INCORPORATING ROAD SAFETY INTO VEHICLE ROUTING

HAMISH KINGSBURY

BACKGROUND

- Myself, BSc in Geography and PgDip GIS
- Callaghan Innovation Student Research Grant
- Safer Journeys Strategy

KiwiRAP URBAN
NEW ZEALAND ROAD ASSESSMENT PROGRAMME

Brodie et al.

VS

Economic Evaluation Manual (EEM)

(New Zealand Transport Agency, 2013)

New Zealand Transport Agency. (2013, January 21). *Economic Evaluation Manual.* Retrieved from NZ Transport Agency.

Brodie, C., Durdin, P., Fleet, J., Minnema, R., & Tate, F. (2013). Urban KiwiRAP: Road Safety Assessment Programme.

URBAN KIWIRAP RISK METRICS

- Collective Risk
- Personal Risk

URBAN KIWIRAP RISK METRICS

- Collective Risk
  - Fatal and Serious injury (FSi) casualty equivalents
  - Multiply each injury crash by **Severity Index** that reflects:
    - Crash location
    - Crash movement type
    - Speed environment
- Personal Risk

URBAN KIWIRAP RISK METRICS

- Collective Risk
- Personal Risk
  - Exposure based calculation that takes traffic flow into account

$$Corridor\ Personal\ Risk = \frac{Corridor\ Collective\ Risk\ x\ 10^8}{(Q_{corridor})x\ 5\ years\ x\ 365\ days}$$

  - $Q_{corridor}$ = weighted average daily traffic volume

Collective Risk

Personal Risk

ECONOMIC EVALUATION MANUAL (EEM)

- Industry standard for the economic evaluation of land transport activities for New Zealand
- Includes procedures to calculate the safety benefits and costs of transport projects

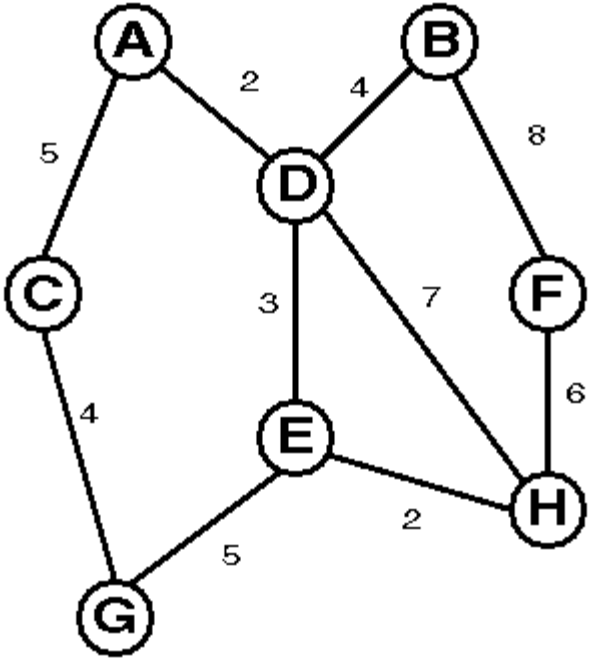
SAFETY RISK METRIC COMPARISON

EEM

Personal Risk (Urban KiwiRAP)

NETWORK DEVELOPMENT

- What is a network?
- Flow directions
- Hierarchies
- Speed Limits



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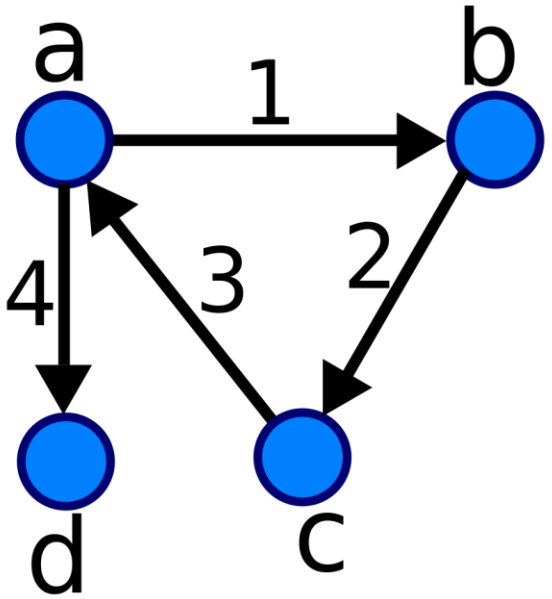

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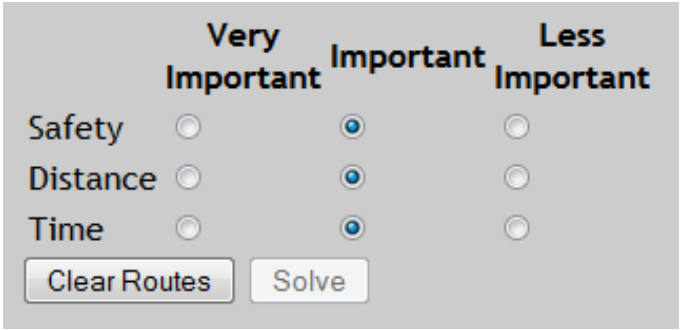
ROUTING

- Resource Constrained Shortest Path Problem (Irnich & Desaulniers, 2005)
- System of weightings
- Development of a matrix



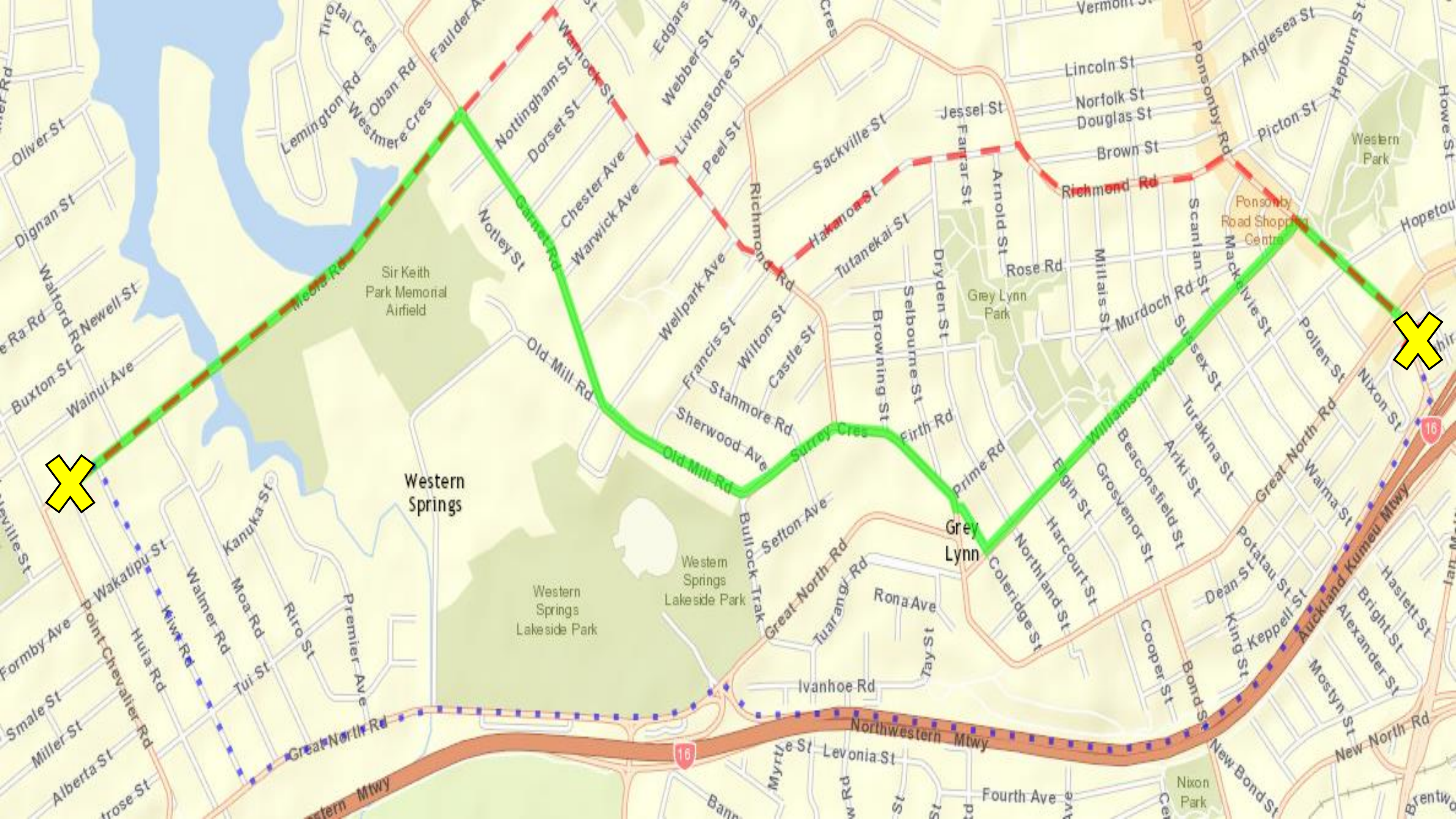
SUITABILITY OF METRICS

- Personal Risk provides a measure of risk for an individual
- Using corridor data, so Personal Risk is available
- Collective Risk provides a measure of risk for the section of road
- EEM is designed to “calculate the benefits and costs associated with investments in the transport system”

WEBSITE

- Built using industry (GIS) leading technologies
- Proof of concept
- Limited to the Greater Auckland Region
- Provides quantifiable results

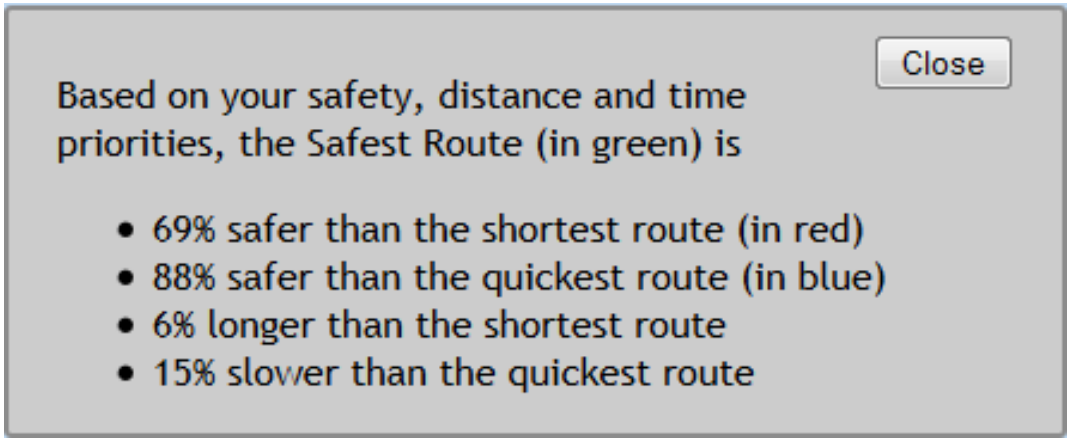
- dev4.interpret.co.nz/safetyrouting



Western Springs
Grey Lynn
Sir Keith Park Memorial Airfield
Western Springs Lakeside Park
Western Springs Lakeside Park
Grey Lynn Park
Western Park
Nixon Park
Ponsonby Road Shopping Centre
Meola Rd
Garnet Rd
Old Mill Rd
Old Mill Rd
Surrey Cres
Williamson Ave
Richmond Rd
Richmond Rd
Great North Rd
Great North Rd
Great North Rd
Northwestern Mtwy
Auckland Kumeu Mtwy
Ponsonby Rd
Point Chevalier Rd
Kiwi Rd
Ivanhoe Rd
New North Rd
Westmere Cres
Oban Rd
Lemington Rd
Faulder Ave
Nottingham St
Dorset St
Chester Ave
Warwick Ave
Warnock St
Notley St
Livingstone St
Peel St
Webber St
Edgars
Wellpark Ave
Francis St
Wilton St
Castle St
Stanmore Rd
Sherwood Ave
Hakanoa St
Tutanekai St
Sackville St
Jessel St
Farrar St
Arnold St
Dryden St
Selbourne St
Browning St
Firth Rd
Prime Rd
Rose Rd
Millais St
Murdoch Rd
Scanlan St
Mackelvie St
Sussex St
Pollen St
Nixon St
Turakina St
Ariki St
Beaconsfield St
Grosvenor St
Elgin St
Harcourt St
Northland St
Coleridge St
Cooper St
Bond St
King St
Potatau St
Dean St
Keppell St
Waima St
Bright St
Alexander St
Haslett St
Mostyn St
New Bond St
Lincoln St
Norfolk St
Douglas St
Brown St
Picton St
Anglesea St
Hepburn St
Howe St
Hopetoun
Vermont St
Oliver St
Dignan St
Walford Rd
Newell St
Buxton St
Wainui Ave
Kanuka St
Wakatipu St
Walmer Rd
Moa Rd
Riro St
Premier Ave
Tui St
Huia Rd
Formby Ave
Smale St
Miller St
Alberta St
Bullock Track
Sefton Ave
Tuarangi Rd
Rona Ave
Tay St
Levonia St
Myrtle St
Fourth Ave
16
16
16

QUANTIFIABLE RESULTS

- Allows for users to:
  - easily compare results
  - Make smarter and safer routing decisions



LIMITATIONS AND FUTURE DEVELOPMENT

- Simple vehicle routing network
  - Partnership with commercial partners
- Limited safety data
  - Look at combing datasets for wider coverage
  - KiwiRAP, EEM, Star Rating

ACCOLADES

- 2015 ESRI Young Scholars Award
- 2015 New Zealand Geospatial Research Conference
- Winner of Undergraduate of the Year at the NZSEA
- Entry into the APSEA
- 2015 ACRS Conference

ANY QUESTIONS?

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