Money Well Spent,
The challenge of finding primary data to demonstrate sound infrastructure investment

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Or,
How are we really going to demonstrate that we are delivering the benefits we told our funders?
A Case Study

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...The Challenge...

- The country is investing $2.4Bn in the Waikato Expressway.
- 102km of high quality 4-lane road, being built over 10 years.
- One key metric is journey time savings, improved journey choices and higher journey reliability.
- Other metrics are safety and growth.
- Looking for rapid assessment as we open each section to see if we are in the right ballpark.

What are others saying about investment?

Hamilton is tipped to boom

One of the most crucial drivers is set to be the completion of the Waikato Expressway and the opportunities Hamilton will get because of its proximity to Auckland which is busting at the seams.

Informacios economist Gareth Kiernan said mounting bulletproofs over Waikato’s prospects was becoming increasingly difficult to disagree with.

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Option 1 - NZTA eRUC Data

Commercial vehicle mounted GPS Recorders.
Locations and times
Option 2 …The chosen solution…
- A suite of Bluetooth detectors along the route.
- Detects any passing vehicle with Bluetooth enabled.
- Provides aggregated data of journeys between detectors.
- System running for 6 months now, close to 1,000,000 journeys captured.

…The technology...
- Equipment installed under local traffic management.
- Needs 3G coverage and power source.
- Typical install on lamp posts.

…The technology...
- As Bluetooth devices pass each device is detected.
- Unique device ID is encrypted, stored and time stamped.
- As vehicle passes next detector the process is repeated.

…The technology...
- Encrypted data (time and encrypted device code) transmitted.
- Data transmitted via 3G in close to real time
- (Every 10 minutes)
- Vendor collects, ‘cleans’ and processes data to form journey data.

…The technology...
- Data compiled into customer specified reports.
- Data made available through web based interface.
- Data can be used in real time for operational applications or downloaded for analysis.
Real Time web interface

- 16% of vehicles carried Bluetooth.
- This is an excellent sample rate.
- Similar Danish research showed 27%.

Data mining through web interface

- And historic reports and data files.
- Download for more detailed analysis.

...Privacy questions....Big Brother?...

- Data is truly anonymous and it can’t be traced to people, phones or vehicles.
- Technology has been subject to both Ministerial and Official Information Act requests from civil liberties groups.
- To date, no objections have been raised after the technology was explained.
- Fewer privacy questions than many existing survey methods (e.g. Number plate recognition).

...Is it a reliable source of data...

- We compared Bluetooth journeys detected between two points.
- Compared to conventional loop detector.
- Over 250,000 Bluetooth journeys recorded over a 4 month period.

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Journey Times and Hourly Flows

- 490,000 Journeys
  Bombay – Cambridge
  Southbound M-F
Distribution of Journey time... Reliability

Average Journey Time, 88 mins

95% of Journeys in 34 mins

CASE STUDY Pre and Post opening, Te Rapa

Before and After Comparison

Old Road

Opening December 2012

New Road

Distribution of Journey Times Before opening

10,862 Records, Northbound 4-6pm M-F, Avalon-Taupiri

Distribution of Journey Times after opening

Journey Time Saving of 4 minutes
Journey reliability, 95% of journeys completed in X mins

Combined Journey Time and Reliability post opening

The Value Calculation.. (simplified)
- To convert time and reliability savings into Value $$$
- Detecting approx 90% diversion rate of through traffic onto Expressway (90% of 19,900AADT) = 17,910/day
- Typical time saving on Expressway 4 mins = 1,200 hours/day
- Number of vehicles still on old route = 20,760
- Typical time saving on old route 2 mins = 700 hours/day
- Value to NZ Inc. 1,900 x $21.7/hr x 200 days =

  • $8,2M/year in time saving alone

Extra benefits that Bluetooth system is providing
- Near real time information, so it can be used operationally as a basic Traffic Monitoring System.
- Can setup Alerts to inform of high congestion / construction delay
- Origin – Destination information.
- Data on trip choices
- Diversion rates post opening
- Impacts of specific events (race meetings)
- Validation of traffic models

Is it giving us what we are looking for?
- It provides excellent Primary Data,
- Detectors are rapidly installed, robust & reliable,
- Exceptionally cost effective ($5–$10k / unit),
- Providing cumulative data for data mining,
- Quality and quantity of data is much higher than many other alternatives,
- Provides Reliability data which was almost impossible to capture cost effectively with other means.

Is it giving us what we are looking for?
- AND – Most importantly the time savings predicted when we undertook the feasibility are being measured.
QUESTIONS