Australian Light Rail Systems & Bus Alternatives - Lessons for NZ
CILT Talk by Neil Douglas 11th October


DARWIN
ATRF DEBATE
LRT v BRT
Oct/Nov 2018
BROOME
DAMPIER
PORT HEDLAND
NORTHERN
TERRITORY
WESTERN
AUSTRALIA
AUSTRALIA
SOUTH
AUSTRALIA
GERALDTON
PERTH
BUNBURY
ESPERANCE
PORT LINCOLN
CAIRNS
TOWNSVILLE
ABBOT POINT
MACKAY
QUEENSLAND
ROCKHAMPTON
GLADSTONE
BRISBANE
GOLD COAST
PARRAMATTA
NEWCASTLE
SYDNEY
WALES
ADELAIDE
MELBOURNE
PORTLAND
TASMANIA
HOBART

My involvement with Light Rail

UK Docklands Light Rail - 1980s Land Use effects
UK Manchester LRT - 1980s Patronage Forecasts (winning consortium)
Midlands LRT – Market Research – UK DoT recommended basis for projects
Phoenix LRT - 1980s Patronage Forecasting

Wellington Heritage Tram 1995
Johnsonville Light Rail - Patronage Assessment Mid 1990s – Urban Consolidation
Wellington Spine Study – Funding Analysis 2012-13

Sydney Pyrmont LRT Patronage Forecasting, Economic Evaluation, Impact on Buses
Sydney NWTL - Patronage Review & Economic Evaluation (LRT one option)
Sydney CBD LRT: Market Research, Patronage, Economic Evaluation ≈2000, 2004, 2012-14
Parramatta LRT – Review of Applicability of TfNSW Demand Forecasting Model 2016
LRT TfNSW Demand Forecasting of Short Trips & Time Period Modelling 2018

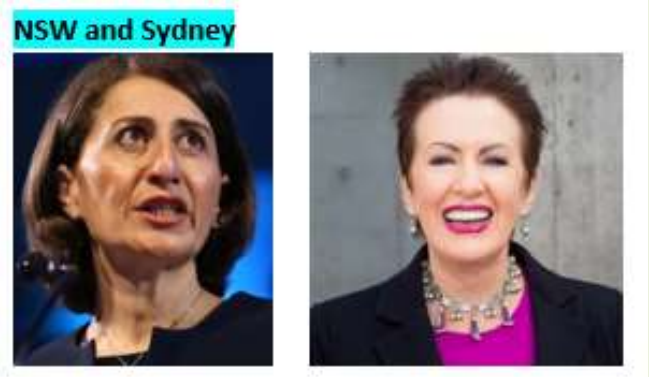
Melbourne – PT Information - Surveys of Tram, Bus and Rail Passengers

Perth MAX 2013 Patronage Forecasting & Economic Evaluation
Gold Coast LRT 2015 – Funding Study

Auckland LRT 2015 – LRT Demand Parameters & Integrating Wider Economic Benefits
Canberra June 2016 - Review of the Economic Evaluation for ACT Audit Office

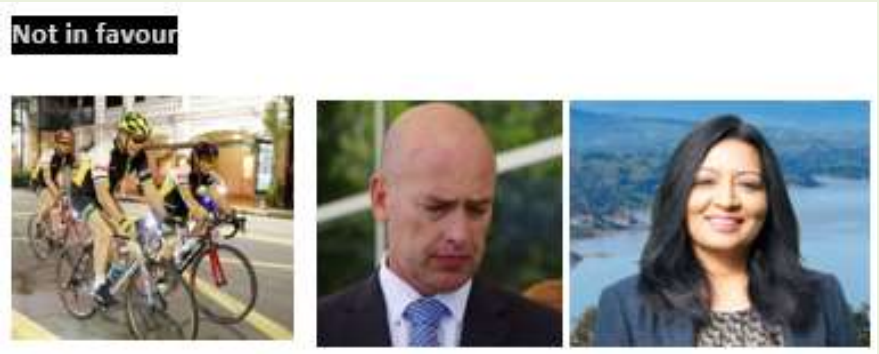
Some of the Australian politicians who have made LRT happen (or not)

Malcolm Turnbull Ex Liberal Prime Minister on right who is keen on rail and who approved federal funding of **Gold Coast LRT stage 2.**
Shown with QLD Premier are Annastacia Palaszczuk & Gold Coast Mayor Tom Tate after riding on the Gold Coast LRT (Photo Courier Mail).



NSW Premier Gladys Berejiklian Liberal on left
Clover Moore Mayor of Sydney on right

Katy Gallagher ACT Labor on left & Shane Rattenbury Green Party Member for Kurrajong on right



Keen cyclist Tony Abbot who was against federal funding of urban rail and pro road funding. In middle, WA Transport Minister who cancelled Perth MAX in 2016 before resigning. On right, Dr Mehreen Faruqi NSW Greens MP who opposed closure of heavy rail into Newcastle & LRT replacement.

How much does LRT infrastructure cost!

LRT Lines opened in Australia since 2010							
LRT Project	Built / Committed?	Cost $Aus millions	Length kms	Cost/Km	Speed kph	Pax (million)	Comment
Newcastle	Yes	280	2.7	104	14	na	Total cost (2017) $510 million (increased from budget of $460m) included $200m for Wickham interchange and $30 million (est.) for LRVs. 2.2 kms of street and 0.7kms existing rail. Street running estimated to add $100m which gives a street cost of $120m per km. Part funded by 99 year lease of Port of Newcastle which raised $340m. Timetabled to take 12 mins compared to 4 mins by Intercity train and 6 minutes by shuttle bus. Also additional transfer. Around 2,500 single trips travelled on intercity line.
Canberra	Yes	707	12	59	29	4.7	Design and construct cost of winning PPP tender (Capital Metro - John Holland). Cost 10% lower than $783m in Business Case (July 2014) which included $65m for rolling stock ($55/km excl RS). 'Present Value' of $939m of 20 year concession ($54m payment in 2020) discounted at 7.52% p.a. Note that ticket revenue (patronage risk) goes to ACT Government. Target 25min travel time Gungalihn - Civic in peak. Forecast of 4.7m trips per year.
Paramatta - Stage 1	Yes	1,200	12	100	na	na	Westmead to Paramatta - Carlingford (P-C via existing Carlingford line). $1.2b estimate based on budgetted figure of $1billion that 'will be exceeded' when Business Case costs released in mid 2017.
Paramatta - Stage 2	No	2,400	10	240	na	na	Based on reported total cost of $3.6 billion. Stage 2 is Camelia - Olympic Park - Strathfield. High cost probably led to staging of project. Metro now proposed.
Sydney CBDSE	Yes	2,100	12	175	22	31	Circular Quay - Central - Moore Park then branches to Kingsford and Randwick. $1.6 billion in 2012 Business Case. TfNSW claimed cost increase was due to change in specification. Major items include tunnel under Moore Park and bridge over Eastern distributor. Audit Office investigation found cost underestimation. Costs exclude costs to Randwick Council. Tiemtable to take 34 mins from Randwick to C.Quay. Travel times increased podty Business Case (priority assumptions). Patronage forecast of 31m trips.
Hobart	No	55	9	6	34	na	8.6kms of restoration of existing single rail track (Glenorchy - Mawson Place) plus 0.4 kms street running to Franklin Park. Cost exclude 15 million for LRVs. Street cost of the order of $10m per km. Fast 3 stop route timetabled to take 16 mins.
Dulwich Hill	Yes	176	5.6	31	19	6.1	Extension of Inner West Darling Harbour-Lilyfield LRT along disused Rozelle rail freight line. Budgetted cost of $150m which was exceeded without cycleway. 40 minute travel time from Dulwich Hill to Central (12.8 kms). Reported 6.1m trips in 2014/15
Gold Coast Stage 1	Yes	1,300	13	100	25	7.7	Opened July 2014 connecting Gold Coast University Hospital in North then running parrallel to Surfers to Broadbeach South. All street runniing. Costs were 30% above budget. Takes 32 mins end to end. 7.7million trips in 2015/16. Estimated 6m diverted from bus so 20% car/walk/new.
Gold Coast Stage 2	Yes	420	7	60	40	na	Northern continuation to Helensvale rail station (with around 50% alongside existing rail corridor). Includes federal funding of $95 million scheduled to be open for Commonwealth Games in 2018. Timetabled to take11 mins from H'vale to GC Hosp.
Perth MAX	No	1,900	22	86	na	30	Mirrabrooka - CBD with short branches south to Victoria Park and QEII Medical Centre. Cost in WA DoT submission to Infrastructure Australia. Project cancelled in 2016. Forecast patronage of 100,000 trips per weekday.
Adelaide Ent. Centr	Yes	100	2.8	36	12	8.9	Extension to Adelaide Entertainment Centre announced in 2008 budget, constructed in 2009 and opened in 2010. Takes 10 minutes from Entertainment Centre to Railway Station (approx 2kms). End to end Ent Cent. - Glenelg takes 52 minutes (15kms) 27kph. Total line patronage of 8.9 million trips in 2015-16 including 6.3million 'free' trips in city centre.

All Projects	Built/Comi	Tot $Aus	Tot Kms	Average	Average	Total
Total 'Committed'	Yes	6,283	67	94	23	58
Total	Some	10,638	108	98	24	88
Uncommitted	No	4,355	41	106	26	30

All Projects	Built/Comi	Tot $Aus	Tot Kms	Average	Average	Total
Max	-	2,400	22	240	40	31
Median	-	707	10	86	24	8
Min	-	55	3	6	12	5

Approx $100 million per km

So much cheaper in the 1920s

Intersection of Brunswick and Wickham St with the two women walking across the tracks in non safety standard hats with man inspecting tracks
Source: State Library of Queensland

So much cheaper in the 1920s

Source: State Library of Queensland

So much cheaper in the 1920s and quicker to build

single tram crossing at Gregory Terrace Source. Courier Mail

Sydney


CBD and South East Light Rail
More information please visit
transport.nsw.gov.au/projects or call
1800 684 490
For urgent enquiries or complaints
please call 24 hours
1800 775 465
NSW
Transport
for NSW

So much more expensive 100 years later

Blame the Americans?

Fed Transit Authority funding standards precluded street-cars applications so engineers over-engineered light rail to be heavier than heavy rail!

Digging up George St Sydney “more electric/telecoms than another street in the world” and putting in 20cms of concrete and redoing utilities 100 metres up side streets Oct 2017 NJD

Near Central Station

Traffic Disruption – and business disruption –
Not included in the Business Case – “it’s a transfer of activity”
Class action by businesses

Traffic Disruption towards Randwick

Out near the Hospital.

Moore Park

Redoing the pipes - renewal should be a benefit in the CBA but is usually omitted

Parallels with Basin Reserve?

Surry Hills – disruption in suburbia

Concrete Foundations heading towards Depot

Still digging up George St May 2018

Adelaide

Interesting Fact: *Free in the city centre*
Patronage increased markedly but survey estimate

Views of Peter Tisato

1. Link up with other transport & activity nodes
2. Don't rush!
3. Are the supposed land use benefits proven?
4. Is road congestion improved or worsened?
5. Can similar outcomes be achieved with BRT

Adelaide

1. Link up with other transport & activity nodes

Initially, tram ran from beach to Victoria Square, which is in the CBD but is not next to the retail heart.

In 2000s, tram was extended to the Adelaide Railway Station, which was on the other side of the CBD. Doing so brought the line through the retail centre.

A second stage extended the line beyond the railway to the Adelaide Entertainment Centre just past the parklands. In doing so, a park-n-ride was built at the Entertainment Centre.

So four ticks: **getting closer to retail centre; and linking with central railway station; linking with key activity node; park-n-ride to maximise effectiveness.**

Peter Tisato

Adelaide

2. Don't Rush!

The last stage was to extend the tram along North Terrace, a cultural boulevard.
The idea probably had merit.

However, the project was done in a **huge rush** to be finished before last March's election.

We are now 6 months post election and the line still has not opened due to ongoing investigations to find and repair major electrical faults. ***Sound familiar?*** ***(brought in a German expert)***

Peter Tisato

Adelaide

3. Are the supposed land use benefits proven?

A primary argument used to justify the tram extensions has been that they generated significant land use benefits, over-and-above transport benefits.

As I understand it, they increase inner-city development relative to fringe development, with associated benefits.

Unfortunately no analyses have been released to support the argument. The same argument has been used elsewhere, yet little in the way of rigorous evidence-based support has been provided.

And there are no ex-post studies yet to test the claims. So is the argument justified?

Peter Tisato

Adelaide

4. Is road congestion improved or worsened?

The rhetoric is that the extension will improve congestion.
Not clear that has occurred.
No formal studies to assess.

Peter Tisato

Adelaide

5. Can similar outcomes be achieved with BRT?

This is a question that continues to prick my mind.

If buses are run in dedicated corridor like trams, why wouldn't the supposed land use effects be similar?

Even if the land use effects are a mirage, BRT is a fraction of the cost.

I suppose the whole debate could change in foreseeable future if new technology trams come on stream at significantly lower costs.

Peter Tisato

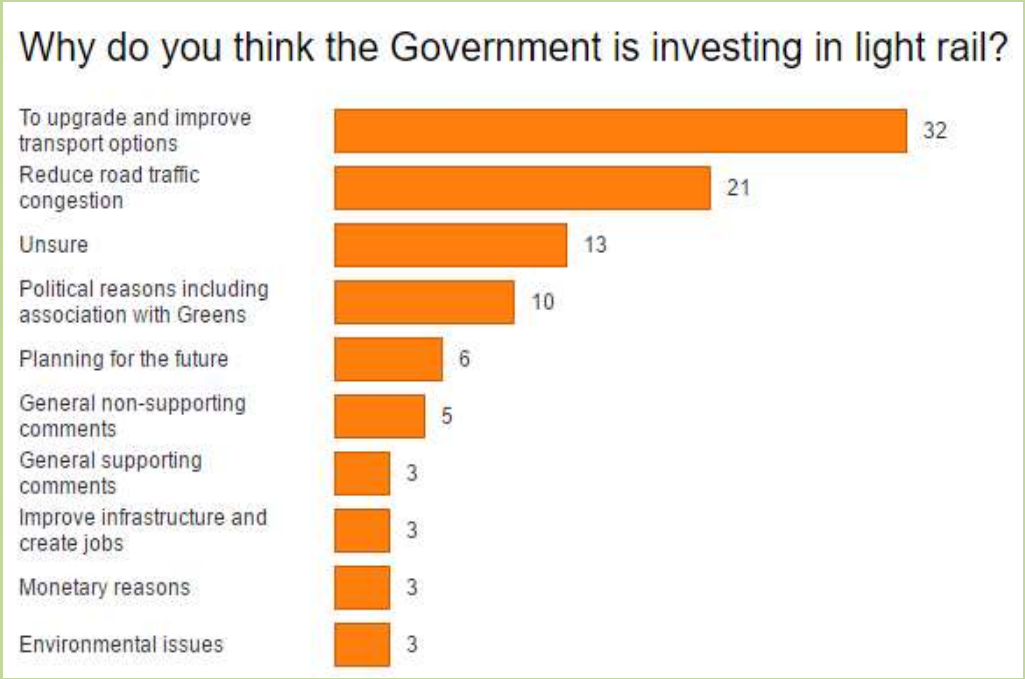
Canberra

54% were concerned about cost & affordability of LRT in 2016 survey of 1,192 respondents (phone call survey)

Public opinion surveys rather than demand forecast market research – a political project?

I ♥ ACTLightRail.info

Asked if they supported extra money being spent on light rail instead of buses for long-term benefits to the environment and job creation, 48 per cent backed light rail compared with 38 per cent supporting buses.



Lots of space for the LRT depot!

Cost Benefit Appraisal of LRT in Wellington versus Canberra

Wellington Spine Study AECOM			
	Benefit / Cost $m PV		
Benefit/Cost	Bus Priority	Bus Rapid Transit	LRT
Public Transport User Benefits	35	96	56
Road User Benefits	-18	-24	-32
Wider Economic Benefits (25%)	*4*	*18*	*6*
Total Benefit	21	90	31
Capital + Operating Costs	46	127	680
Car Parking Cost Savings	-10	-23	-8
Total Cost	36	104	671
Net Present Value	-16	-14	-641
BCR	0.57	0.87	0.05

Benefits/ costs discounted at 8% over 30 years

Canberra LRT		
Benefit/Cost	$m PV	Share
Bus Operating Cost Saving	54	5%
PT User Benefits	245	25%
Road Decongestion Benefits	2	0%
Accident Benefits	7	1%
Health Benefits	5	1%
Externality Benefits	14	1%
Residual Value	81	8%
Land Use Benefits	*381*	*39%*
Wider Economic Benefits	*198*	*20%*
Total Benefits	987	100%
Capital Cost	619	75%
Operating Cost	204	25%
Total Cost	823	100%
NPV	164	
BCR	1.20	
BCR (Transport Benefits)	0.50	

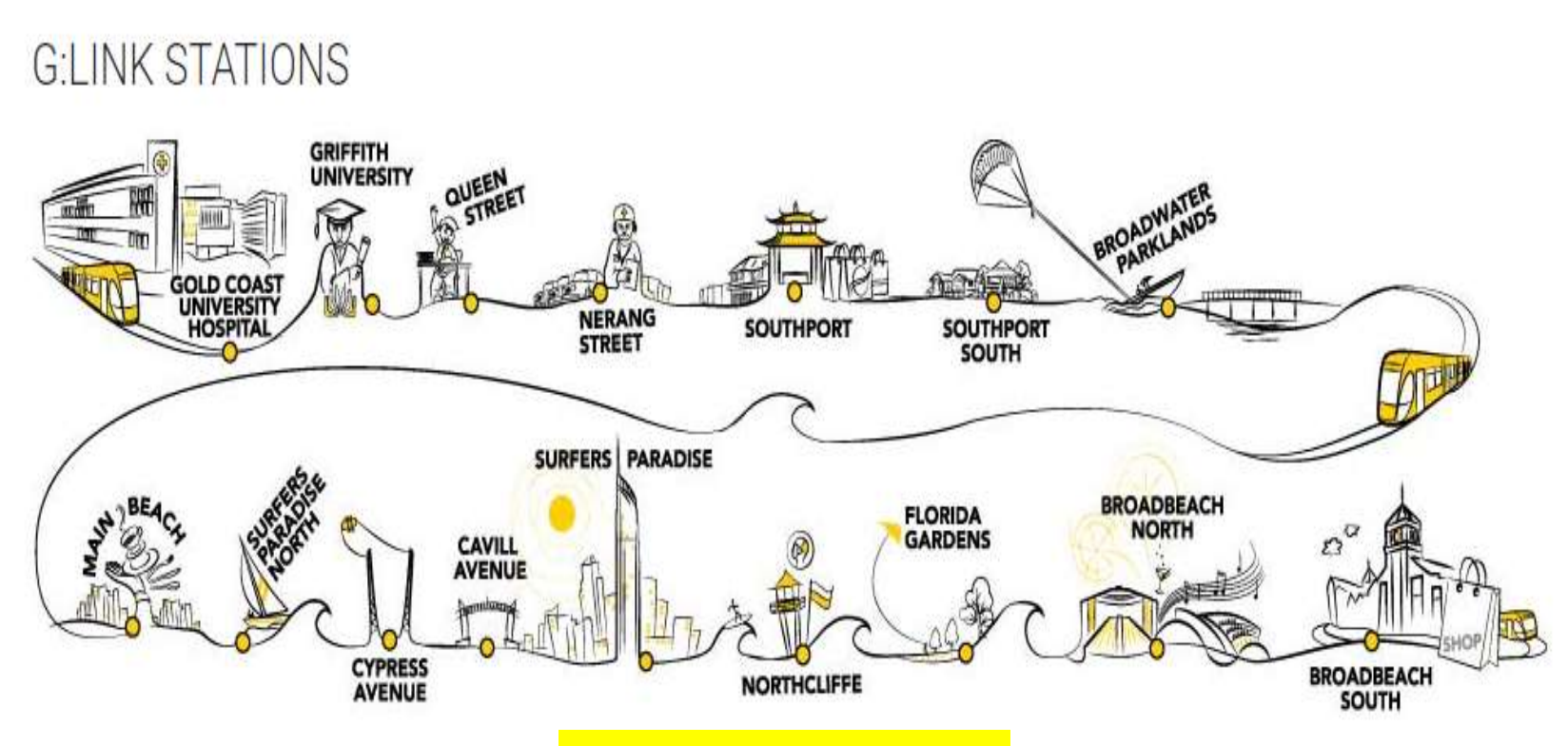
Benefits/Costs discounted at 7% per year 30 years

11kms

12kms

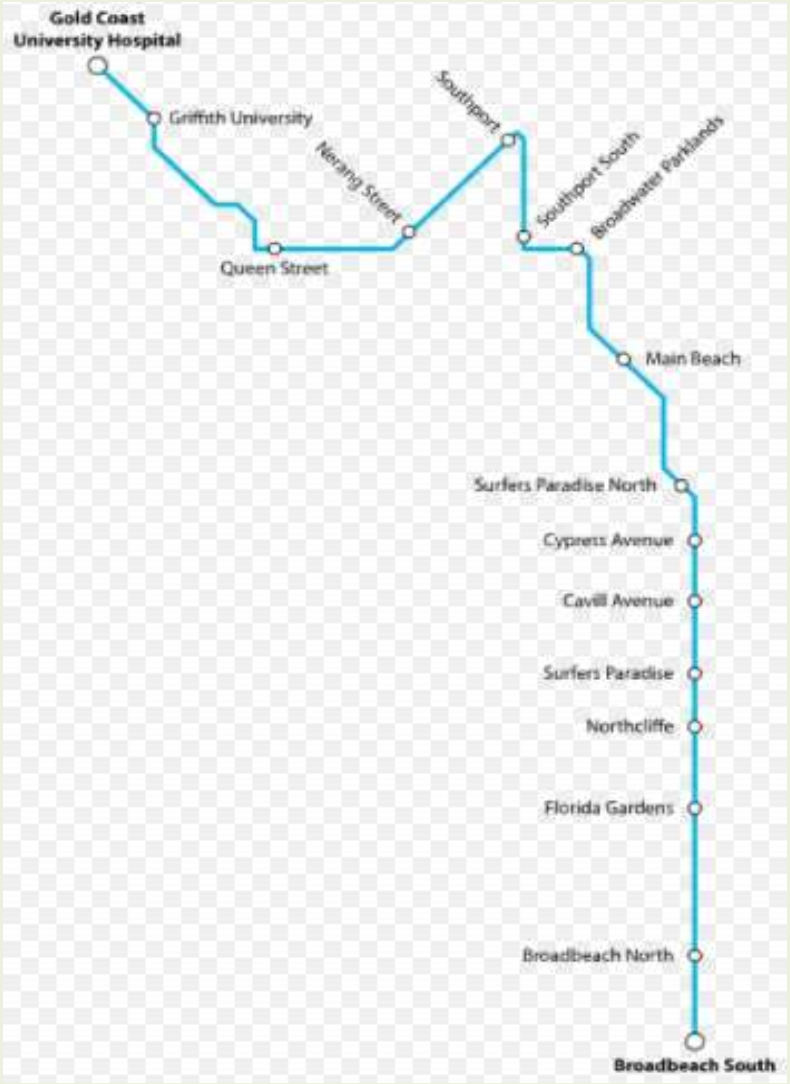
Aerial view courtesy of Wikipedia

Gold Coast Light Rail



String of Pearls?

Wellington: Interisland Terminal, Cake Tin / Cruise Liner, Railway Station, Cable Car, Te Papa Museum, Courtenay Place, Basin Reserve, Hospital, Zoo, Kilbirnie Shops, Kilbirnie Indoor Sports Arena, Airport.

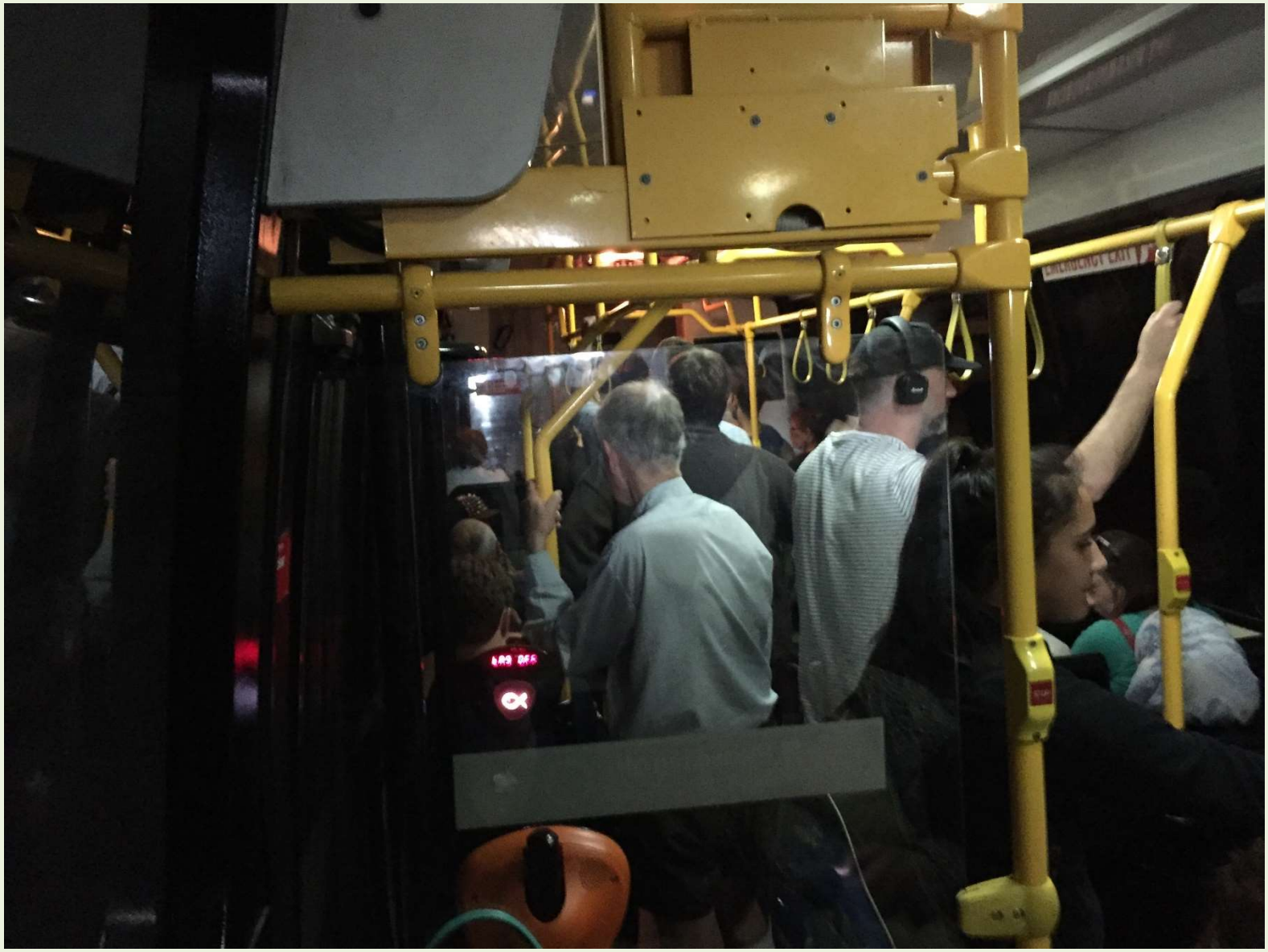

Gold Coast
University Hospital
Griffith University
Nerang Street
Southport
Southport South
Broadwater Parklands
Queen Street
Main Beach
Surfers Paradise North
Cypress Avenue
Cavill Avenue
Surfers Paradise
Northcliffe
Florida Gardens
Broadbeach North
Broadbeach South


tickets


Touch off at the station

Broadbeach South

Well patronised tram back to Helensvale



Melbourne

Graham Currie

Melbourne is a legacy streetcar system - largest in the world.

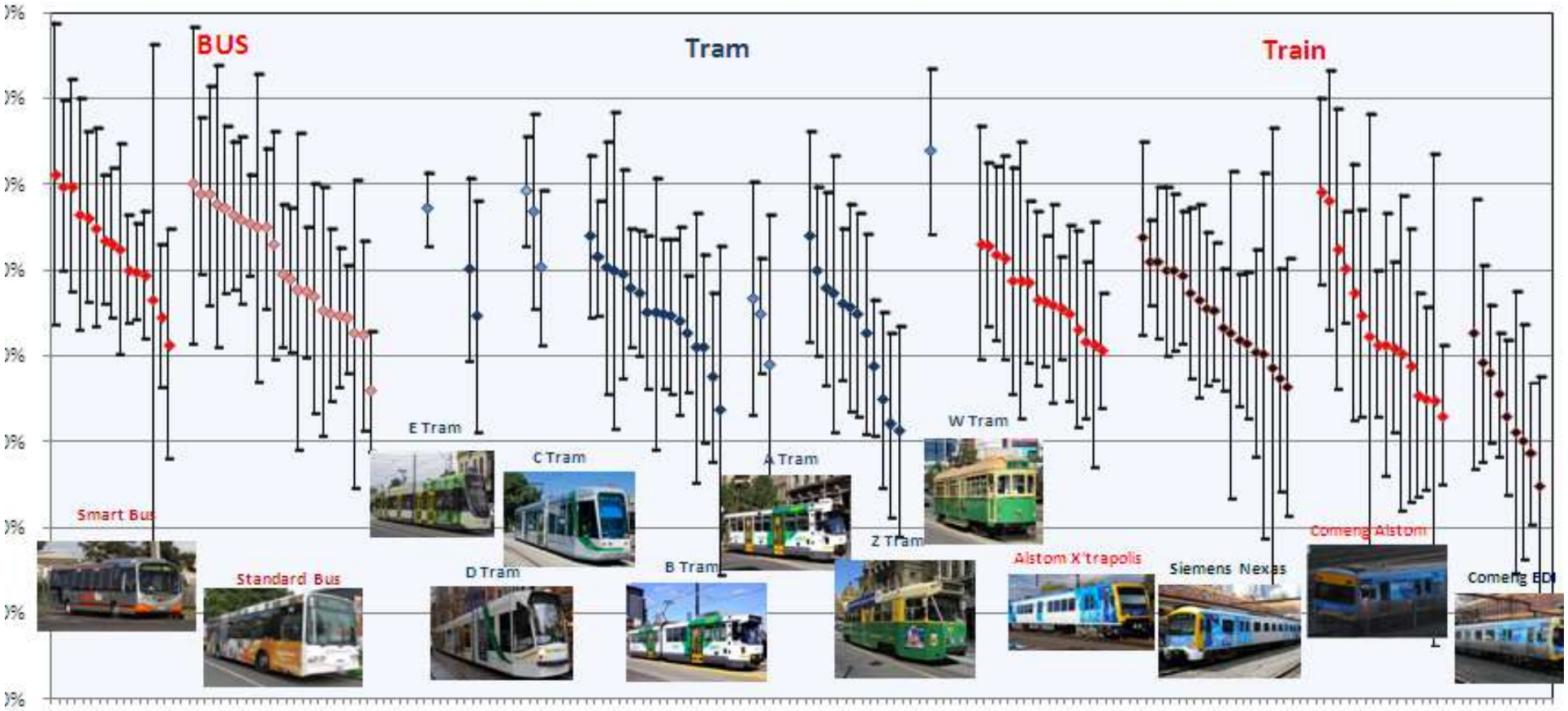
Don't build streetcars; slow, unreliable, old infrastructure needing renewal; traffic interference in operations and inability to have priority due to car dominance a pervasive issue.

Segregation of right of way essential for quality LRT

Investment in higher capacity segregated Right of Way Light Rail has a lot more to do with **land use development** than transport

Trackless tram = interesting new development

Melbourne - How passengers rate their vehicles
2014 Survey by Douglas Economics & Sweeney Research



Melbourne - How passengers rate their vehicles 2014 Survey Douglas Economics/Sweeney

Mode	Average Rating	Lowest Rated	Middle Rated	Highest Rated	Rating Range
Bus	71%	Standard Bus 71% 	not applicable only 2 types	Smart Bus 73% 	71%-73%
Tram	66%	Older Tram, W,Z 65% 	Standard Tram A,B 65% 	New Tram C,D,E 73% 	65%-73%
Train	64%	Comeng 60% 	Siemens Nexas 65% 	Alstom X'trapolis 67% 	60%-67%
All	66%	Comeng 60%	-	Smart Bus/New Tram 73%	60%-73%

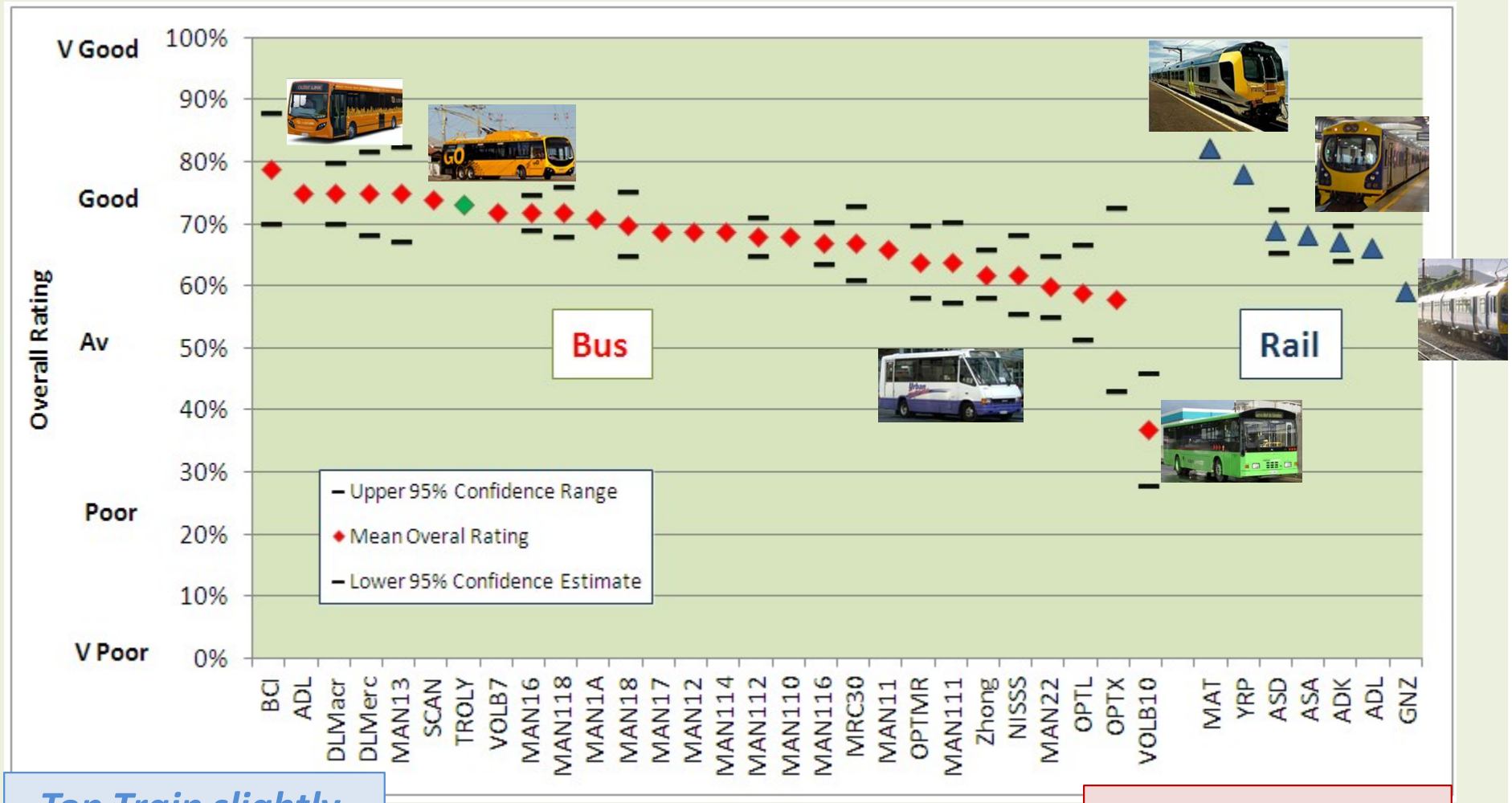
* calculated on the average rating per service surveyed (Rating + SP surveys combined) where a rating given.

Melbourne - How passengers rate their vehicles 2014 Survey Douglas Economics/Sweeney

	Bus		Tram			Rail			
Vehicle Attribute	Smart Bus	Std Bus	New Tram	Std Tram	Old Tram	Xtra	Siem	Comg	All
Outside Appearance	74%	74%	81%	62%	63%	67%	66%	60%	68%
Ease of On Off	78%	78%	82%	66%	67%	76%	77%	72%	74%
Ticket Purchase	69%	71%	-	-	-	-	-	-	70%
Seat Avail & Comfort	73%	76%	82%	69%	69%	74%	74%	67%	72%
Space for Possessions	69%	70%	71%	59%	65%	66%	62%	61%	65%
Smoothness/Quietness	65%	66%	72%	62%	62%	68%	70%	62%	65%
Heating/Air Con	73%	70%	76%	63%	57%	71%	74%	68%	69%
Lighting	75%	76%	82%	69%	68%	74%	77%	71%	73%
Cleanliness/Grafitti	67%	74%	82%	66%	65%	56%	59%	58%	65%
Information	64%	60%	74%	55%	56%	70%	63%	59%	62%
Internet Connectivity	44%	49%	71%	57%	50%	54%	58%	53%	52%
Driver	77%	74%	78%	69%	70%	-	-	-	73%
Environmental Impacts	65%	65%	74%	60%	58%	60%	61%	57%	62%
All - Rating Survey	73%	72%	77%	66%	67%	70%	70%	63%	69%
All - Rating & SP	71%	71%	73%	65%	63%	66%	65%	60%	66%
Sample Size (Rate)	117	136	33	123	73	99	109	110	800
Sample Size (Rate+SP)	252	281	64	251	157	217	230	263	1715

* Calculated on the average of respondent ratings by vehicle type where response given.

Passenger Rating of NZ Buses & Trains



Top Train slightly better than Top Bus

Worst Train better than Worst Bus

Tom Frost – Transport Economics
Director Brisbane

1. LRT really expensive to build
2. Integrate into transport system to reduce number of buses
3. Owning land the key to unlocking land-use potential
4. Understand what the public wants

1. **LRT is REALLY EXPENSIVE** to build in the CBD and the risks are high when you don't know where all the pipes/wires are.

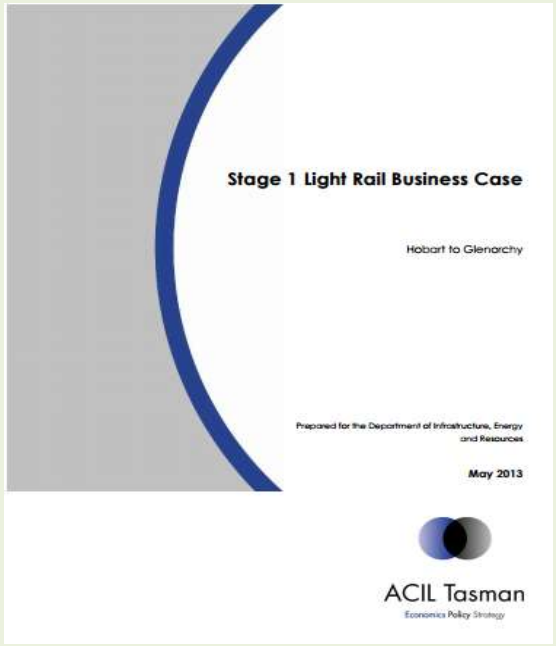
2. **INTEGRATE**: Projects rarely stack up on patronage grounds alone, but if they integrate into the transport network i.e. reduce the number of buses and/or allow them to offer more services, they might stack up on transport grounds alone.

3. **LANDUSE DEVELOPMENT**: Each LRT investment has been made with the implicit assumption that it will offer more than a transport solution, but with the exception of Canberra (where the government owned much of the land adjacent to the corridor and combined the project with major land use changes) these are difficult to identify.

4. Understand what the public wants

- If you are considering an **LRT for Wellington** because of the perception that it is 'popular' you should talk to the people to understand **what attributes of a LRT service makes it popular**.
- Make sure that whatever is built provides those attributes. **Melbourne** is always talked about as the shining light of tram services but these services are **on - street services with relatively low capital cost stops.**
- Almost all the new LRT services have much larger more **expensive 'stations'** and these stations lose one of the key perceived benefits of the Melbourne services, which is **'ease of access'.**
- I would argue that some of the **new LRT systems** have characteristics which are **closer to heavy rail** than Melbourne trams and would question whether this is what people were thinking of when they agreed that it was a good idea to build an LRT in first place.

Hobart



Surprisingly cheap to build!
$55m for 9kms (existing track)
Unusual demand forecasting approach

Table 7 **Benefit cost analysis results – alternate transfer penalties**

	Five minutes	Two minutes	One minute	Zero minutes
BCR				
4%	0.00	0.67	1.11	1.58
7%	0.00	0.48	0.79	1.12
10%	0.00	0.36	0.59	0.84
NPV				
4%	-$83,453,527	-$25,251,088	$8,309,913	$44,326,000
7%	-$75,710,900	-$37,231,886	-$14,998,119	$8,706,000
10%	-$69,572,184	-$42,687,482	-$27,121,490	-$10,635,000
IRR	N/A	1%	5%	8%

No transfer penalty from bus to LRT and its economic

Brisbane

Brisbane Metro

Brisbane Metro is a key part of Council's plan to get you home quicker and safer, with more travel options, less congestion and better public transport. With services every three minutes in peak hour and operating 24 hours on weekends, Brisbane Metro will get you home up to 50 per cent quicker.

Brisbane

Observations of Brendan O'Keefe

Principal Engineer Policy and Strategy BCC

BRT has been chosen rather than LRT because of:

1. **Flexibility**
2. **Integration**
3. **No digging up of streets**
4. **Greater choice of propulsion systems**
5. **No strengthening of bridges/culverts**

Brisbane

1. Flexibility

BRT has more flexibility **in being incorporated into existing street environments (particularly the narrow street environments common in Brisbane, Auckland & Wellington).**

2. Integration

BRT has better ability to integrate with traditional bus services **so both modes get a benefit. There was a study done by the QLD State Government a few years ago to look at the feasibility of converting the South East Busway to LRT. It found that mixing buses with trams caused a number of operational inefficiencies.**

Brisbane

3. No digging up of streets

Do not have to completely dig up the streets to relocate services and lay track. Works for BRT consists of pavement strengthening only if required.

4. Greater Choice of Propulsion Systems

LRT is limited to being dependent on overhead wiring or third rail traction. BRT can use overhead, electric battery, diesel hybrid, diesel.

5. No need to strengthen culverts and bridges

A key cost element for an LRT system in Brisbane is the strengthening required on the Victoria Bridge to get trams across the river.

Perth WA

Ill-fated MAX Light Rail

Now Trackless Tram?

https://vimeo.com/290106133

"Wellington needs light rail as always. My views have not changed on this but they have changed on the technology to do this and I now believe that a Trackless Tram will do everything I always wanted to achieve with light rail but at one tenth of the price.

The TT has six innovations in it from High Speed Rail put into a bus and this makes it a completely different transit system. It has the ride quality of light rail and will attract development around it as occurs with LRT but not BRT.

This means it could be paid for by developers in a partnership and we have the first of these being set up now in Australia. It does not destroy the street economy for several years during construction and can be implemented very quickly using a Bus Depot and main roads Control Centre.
It has a gradient of 13% rather than 6%
with LRT which is very relevant to Wellington"

"If you want documentation on any of this I can provide it but the two small videos in this presentation are very powerful".
Reflections on China Trip. And this table summarizes my views…

https://vimeo.com/290106133

Peter Newman 11th Oct 2018
Via email

Trackless Tram

Fixed v Flexible? = Fixed says Peter Newman

$5 million versus $50 million for LRT per km

$3 - $4 million per set

No construction disruption

In over a 'weekend'?

CRRC – 1930s Rail Co. 18,000 staff Xi Jenpeng President

HSR technology – stabilisers, hydraulic double axles

GPS Optics to keep it 'on track', Special tyres

Battery electric 50kms/recharge takes 10 mins

Lighter 9t v 17t for a bus

Feels like Light Rail – looks like Light Rail…

And can go around an accident

Note claims are far from universally accepted

Characteristics of transit systems

The table summarises the key characteristics of Bus Rapid Transit (BRT), Light Rail Transit (LRT) and Autonomous Rail Transit (ART, or trackless tram) systems.

Characteristic	BRT	LRT	ART
Speed and capacity	✓	✓✓	✓✓
Ride quality	✗	✓✓	✓✓
Land development potential	✗	✓✓	✓✓
Cost	✓	✗	✓
Disruption to services and local economy in construction period	✓	✗	✓✓
Implementation time	✓	✗	✓
Overall	✓	✓✓	✓✓✓

Source: Author provided

Peter Newman 11th Oct 2018
Via email

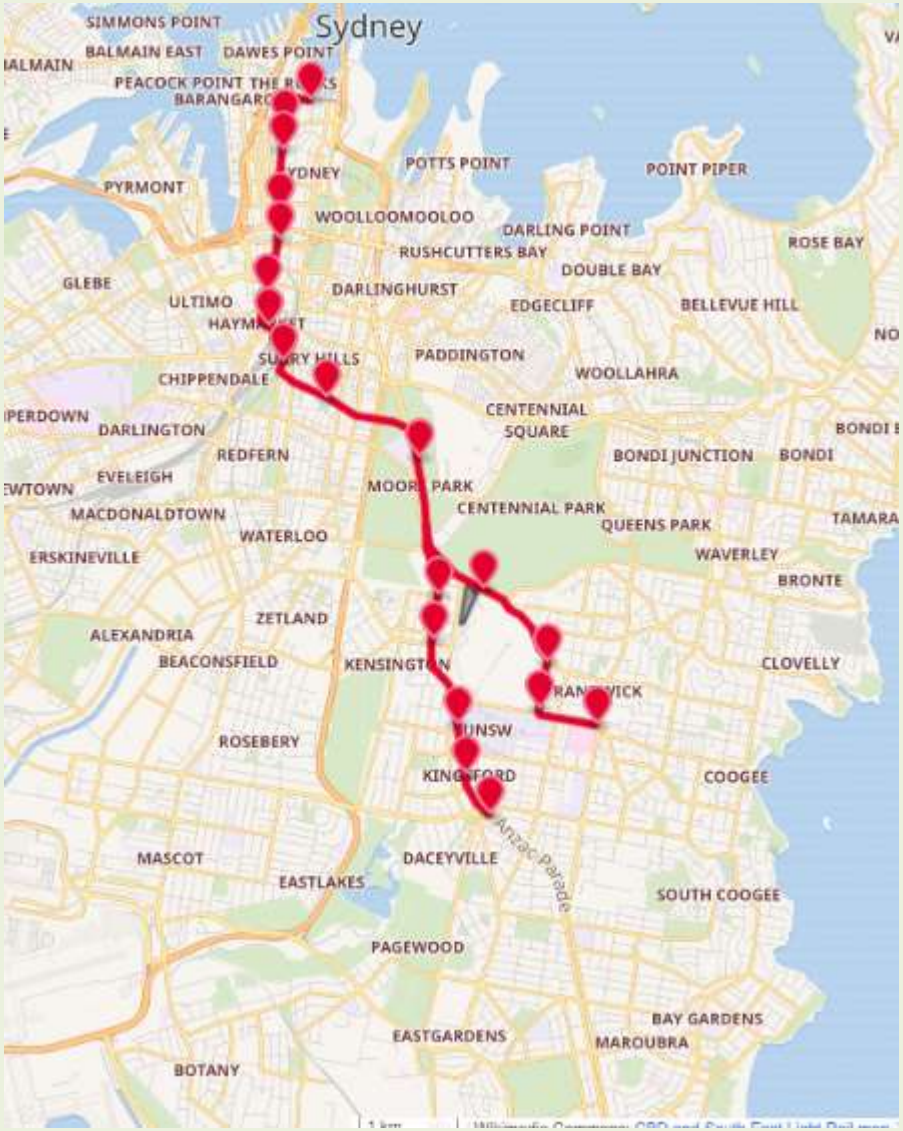
Note claims are not accepted by everyone

The trial route in Zhuzhou is 6.5 kilometres in length

The AKL LRT route from Wynyard to the Airport for example is significantly longer (22km).

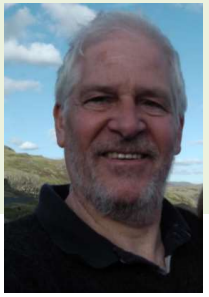
The operation and longevity of the batteries for longer routes similar to the City to Airport route in Auckland is not yet proven.

Sydney CBD-SE LRT



Sydney CBD-SE LRT

Dr Tim Brooker



1. An Old Tram route

The CBD - Randwick route was a former tram route and heavily patronised

So in principle, implementation should have been straightforward.

That's if the traditional route via Anzac Parade - Oxford Street & Elizabeth Street had been retained!

2. But route changed!

But the route was complicated to satisfy route change priorities of the Government Stakeholders

e.g. via George Street through the CBD and to serve the Cricket & Football Stadiums & Racecourse.

Sydney CBD-SE LRT

Dr Tim Brooker
Sydney Transport Planner

1. An Old Tram route
2. But route changed
3. Not full routes so bus interchange
4. Insufficient capacity so buses will still be needed
5. Contractual Issues

Sydney CBD-SE LRT

Tim Brooker

5. Contractual Issues

There were contractual issues with the implementation mainly with the relocation of electricity infrastructure and other utility pipelines and services along the route, the cost and delays from which have been much greater than originally budgeted for, with flow on impacts for business along the roads where construction has taken longer than anticipated.

Sydney CBD-SE LRT

Tim Brooker

3. Not full routes so bus interchange

The implemented route is half of the length of the main corridor to La Perouse & 85% of the route of the secondary corridor to Coogee. So interchange to bus will still be required for longer distance trips.

4. Insufficient capacity so buses will still be needed

So most of the longer distance passengers will still need through buses to & from the CBD but this will be necessary anyway because the LRT peak hour capacity is only sufficient to serve the inner end of the route while providing passengers with a reasonable degree of comfort (i.e. avoiding overcrowding).

Rodney Forrest who worked at NSW Treasury

and was involved with Sydney CBD – SE LRT

Matters considered for CBD-SE Light Rail were like any other major infrastructure project
https://arp.nsw.gov.au/sites/default/files/TPP17-03_NSW_Government_Guide_to_Cost-Benefit_Analysis_0.pdf

Level of scrutiny reflected the size of the project Matters of interest were:

Base Case – what happens without LRT?
Projects linked to LRT in the CBA e.g. George St Pedestrianization?

Construction cost risk? Is it P50 or P90? What escalation is used?
How does George St with its major electrical and telecoms cabling get considered?
Is there d**isruption to business and traffic during construction and flow-on economic impacts**? Is an appropriate impact included the CBA?

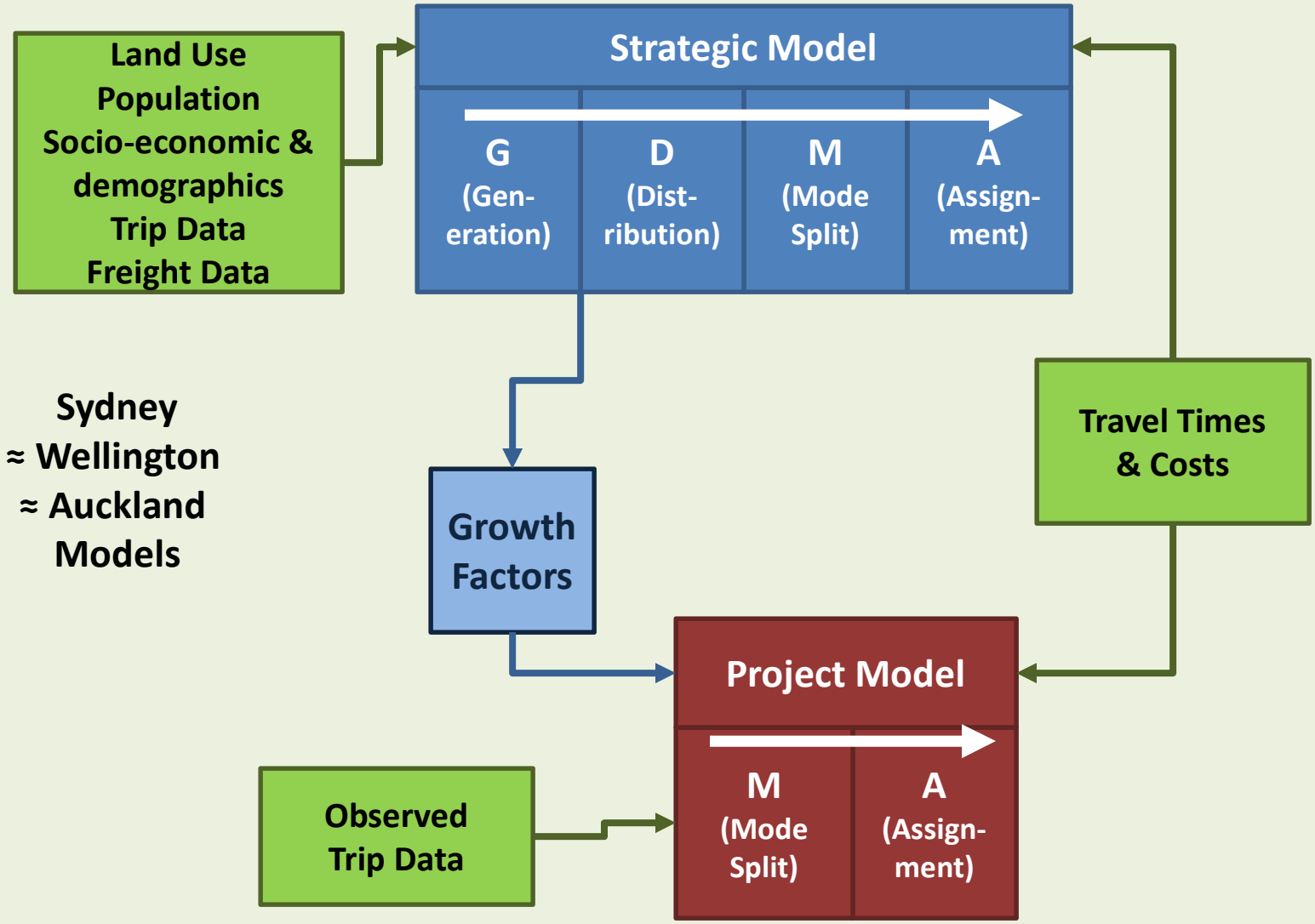
Operational costs and comparison with bus – relevant for ongoing funding support

Revenue assessment and patronage diversion - how much traffic would be 'new'

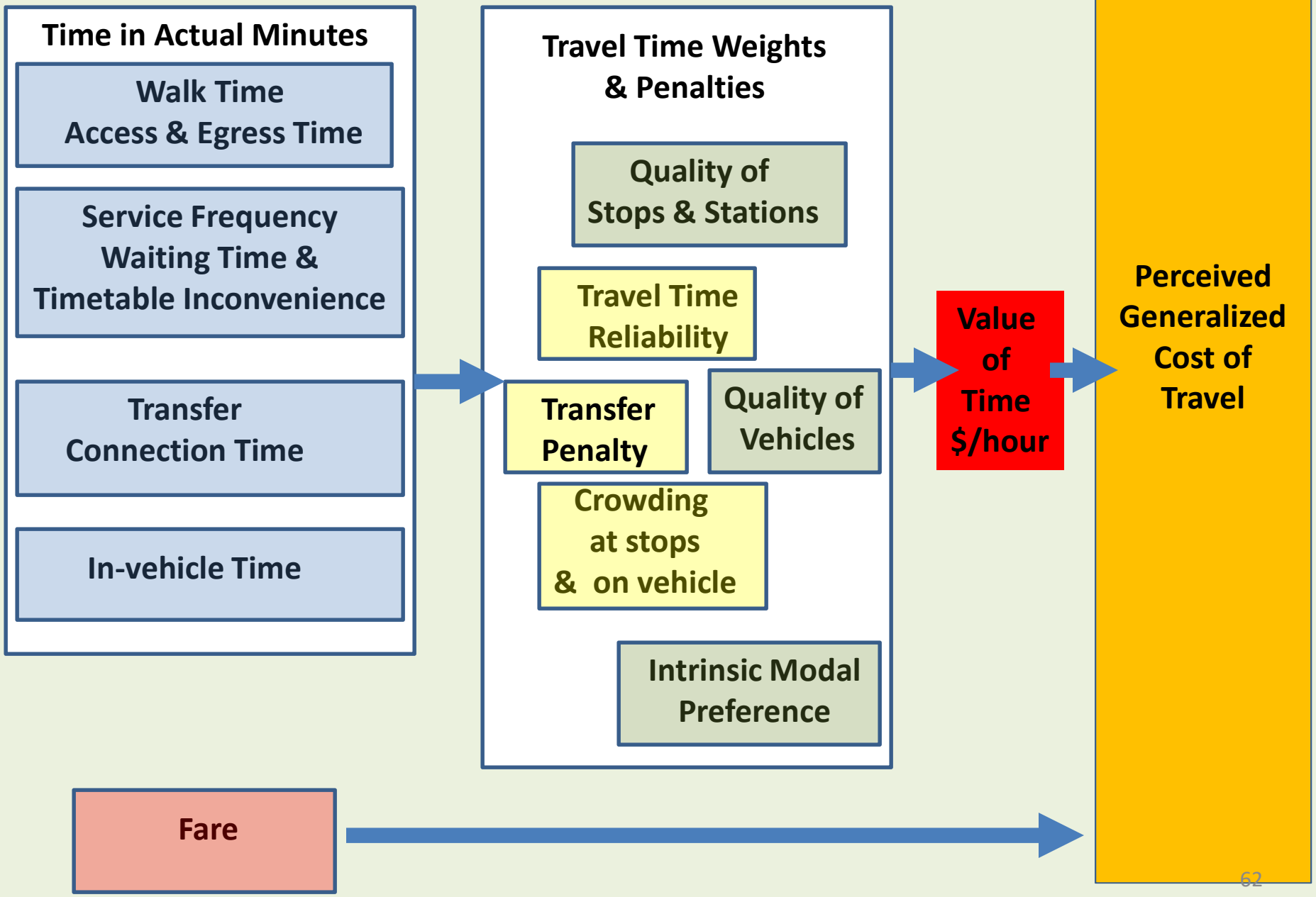
Operational impacts – how is overall road traffic capacity and performance affected?

'User Benefit' is a major benefit but its less tangible & reflects input values of time
How reasonable are the LRT 'time savings'?
What benefit is there from LRT over a bus and does it justify subsidy?

Patronage Forecasting - Demand Model



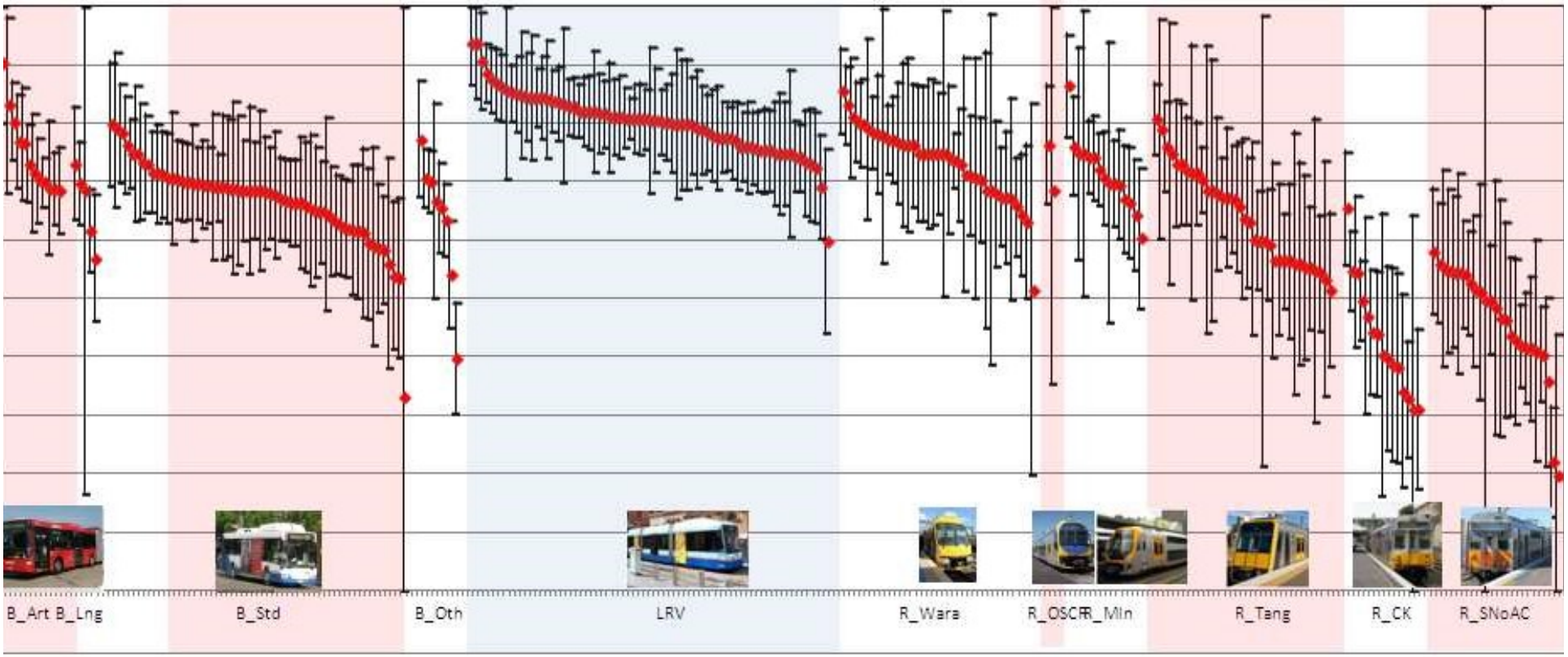
Calculating Generalised Travel Times



Market Research for Sydney CBD-SE LRT Service

6,710 Responses 2013

Sydney public transport users view of their own mode

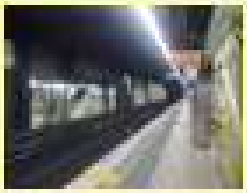


Sydney Light Rail Vehicles were the highest rated

Mode	Average Rating	Lowest Rated Type	Highest Rated Type	Rating Range
LRT	80%	Variotram 	Only one LRT type	
Bus	68%	'Other' 64% Rating 	M10 Artic. 75% Rating 	64% - 75%
Train	64%	C/K Sets 43% Rating 	Waratah 74% Rating 	43% - 74%
RailCorp 2012	*70%*	*C/K Sets 59% Rating*	*Waratah 82% Rating*	*59% - 82%*
Train All	66%	C/K Sets 53% Rating	Waratah 77% Rating	53% - 77%
All *	71%	43% C/K Train	80% LRT Variotram	43% - 80%

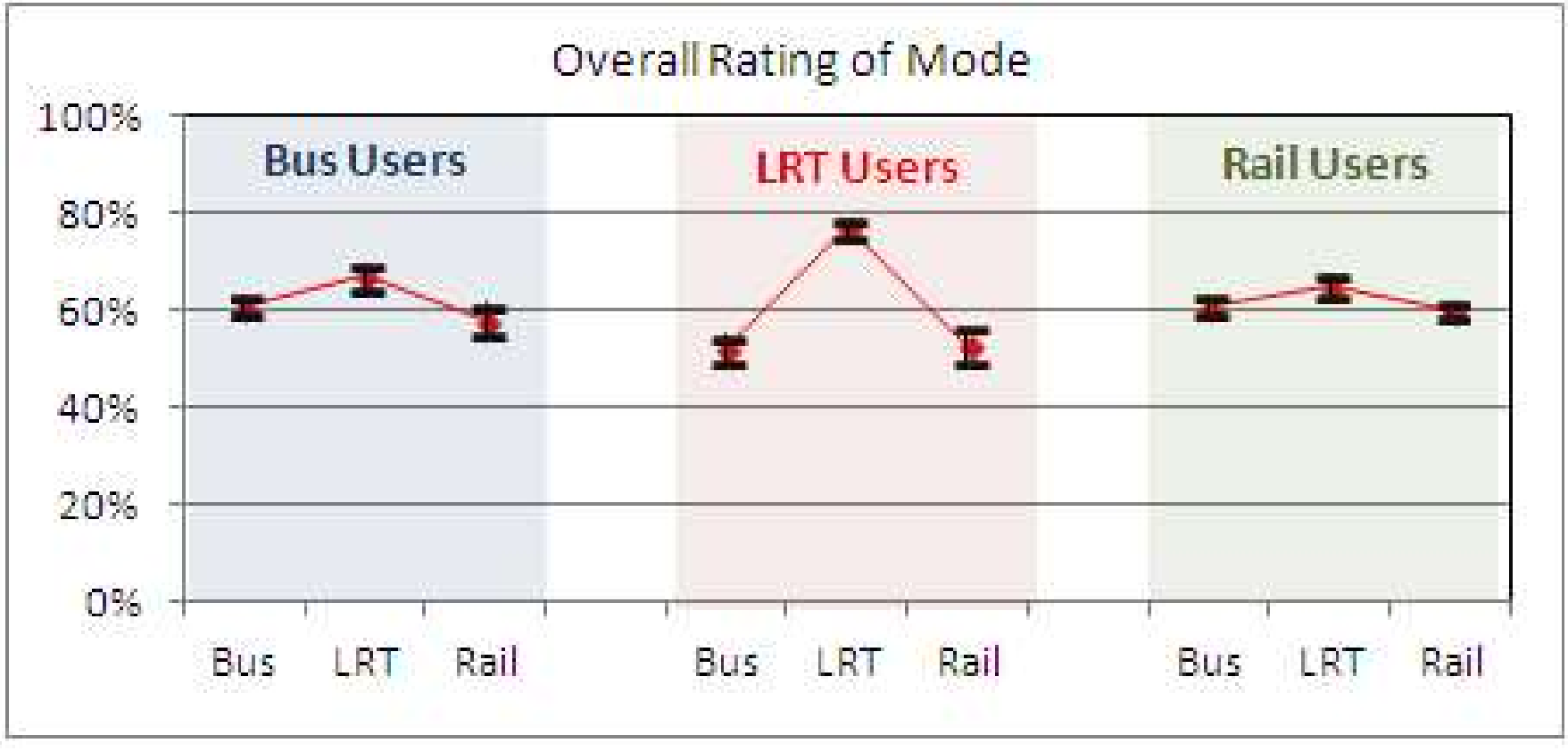
* excluding 2012 RailCorp Survey

Sydney LRT stops were the highest rated

Mode	Average Rating	Lowest Rated Stop/Station	Highest Rated Stop/Station	Rating Range
LRT	74%	John St Sq 63% 	Rozelle 81% 	63%-81%
Bus	62%	Town Hall 56% 	Central 70% 	56%-70%
Rail	66%	Town Hall 61% 	Illawarra 76% 	61%-76%
RailCorp 2006	*59%*	*Macarthur 39%* 	*Martin Place 75%* 	*39%-75%*
ALL *	67%	Town Hall (Bus) 56%	Rozelle LRT 81%	56%-81%

* Excluding RailCorp 2006 Survey

Sydney public transport users view of bus, LRT and rail



Value of LRT compared to Bus

Source	LRT Advantage over bus for a 25 minute trip	Implied IVT Multiplier	Comment
Australian TransportCouncil Guidelines 2006	**7.5**	**0.70**	Based on a 2001 review for Auckland Regional Council. Incorporates a 2 min constant and 5.5 minute travel time advantage. The combined 7.5 minute advantage implies an IVT multiplier of 0.7 multiplier for a 25 minute trip.
Douglas Review 2014	**5**	**0.81**	Estimated at 25 minutes. Based on a review of 15 studies with no significant difference between rail & LRT.
US Federal Transit Authority	**5**	**0.80**	Recommended parameter for commuter rail versus bus for 'Quality Control' modelling.
UK Tram Wardman Review	**10**	**0.60**	Average of ten UK studies. Trip length was not reported. 25 minutes assumed.
Sydney Market Research Douglas	**4**	**0.84**	Separated out intrinsic (-2.8 mins) preference from quality (-1.3 mins) preference.
Median	**5**	**0.80**	
Mean	**6**	**0.75**	

Other findings from Sydney Study

Transfer Penalty = 5 minutes Rail - LRT
= 8 minutes to/from Bus

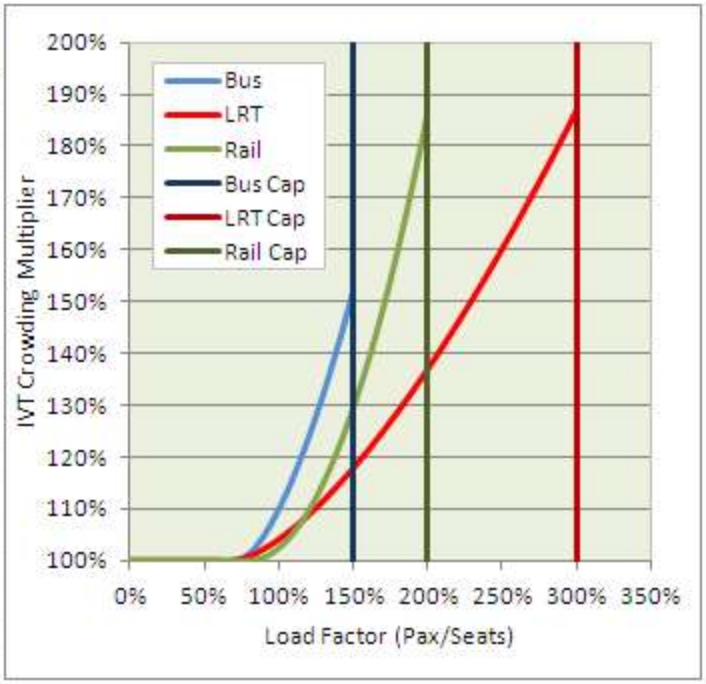
Wait time 1.5 x in-vehicle time so
5 minute transfer Rail to LRT = 5 + (5 x 1.5)= 12.5 minutes
5 minute transfer Rail to Bus = 8 +(5 x1.5) = 15.5 minutes

Cost of unreliability Valued 3 times worse than 'planned' time

Crowding – increases 'cost' of onboard time….
With LRT having greatest load factor (Pax/Seats)

Load Factor(1)	Bus	LRT	Rail
80%	101%	101%	100%
90%	105%	102%	101%
100%	110%	104%	102%
110%	116%	106%	105%
120%	124%	109%	109%
130%	132%	112%	115%
140%	141%	115%	121%
150%	152%	118%	129%
160%	na	121%	138%
170%	na	125%	148%
180%	na	129%	160%
190%	na	133%	172%
200%	na	137%	186%
220%	na	146%	na
240%	na	155%	na
260%	na	165%	na
280%	na	176%	na
300%	na	187%	na

(1) Passengers / Seats



TfNSW
Walk Trips to LRT – CBD
Hop On Hop Offs

Very Few before and after studies
Croydon

Trip Making	Total	Percent
Made the trip before	1,868	95%
New trip (too difficult before)	101	5%
Total	1,969	100%

Excludes 86 who moved house, 156 who moved job, 180 other and 143 non response.

Previous Mode	Trips Transferred per Year 000s	
	000s	Percent
Bus	9,316	69%
Car as Driver	2,160	16%
Car as Passenger	405	3%
Rail	945	7%
Walk	540	4%
Other	135	1%
Total	13,501	100%

Source: Copley et al (2002)

Light rail will derail Premier Pollyanna

Miranda Devine

September 26, 2018 12:00am
Subscriber only

How the luckiest Premier in the wealthiest state in Australia managed to drive her government into a losing position against a lacklustre opposition is a salutary tale for politicians who are more abacus than acumen.

The light rail catastrophe is emblematic of the Premier's Pollyanna approach.

No one wanted trams back in Sydney except Gladys, then the transport minister, and Lord Mayor Clover Moore.

Gladys Berejiklian, pictured in the NSW Legislative Assembly on Tuesday, ignored reports sceptical about the success of a light rail project, but pushed ahead regardless. Picture: Mick Tsikas/AAP

In 2012, Gladys and then Premier Barry O'Farrell ignored every naysayer around the cabinet table, including then-Roads Minister Duncan Gay whose department was warning that light rail would make congestion in the CBD 35 per cent worse.

This was a nightmare we walked into with our eyes wide shut.

Every expert said it was stupid. The business case was woeful. It would increase congestion. It would cost a fortune. George Street was too narrow.

And yet Gladys forged ahead.

Existing bus passengers would be worse off because they will "be required to interchange or walk a longer distance."

And it warned the narrowness of George Street means "a high capacity light rail service is fundamentally incompatible with a high-quality pedestrian boulevard."

The truth is light rail was always just a boutique adornment to the city, a vanity project, not the solution promised for harried commuters.

The report accurately predicted that the project would damage businesses along the route, "cause substantial disruption for several years" and the need to move water electricity and telecommunications utilities underneath George Street "could impose significant costs and delays."

Ain't that the truth.

In 2013, a business case review by Evans & Peck also predicted cost blowouts and delays because of the difficulty of replacing utilities.

And now Spanish subcontractor Acciona is suing the government for $1.2bn, claiming it was misled about the amount of work needed to replace those utilities.

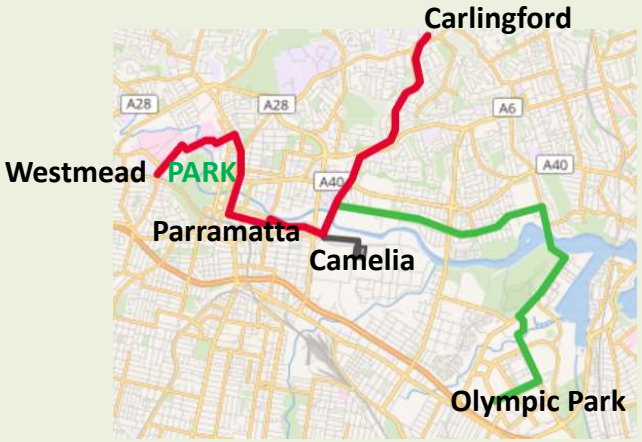
The Infrastructure NSW report is so prescient as to break your heart.

"As other cities have learned to their cost, an ill-considered light rail plan can lead to years of disruption and financial disaster", it says.

It cites light rail debacles in Jerusalem — nine years and a doubling of costs — and Edinburgh. Originally planned as three lines covering most of the city, it ended up being half a line, six years overdue, at triple the cost.

There were so many warnings.

Parramatta Light Rail



"The light rail corridor will activate a priority growth area and there is an opportunity for the government to share in the value uplift that will occur along the corridor. A Special Infrastructure Contribution will be implemented, with the levy expected to be set at around $200 per square metre of gross floor area of new residential developments subject to consultation." TfNSW 2015


The Sydney Morning Herald

EXCLUSIVE NATIONAL NSW

Parramatta light rail costs blow out to more than $3.5 billion

By Jacob Saulwick

15 October 2016 – 11:44pm

May 2015 BCR = 0.73, July 2015 0.66 – 1.06 with WEBs
Construction blow out from $1 billion allocated so 2 Stage Dev.

Stage 1: 12kms
Walk distance between Parramatta rail station & Light rail stop
Enforced transfer for Carlingford Line– Sydney CBD passengers offset by more frequent services with newer vehicles
Circuitous route around Parramatta Park
High car use by medical staff visitors
Stage 2 9kms
LRT catalyst for redevelopment of housing/business

BUT Value Capture has practical issues

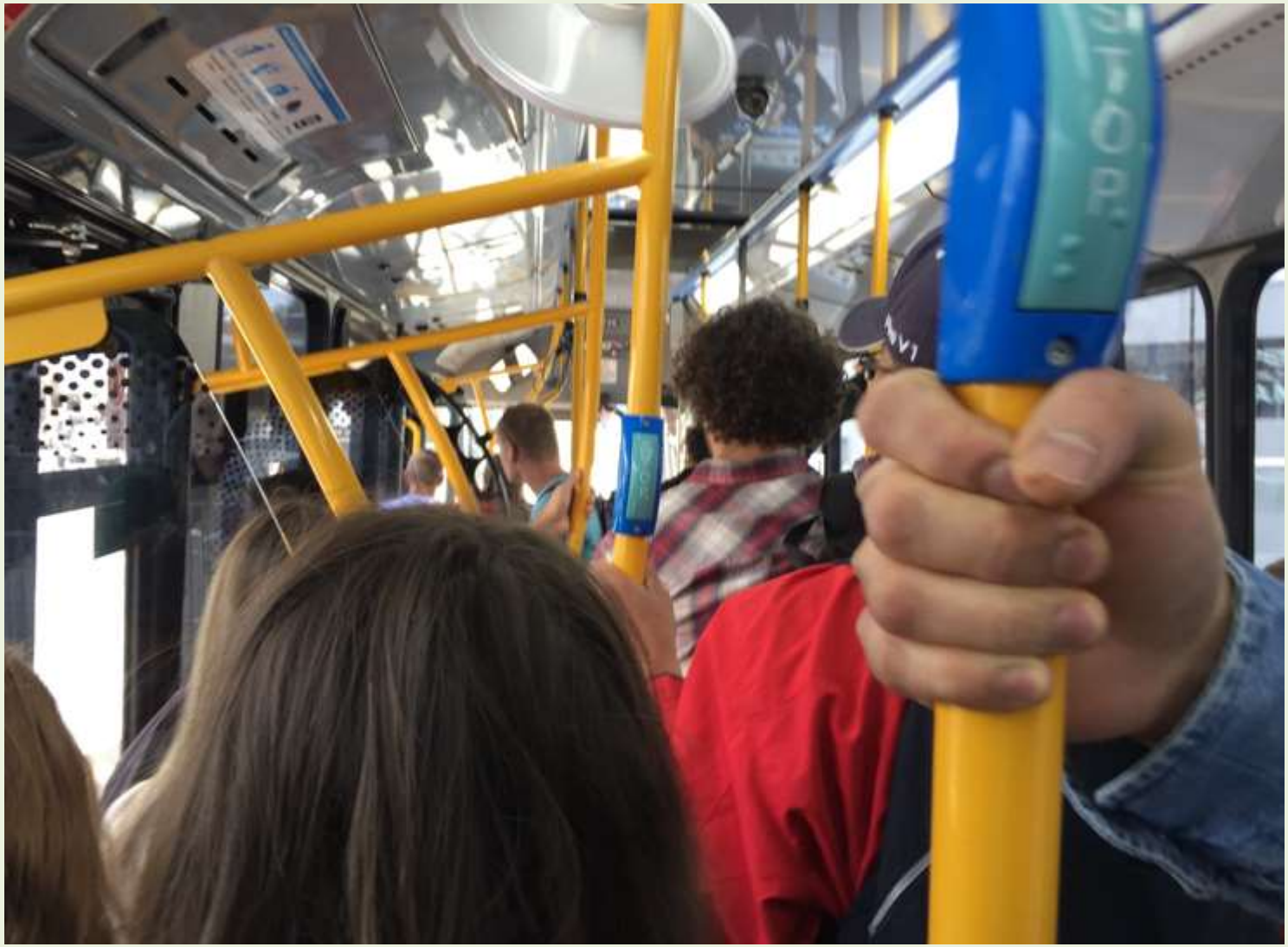
Newcastle LRT

NO OVERHEADS: The city's light rail will use battery storage technology.

Hamilton Station – transfer to temporary shuttle bus

NJD Oct 2017

Temporary Bus Shuttle Hamilton – Newcastle CBD (free)



NJD Oct 2017

Newcastle Bus Shuttle from Hamilton – until LRT operation

Marking out where the utilities are

NJD Oct 2017

What will happen to the disused stations?

NJD Oct 2017

Stockpiling the plastic pipes

NJD Oct 2017

NJD Oct 2017

Newcastle LRT

Some good news from TfNSW

September 17th 2018 – completion of 350m section on budget/time Parliamentary Secretary for the Hunter Scot MacDonald said today was the first day towards the future of Newcastle.

"We've connected Newcastle to its harbour after the heavy rail corridor acted like the Berlin Wall for more than 100 years. Today workers, tourists and families can freely move between the waterfront and the city centre to create more foot traffic and more activity for businesses," Mr MacDonald said.

"Newcastle's light rail is Australia's first and only completely wire-free system, and along with the city scape upgrades and landscaping Newcastle is getting the attractive urban space it needs to thrive.

Some final thoughts

LRT construction costs ludicrously expensive – so difficult to see how LRT can be justified.

Why? LRT US '20cms of concrete' instead of German standards? Disruption costs severe. 2 years for Lambton Quay?

Each Australian city has differences in 'context', priorities, requirements for their public transport system but same old arguments: Steel v rubber wheels, fixed v flexible, diesel/electric

Technology is developing rapidly: wireless electricity, lighter batteries, optic guidance, stabilisation, rubber wheels, driverless…. Don't lead technology but be receptive to it. So *Don't be the first and don't be the last with technology!*

The Capacity Problem: Do we want hundreds of thousands more people living in Australasian cities?

'Business Cases' should be OPEN not SECRET (NZ pretty good here) but focus reports on the important numbers not waffle.


05
G:link

Thanks to the Australian experts for their contributions:

- Tim Brooker
- Graham Currie
- Rodney Forrest
- Tom Frost
- Brendan O'Keefe
- Peter Newman
- Peter Tisato