03	0.21
Turning Accidents at Minor Junctions:	0.00	0.04	0.19
Other Vehicle only Accidents:	0.00	0.01	0.06
Pedestrian Accidents:	0.11	1.03	2.63

Road Total:	0.14	1.29	3.72

Accidents
Estimated Casualties

Print All Print Current Copy to Clipboard Main Menu



SafeNET Editor

- Graphically create road links & intersections

The screenshot displays the NetBuild software interface. The main window shows a road network diagram with nodes and links. Two nodes are highlighted in yellow, indicating they are selected for editing. The configuration panel at the bottom is set for a Rural T-junction with the following parameters:

<input type="checkbox"/> Rural T-junction	Major Arm A	90210	OK
Junction Number: <input type="text" value="10"/>	Major Arm B	20210	OK
	Minor Arm	99210	OK

A button labeled "SELECT MAJOR A" is also visible in the configuration panel.



IHSDM Overview



Interactive Highway Safety Design Model (IHSDM):
Making Safety A Priority in Roadway Design

- The **Interactive Highway Safety Design Model (IHSDM)** is a suite of software analysis tools for evaluating safety and operational effects of geometric design decisions on two-lane rural highways.
- **IHSDM** is a decision-support tool. It checks existing or proposed two-lane rural highway designs against relevant design policy values and provides estimates of a design's expected safety and operational performance.



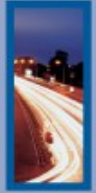
IHSDM: Modules

- The IHSDM suite of software analysis tools for two-lane rural highways includes five evaluation modules:
 - **Crash Prediction Module:** estimates the expected frequency crashes on a highway using geometric design and traffic characteristics.
 - **Design Consistency Module:** estimates the magnitude of potential speed inconsistencies to help identify and diagnose safety concerns at horizontal curves
 - **Intersection Review Module:** performs a diagnostic review to systematically evaluate an intersection design for typical safety concerns.
 - **Policy Review Module:** checks highway segment design elements relative to design policy.
 - **Traffic Analysis Module:** estimates operational quality-of-service measures for a highway under current or projected future traffic flows.



Where to from Here

- Already some good tools available internationally (or available in next 2 years)
- These tools cost a lot to develop
- Even the Australian tools have a lot of limitations due to lack of local research and limited funding (for research)
- We should be looking at Calibrating or Customising overseas safety analysis tools, rather than building our own tools



Where to from Here

- FHWA expects that SafetyAnalyst can be calibrated to NZ conditions
- Need to think about what data is required to utilise these tools – we may need to simplify the analysis if data is unavailable
- Be very weary of the claims of overseas software distributors – we do need customised tools based on quality research