Capturing Travel Time Information

A quick snapshot

Bill Qu, Principal Traffic Engineer

Auckland Transport
An Auckland Council Organisation

Overview

- Technology
  - How we used to do it
  - What happens now
  - The Good vs. The Bad (my own view)
- Applications
  - AT Network Performance Scorecard
  - Project based examples
  - City Rail Link monitoring (under development)

Traditionally (5-7 years ago)…

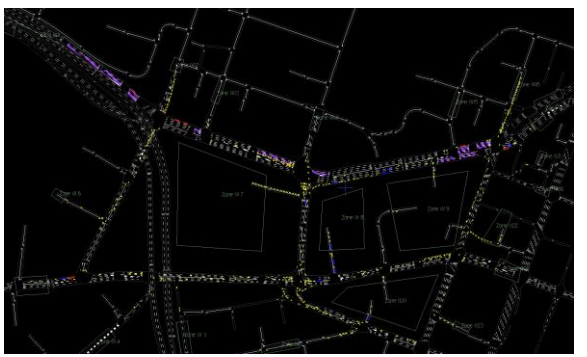
- Floating Vehicle Survey (FVS)
  - First used in late 1920s
  - Dedicated drivers along pre-defined routes
  - Planned on specific days to mimic typical day travel times

The Good about FVS

Accurate Data

Calibrating Other Technologies

Perfect for Single Route or Small Scale Network



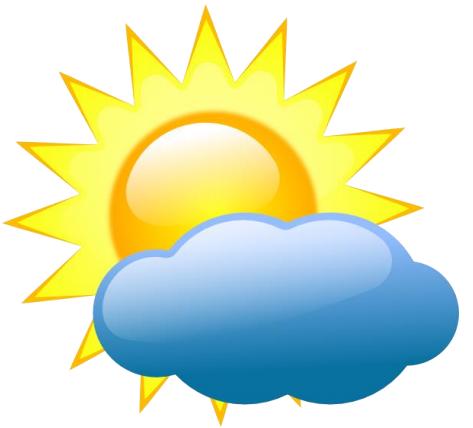
Traffic Model Validation

The Bad about FVS

Floating Vehicle Survey		
Route	Sample Size	Time
Dominion Road	3	07:45
		08:20
		08:55

Small Data Sample

Limited to the Survey Date



Weather + incident

Only on selected routes

High Labour Cost

Human error

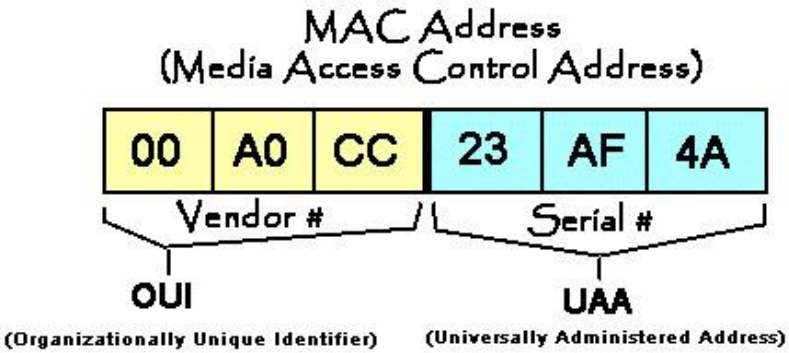
Nowadays…

- **Matching** vs. **Tracking**
  - Both can easily cover wider network
  - Achieving regular monitoring
  - Potential to go back in time for data

- **Not covered**
  - Spot speed detection (Radar, loops)
  - mathematical algorithms

Matching Technology

- Match unique ID in vehicle (re-identification)



- Normally requires permanent or temporary infrastructure for detection
- Higher data sample size (comparing to Tracking)
- Hard to tell what happened between matching points

Tracking Technology

- Constantly/Periodically track vehicles or device in vehicles
- Examples:
  - GPS Tracking
  - Mobile data tracking
- Unlike Matching, Tracking provide full vehicle travel trail – easily filter out “outliers”
- Considered smaller sample size (on quieter roads)
- “Canyon effect”

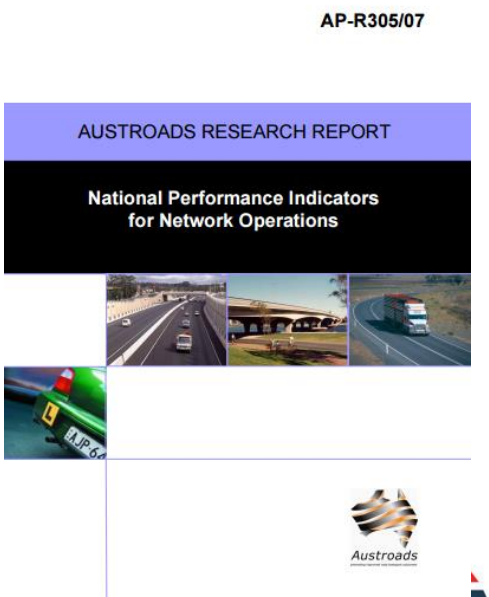
Type	Technology	Notes
Traditional	• Floating Vehicle Surveys	• Deemed highly accurately • Small data sample size • "Typicality" highly relies on weather, network condition during the survey period • Can't track monthly/seasonal variation • High operational cost • More used as a validation method
Matching	• ANPR (number plate) • Bluetooth or Wi-Fi (MAC address)	• Typically, larger data sample size than Tracking • Normally requires permanent or temporary infrastructure installation. Upfront cost for setup and on-going maintenance. • Not be able to tell what happened in between matching points – however less significant if data sample size is large enough
Tracking	• GPS • Mobile phone data	• Could apply filtering algorithm to easily take out outliers, data accuracy higher • Normally purchase services from third party. • May struggle with data sample size • Canyon effect in high rise surroundings, also tunnels
Others	Loops//radar + calculation algorithms	• Not discussed in this paper

Applications

- Transport Planning and Strategy
- Operational Performance Reporting
- Operational Deficiency Analysis
- BCR assessment for project post-implementation
- Providing customer with better and more accurate Information
- All data aggregated to satisfy Privacy Act 1993

Network Performance Scorecard

- Deployed GPS Tracking with local service provider six years ago
- Ability to cover the whole Auckland network, data back to 2010
- KPI defined based on AUSTROADS
- Monthly snapshot as well as ad-hoc



Network Performance Scorecard

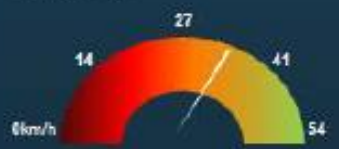
Arterial network performance

June 2015 — **Morning peak**

Travel speeds

36 km/h

is the average traffic flow speed on the network. The average weighted speed limit on the network is 54 km/h



Level of service

23%

of the network is considered congested

Hotspots

The listed routes below are the hotspots in LOS F, and being ranked by the length and the lowest speed.

See those hotspots locations refer to the map

No.	Ranking by Length
1	Blockhouse Bay Road
2	Te Ratau Dr
3	Freight - Albany Highway
4	Sandringham Rd
5	Mt Wellington High Way / Great South Rd
No.	**Ranking by Lowest Speed**
1	Gossamer Dr
2	Mt Wellington Highway / Great South
3	Lake Rd Northcote
4	Wairau / Esmonde
5	Tristram Avenue

9 km/h

or slower is the average speed observed at the locations highlighted on the map.

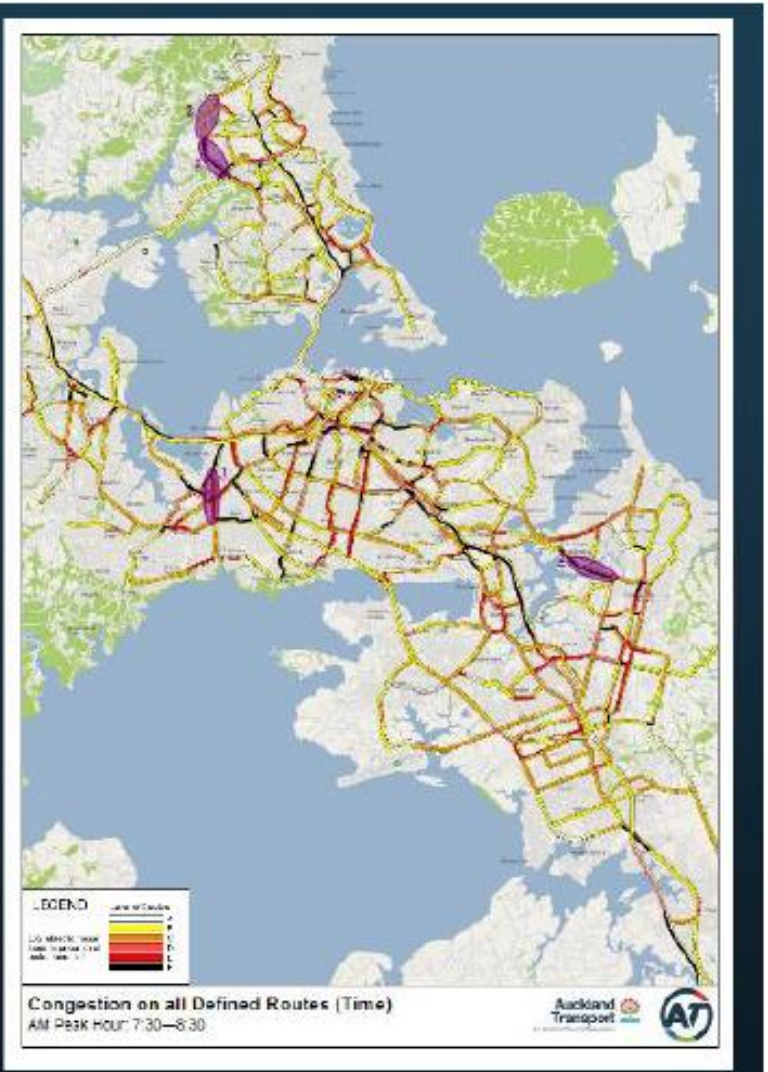
Delay & reliability

55%

extra time is added to each journey due to congestion and signal phasing, compared with

D

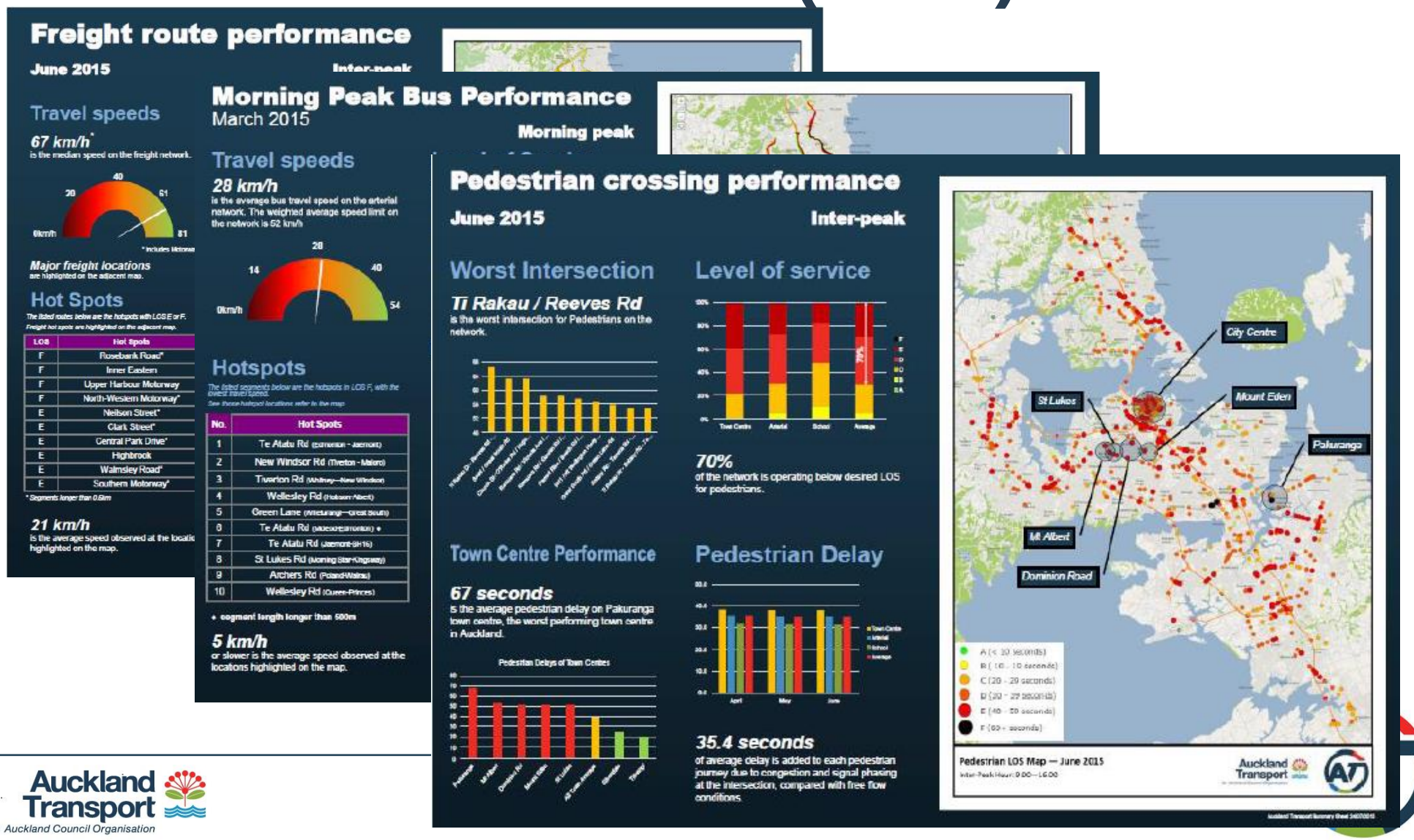
is the LOS score for reliability. A typical journey time is within 35% of the mean journey time.



Auckland Transport

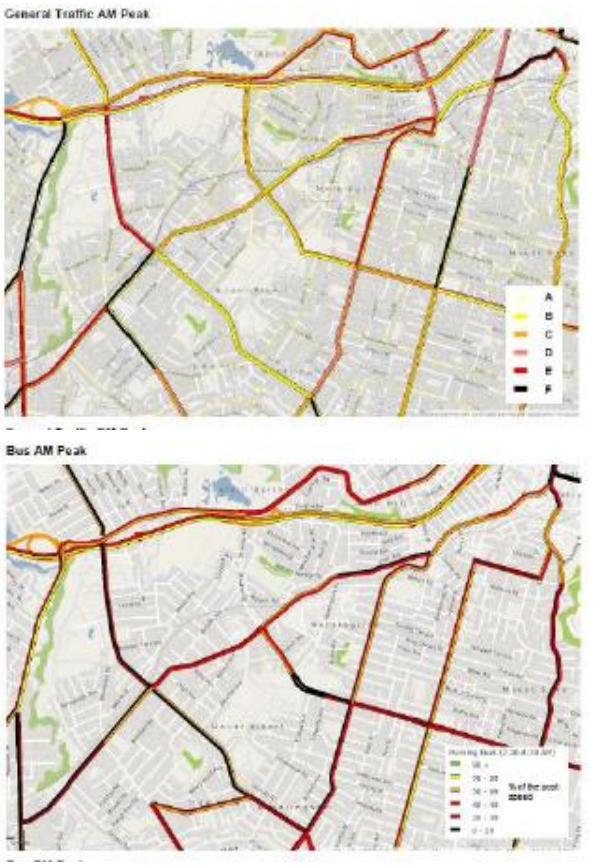
An Auckland Council Organisation

Scorecard (cont.)



Project Based Examples

Corridor Management Plan



Traffic Signal Optimisation

Project Based Examples (Cont.)

Before - LOS F

After - LOS D

Efficiency Improvement Project – Parnell Road Bus Lane
Project Initiation and Justification

Project Based Examples (Cont.)

Multi-modal data directly feeding into Network Operating Plan

City Rail Link (CRL) Monitoring

- Bluetooth tracking in CBD
- Additional to the GPS tracking – canyon effect
- Currently cover six routes – plan to expand
- Traffic snapshot before vs. during construction
- Ability for real time reporting
- Regular reporting as well as ad hoc enquiry
- On going development

CRL Monitoring (Cont.)

HMI Araflow Traffic Monitoring

Welcome Bill Qu (BillQu) logout

< back > Map | Route | Routes Report |

Auckland City Centre / 003 - 012 Hobs

Location A	S003 Fanshawe St/Hobson St
Location B	S012 Victoria St W/Hobson St

Distance	418m
Speedlimit	50km/h
std. Journey Time	1m23s
std. Journey Speed	18km/h

74% and over	14km/h and over
49%..75%	10km/h..13km/h
19%..50%	4km/h..9km/h
below 20%	below 3km/h

Type: Table

Direction: A => B / B => A

From: 06/03/2016

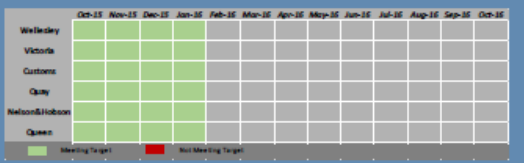
To: 07/03/2016

Date/Time	Journey Time	Journey Speed	Matches	Coun
06/03 00:00	1m06s	22km/h	33	86
06/03 01:00	0m52s	28km/h	33	98
06/03 02:00	0m58s	25km/h	27	80
06/03 03:00	0m44s	34km/h	26	93
06/03 04:00	1m02s	24km/h	19	86
06/03 05:00	0m46s	32km/h	16	54

CBD Travel Time Monitoring Dashboard - *January 2016*

Key CRL Affected Routes

Monthly Overview

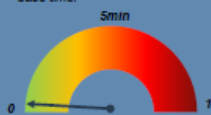


Comments:
From October 2016 to January 2016, all the key routes have met the target, with negligible or minor delays compared to the base time.

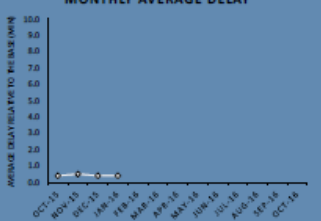
Average Delay relative to the base time

0.4 minute (24 seconds)

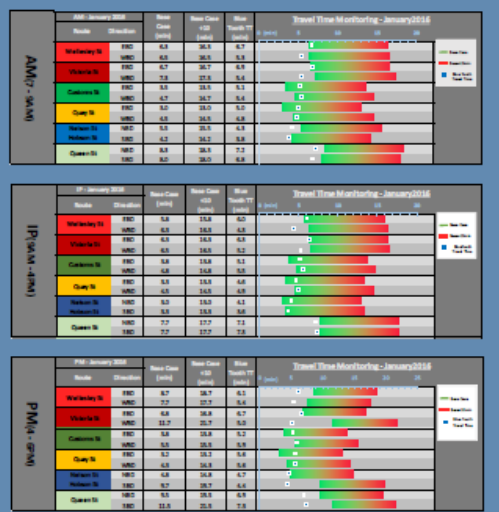
Is the average delay across the 6 key CBD routes during the peak hours compared to the base time.



MONTHLY AVERAGE DELAY



Travel Times *Compared to Base Time and Base+10*



Delay relative to the base time

Routes	AM E/N BO	AM W/S BO	IP E/N BO	IP W/S BO	PM E/N BO	PM W/S BO	Acceptable Delay Threshold(min)	*Delay Lower than Target
Wellesley	0.4	"0"	0.2	0	0	0	10	√
Victoria	0.2	0	0	0	0	0	10	√
Customs	1.6	0.8	1.2	0.7	1.6	0.4	10	√
Quay	2.0	0.3	1.3	0.4	2.5	1.3	10	√
Nelson & Hobson	0	0	1.1	0.3	0	0	10	√
Queen	0	0	0	0	0	0	10	√

** Delay Lower than Target is met when delay in all periods and directions is below the 10min acceptable threshold.*

"0" denotes delay is lower than the base time.

Meeting Target

- All key routes had negligible or minor delays compared to the 10min acceptable threshold during the peak hours.
- Quay St and Customs St have shown minor delays across all peak hours in both directions in January.

Auckland Transport
An Auckland Council Organisation

Auckland Transport
An Auckland Council Organisation