

# Overview – PT Research @ Monash Hot Collaboration Topics

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Public Transport Research Group (PTRG)  
Monash University, Australia

September 2018



## PTRG Overview

### HOT COLLABORATION TOPICS

1. Optimising Revenue Protection
2. Managing Transport Disruption
3. Equity & On-Demand/Shared Mobility











**PUBLIC TRANSPORT  
RESEARCH GROUP**



**MONASH** University

# CONNECTING CITIES

PTRG is the name for researchers at Monash University who are engaged in research on public transport systems, users, planning and policy.

**DISCOVER MORE**



## A Scientometric Analysis of Public Transport Research

Leonard Heilig, University of Hamburg, Germany  
Stefan Voß, University of Hamburg and PUCV, Valparaíso, Chile

### Abstract

Public transport research involves a lot of disciplinary and interdisciplinary research applying methods, techniques, and technologies to investigate, regulate, and advance public transport. The importance of research in this area has led to a huge amount of publications in recent years. In this study, we conducted a comprehensive scientometric analysis of related literature published in 2009–2013 to empirically explore the consistency, focus areas, and key contributors of public transport research from a meta-perspective, providing novel insights into publication patterns, major topics, research impact, and productivity by focusing on short-term developments. As such, the results of this study provide a novel perspective on public transport research and may help achieving an overview on important characteristics.

**Keywords:** Public transport, public transport research, scientometric analysis, scientometrics, keyword cluster analysis.

### Introduction

Public transport, as a mode of transportation moving people from one place to another, is a publicly-used form of conveyance (Levinson et al. 2015), plays an essential role not only for providing sustainable transport forms (Krygsman et al. 2004) and serving the needs of those who are dependent on efficient transport systems, but also for supporting social equity principles (Webster and Bly 1982). The perception of local public transport in terms of accessibility, safety, and efficiency not only influences business travelers and tourists (Thompson and Schofield 2007). Further, the quality of public transport as well as the interplay between different inter-urban and urban transport systems, including car and bike sharing systems, become increasingly important not only in our modern society, but also in developing countries (Sohail et al. 2015). Public transport demand is stimulated by social and economic conditions (e.g., city income, car ownership, land use) as well as by direct demand factors such as service quality (Webster and Bly 1982). Against this backdrop, public transport

Journal of Public Transportation, Vol. 18, No. 2, 2015 111

## World Review of Public Transport Research (2009-2013)

Heilig L and Vos S (2015) 'A Scientometric Analysis of Public Transport Research' *Journal of Public Transportation* Vol 18 No 2

## Top 3 world Universities in Public Transport Research

- Uni of Toronto, UCal Berkeley, MONASH UNIVERSITY

## Most Productive Authors (World Ranking)

- PTRG Staff - Graham Currie 2<sup>nd</sup>, Alexa Delbosc 11<sup>th</sup>
- PTRG Associates – Avi Ceder 3<sup>rd</sup>, John Nelson 10<sup>th</sup>

## Most Cited World Authors

- Graham Currie 5<sup>th</sup>

## International Awards

TRB Largest Transport Conference in the World (13,000 delegates)

- Best Paper in Public Transport (William M Millar Award)
  - 2012
  - 2017

## World Conference on Transport Research

- Best research paper in Transport Policy 2016

## ARRB Transport Research

- Research Impact Award 2017



# PTRG is part of a wider collaborative framework in transport research across multiple groups/ faculties

## Key Research Groups



## Key Research Themes

Railway  
Engineering &  
Technology

Public Transport  
Policy & Operations

Traffic &  
Transport  
Systems

Intelligent  
Transport  
Systems

Design in  
Public  
Transport

Model Data  
Fusion

Light Weight  
Vehicles

Aerodynamics

Transport  
Safety



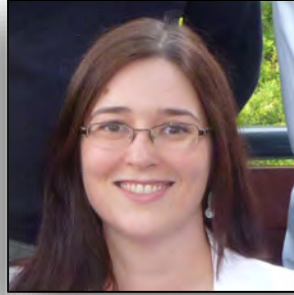
# Key PTRG staff, the associate team & students



**Prof Graham Currie**  
Chair of Public  
Transport



**Nicholas Fournier**  
Research Fellow



**Dr Alexa Delbosc**  
Senior Lecturer  
DECRA Fellow



**James Reynolds**  
Research Fellow



**Katerina Pavkova**  
Research Fellow



**Wendy Walker**  
Website  
Manager



**Dr Farhana Naznin**  
Research Fellow

- 27 PhD students
- 52 Research associates across Monash University (e.g. ITS, MADA, MUARC), International Universities, and external experts
- 48 Masters Students; most in China
- 10+ final year civil engineering undergraduate research students per year

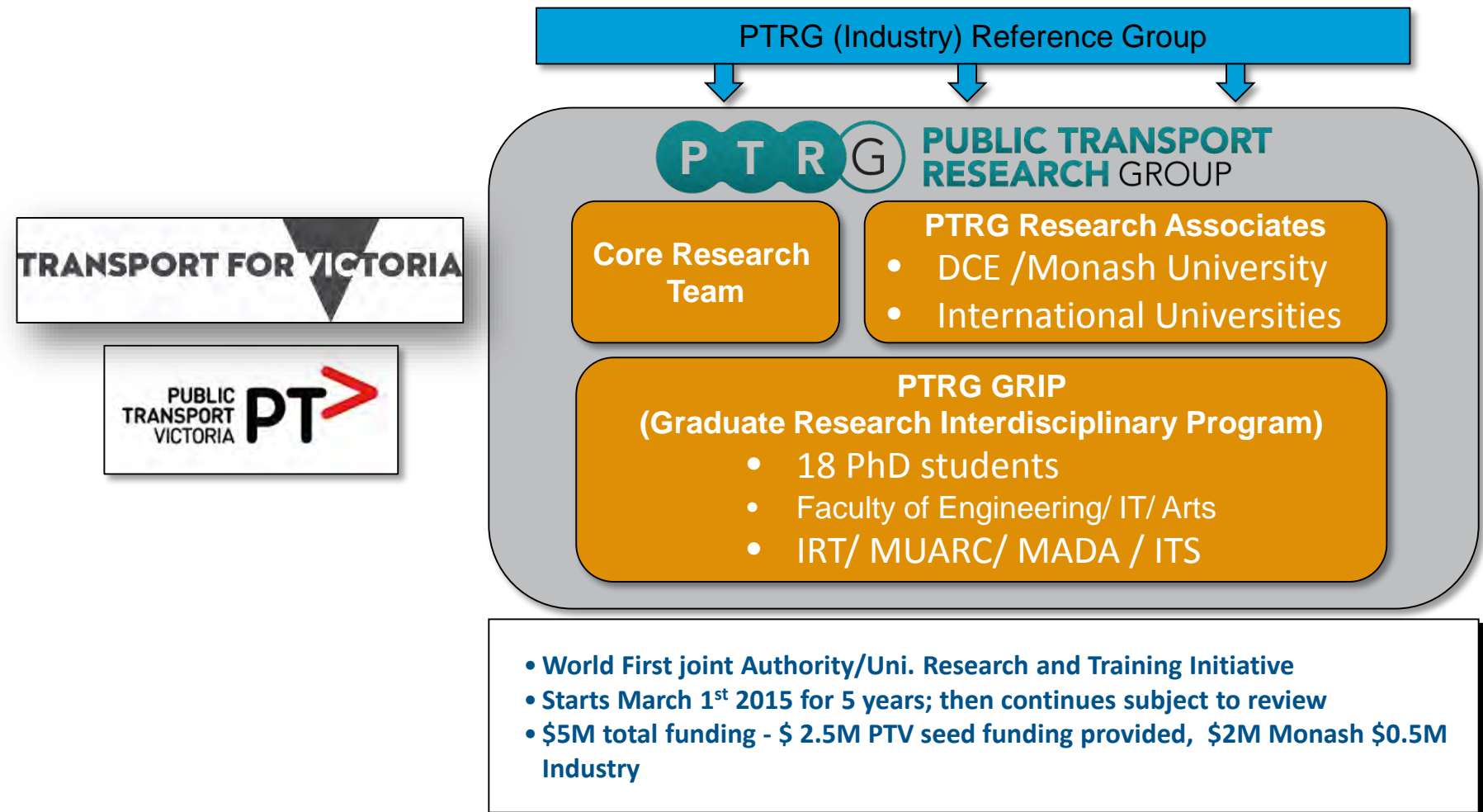


**Laura McCarthy**  
Research Fellow



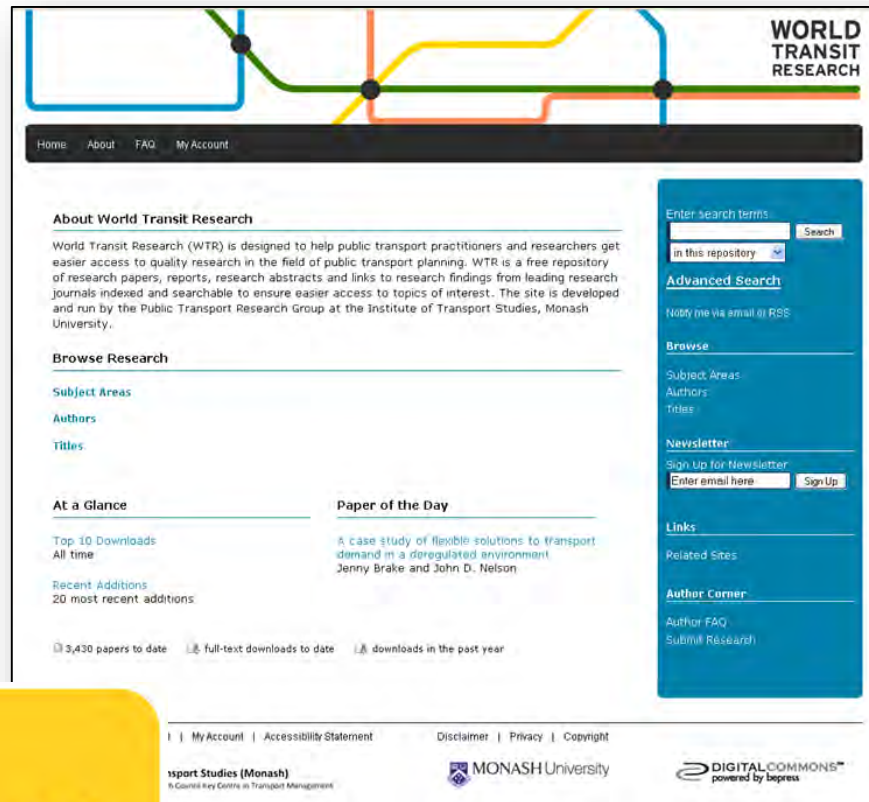
**Dr Kun An**  
Lecturer

# The Chair started in 2003; in 2015 a new PTV/TFV - Monash Public Transport Research Group (PTRG) commenced





# PTRG runs World Transit Research; the global research clearinghouse for public transport research



## World Transit Research

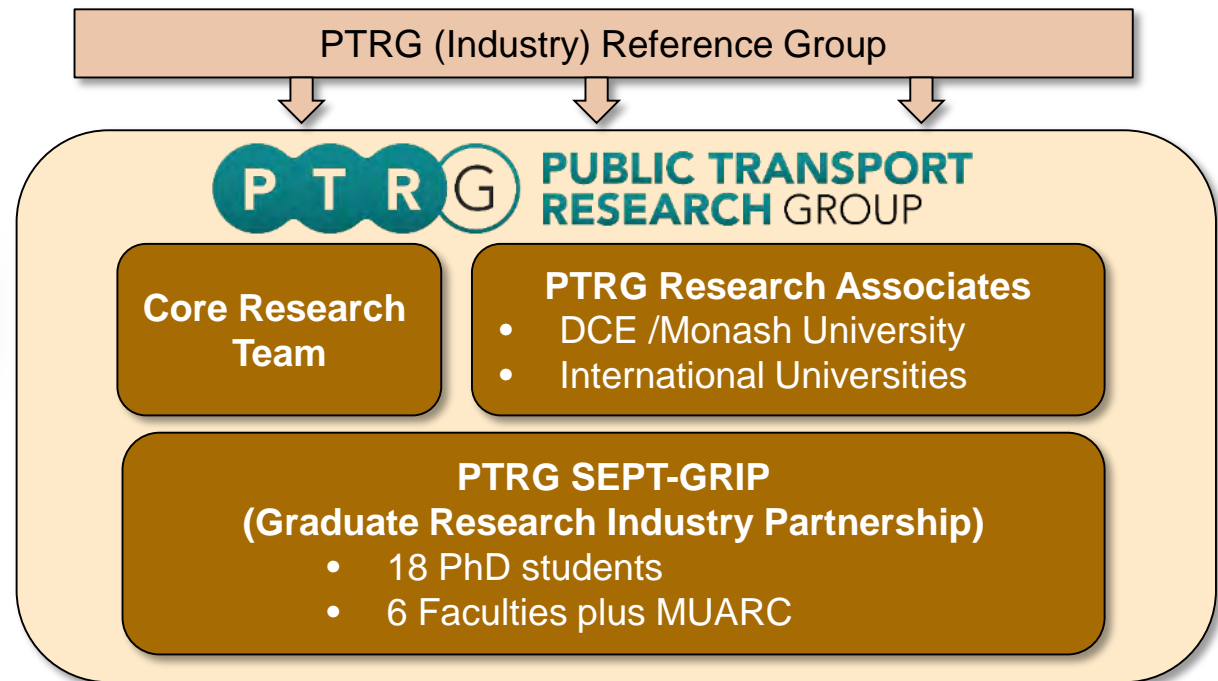
- Commenced 2010
- 256,639 site users
- 8,000 towns and cities from 170 countries
- 6,896 journal papers
- World index of authors and topics
- Users in the Netherlands:
  - 12,273 page views

2025=PTx2

UITP Showcase Award  
Winner

[www.worldtransitresearch.info](http://www.worldtransitresearch.info)

# SEPT-GRIP is an initiative of the Public Transport Research Group (PTRG) at Monash...



## Sustainable and Effective Public Transport - Graduate Research Industry Partnership



# It has 18 students, 6 faculties, 15 supervisors & 6 industry partners – the largest collation of PhD students in public transport in the world

- Cohort of 18 PhD students conducting research on the theme of Sustainable and Effective Public Transport (SEPT)
- Representation from 6 Faculties & MUARC from diverse disciplines
- Industry support through industry scholarships: PTV (4), Metro Trains (1), Yarra Trams (1), VicRoads (1), Transdev (1), BusVic (1) and Monash (9)
- Customised professional development program offered to students
- 50/50% mix of domestic and overseas students
- Advertised August 2015, 180 applications, PhD students started **April 2016**



# ...with 6 industry partners...

**1. TOD & Transit**  
Laura Aston



**2. Big Data & Visualisation**  
Homayoun Rafati



**3. Network Synchronisation**  
Rejitha Ravindra



**4. Shared Mobility**  
Taru Jain



**5. Changing Travel Behaviour**  
Laura McCarthy



**6. Tourism & Public Transport**  
Victoria Radnell



**7. Reliability Engineering Approaches in Best Practice Railways**  
Maryam Nawaz



**8. Improving Gender Diversity in the Public Transport Workforce**  
Rachel Mence



**TRANSPORT FOR VICTORIA**

**9. Future Train**  
Lisa Fu



**10. Designing Urban Rail to Reduce Vandalism**  
Amy Killen



**11. Bus & Tram Priority Implementation**  
James Reynolds



**12. Simulating Bus & Tram Priority**  
Samithree Rajapaksha



**13. Placemaking & Street Redesign**  
Matthew Diemer



**14. Passenger Falls in Trams**  
Luke Valenza



**15. Transit Network Design**  
Nora Estgfäller



**16. Future Bus**  
Sarah Roberts



**17. The New Bus Rider**  
Prudence Blake



**18. Road Safety Impacts of Bus Safety Inspections**  
Jianrong Qiu





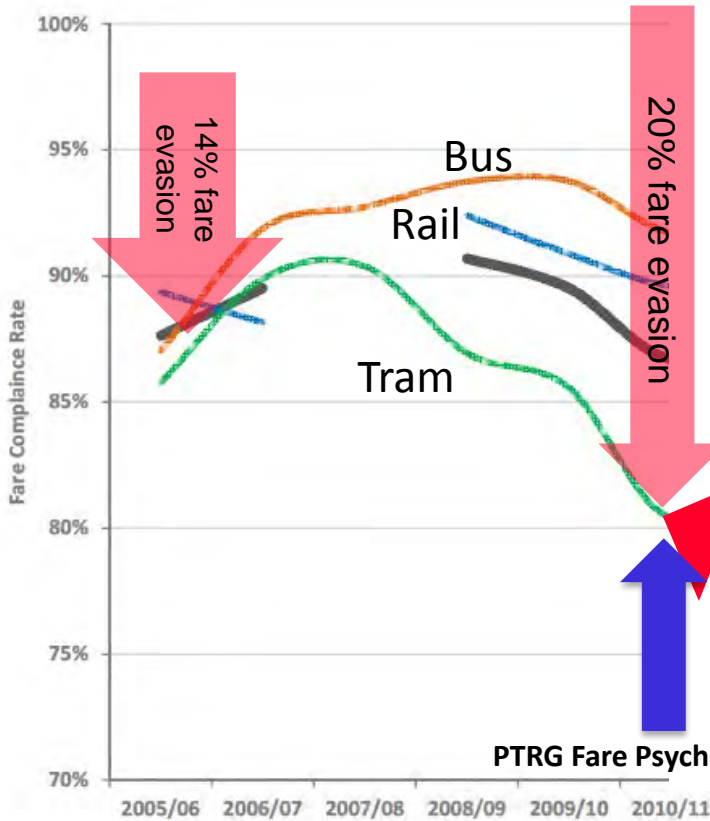
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# Understanding the Psychology of Fare Evasion Behaviour – The project & its inception



The Age Newspaper:  
October 3, 2011

## Rates of evasion highest on trams

Jason Dowling  
Published: October 3, 2011 - 12:00AM

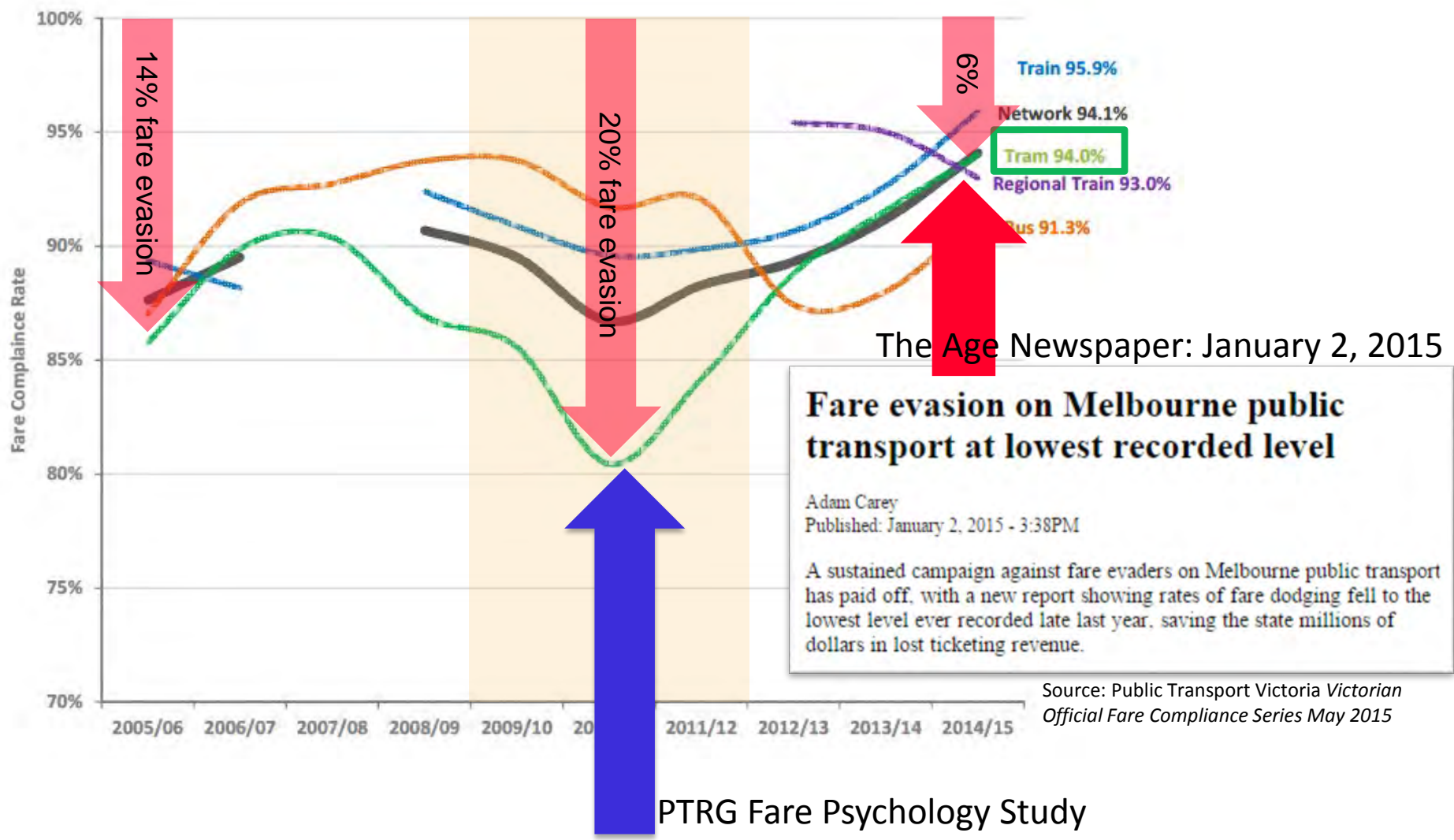
ALMOST 30 per cent of passengers on some Melbourne tram routes are riding free, according to figures released to *The Age*.

“a waste of public transport funds as it was unlikely to reveal anything startling.”  
PTUA

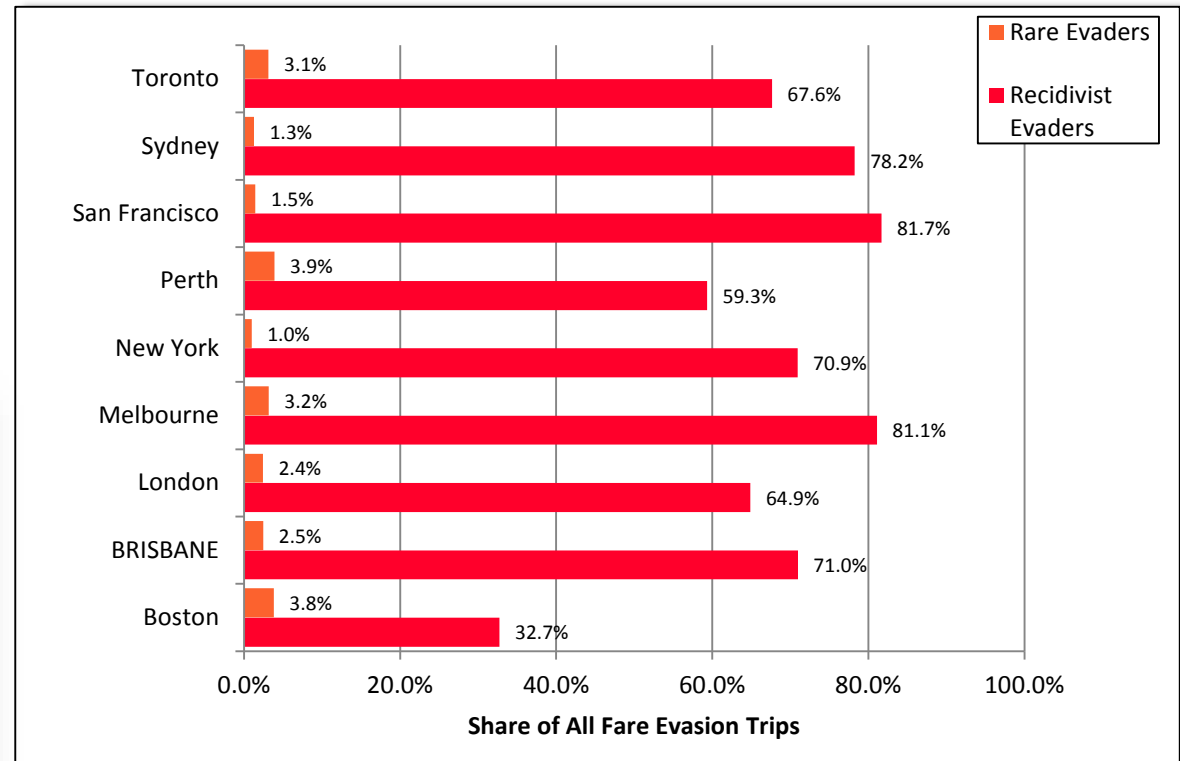
“[The Minister] has made a lot of dopey and bizarre decisions, but spending over \$100,000 of taxpayers' money to 'understand the psychology a fare evaders' has got to be close to the top of the list,”  
OPPOSITION TRANSPORT SPOKESPERSON







# IMPACT – Over \$105mp.a. in savings in Australia ; much larger in overseas cities



**IMPACT - Large improvement in revenue protection ~\$105M p.a. savings in Melbourne and Sydney since 2015; more reductions internationally**

## Research Awards:

- 2016 - Best Research Paper – World Conference on Transport Research
- 2017 - ARRB Inaugural Research Impact Award
- 2017 - Vice Chancellors Award for Research Impact

# Key Finding: most fare loss is a few frequent users..

Table 5.3: Estimated Volume of Trips Made by Fare Evasion Frequency and Public Transport Trip Frequency Groups

Estimated Share of Trips Involving Evasion		Estimated Fare Evasion Trips Made by People in Each Evasion Frequency Group (M p.a.)						Total Trips (M)	Share of Total Travel	Share of Evasion Trips
		6-7 days a week	5 days a week	3-4 days a week	1-2 days a week	> monthly	Less often			
Always	100.0%	1.2	2.9	-	-	-	0.0	4.1	0.8%	16%
Almost Always	95.0%	1.1	4.6	-	-	0.0	0.0	5.8	1.1%	22%
Mostly	75.0%	0.9	3.7	2.7	0.6	0.1	0.0	7.9	1.5%	30%
Regularly	37.5%	0.4	0.7	0.8	0.3	0.1	0.0	2.3	0.4%	9%
Occasionally	12.5%	0.1	2.8	1.3	0.4	0.1	0.0	4.8	0.9%	18%
Rarely	1.0%	0.0	0.6	0.4	0.2	0.0	0.0	1.2	0.2%	5%
Never	0.0%	-	-	-	-	-	-	0	0.0%	
Sub-Total: Fare Evasion Trips (M p.a.)		3.8	15.4	5.2	1.4	0.4	0.1	26.2	5.1%	100%
Share of Total Evasion		14.3%	58.7%	19.9%	5.4%	1.4%	0.3%			

### Recidivists

- 68% of all FE trips
- 65,400 people
- 81% high frequency PT users

### High Frequency Users who Fare Evade

- 73% of all FE trips
- 285,900 people
- 75% Recidivists

### All Fare Evaders

- 822,200 people (20.6% of Melbourne population)
- 71% (580,000 people) a one off occurrence never to be repeated

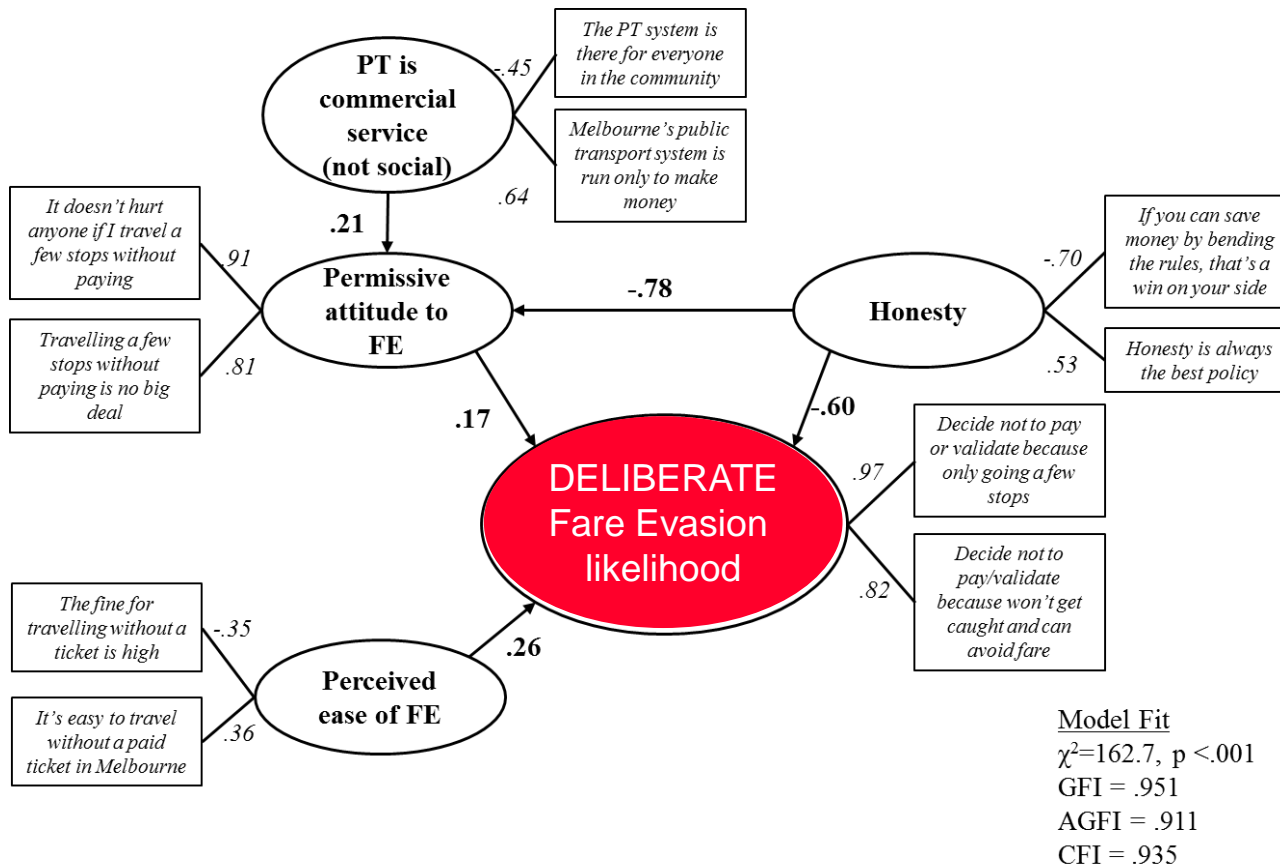


# ...“recidivists” contrast with accidental evaders

Contrasting Fare Evader Metrics

Measure	Fare Evader Type			
	Recidivists	Meant to pay, accident, one off	Deliberate	Unintentional
Share of people fare evading at least once p.a.	8%	70%	41.0%	44.0%
Share of revenue lost/fare evasion trips	68%	5%	77.4%	15.5%
Estimated Value of Revenue Lost p.a.	\$54M	\$4M	\$47.8M	\$9.6M
Number of People	65,400	580,000	702,240	1,388,520
Share of Melbourne population	1.6%	14.5%	17.6%	34.8%
Lost Revenue per person p.a.	\$826	\$6.90	\$68.00	\$6.90

# Deliberate FE is driven by (dis)honesty, (weak) perceived control and permissive views

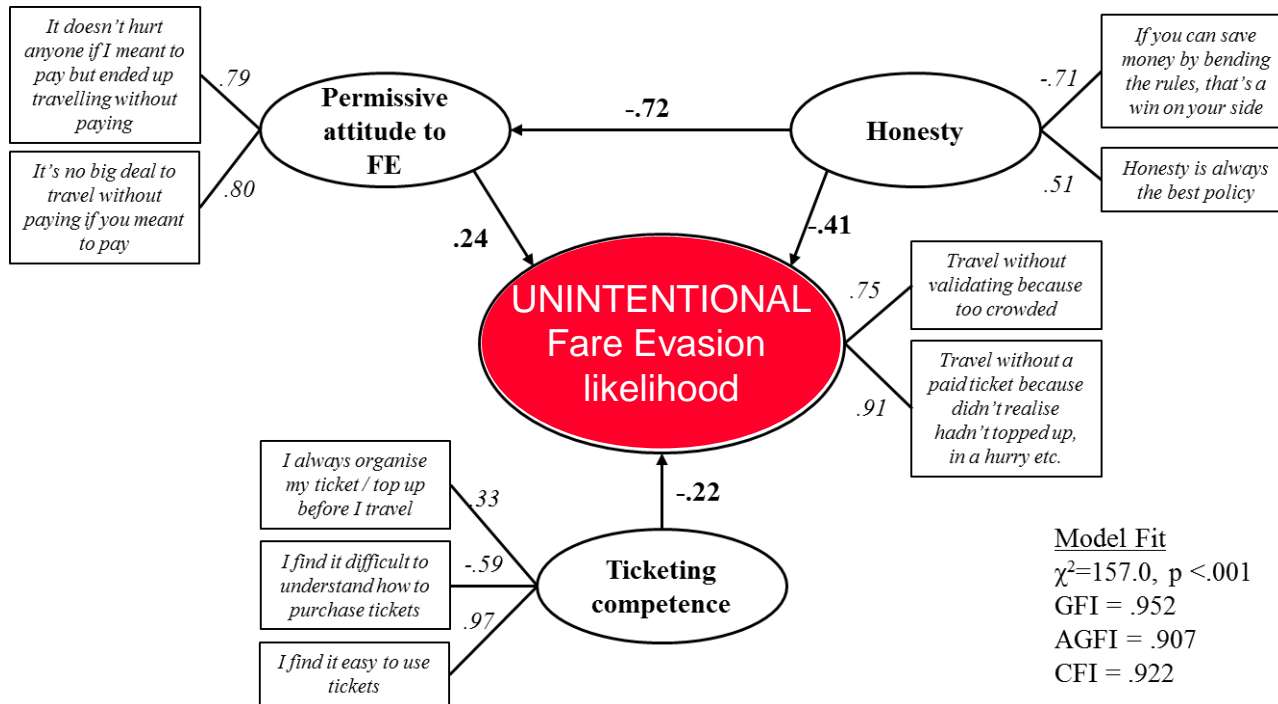


## Key Points

- **(dis) honesty a critical driver**
- **Ease of evasion next followed by permissive attitudes**
- **(dis) honesty and Permissive attitudes linked**
- **View PT is provided for commercial (profit) motives affects permissive views**
- **Negative Servicescape views not a direct driver**
- **Personality factors a secondary issue**

Source: Currie G and Delbosc A (2017) 'An Empirical Model for the Psychology of Deliberate and Unintentional Fare Evasion'  
 TRANSPORT POLICY Volume 54, February 2017, Pages 21–29

# Accidental FE is driven by (dis)honesty permissive views and (poor) ticketing competence



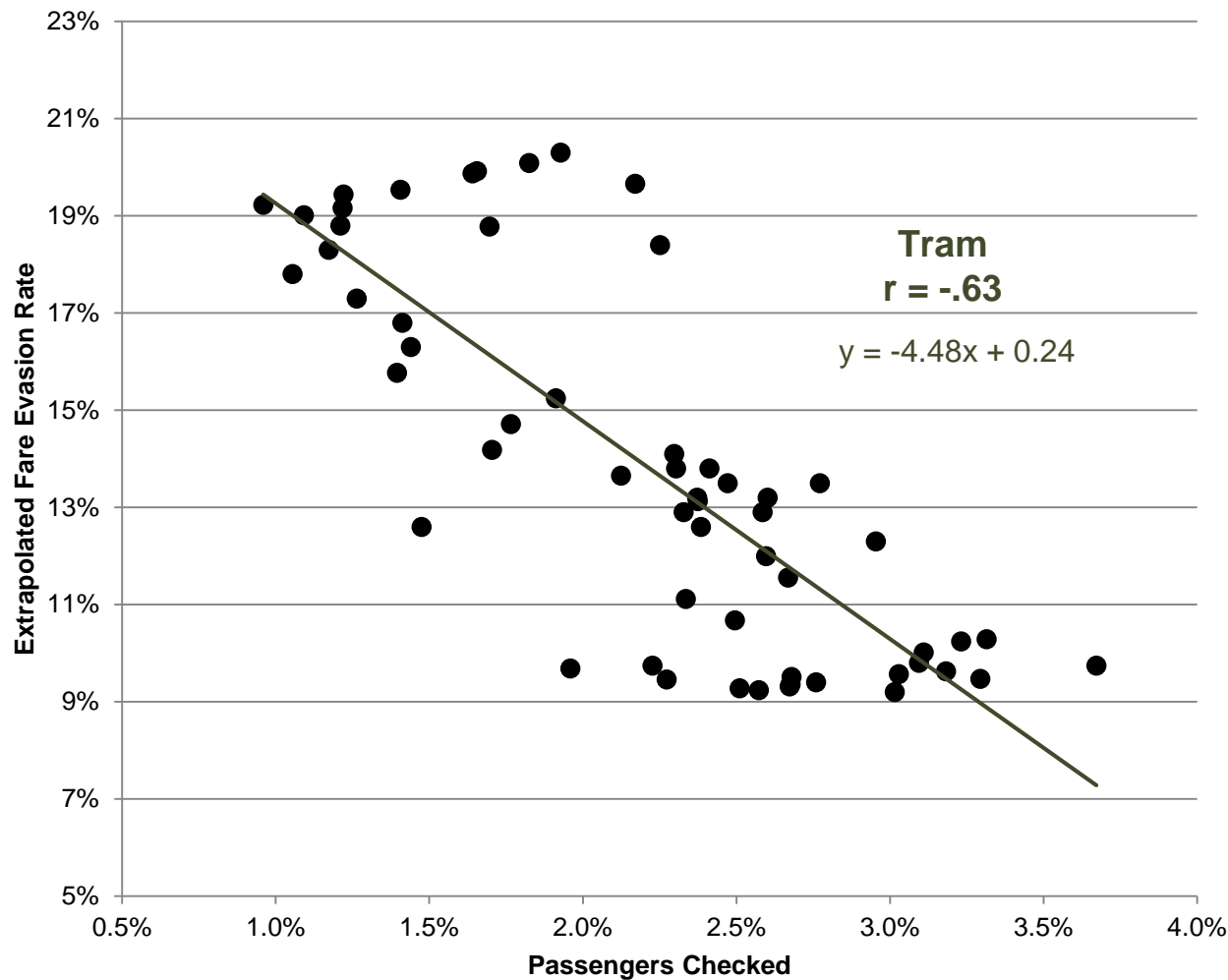
## Key Points

- (dis) honesty a main driver followed by permissive attitudes then ticketing competence
- Ease of evasion is not an issue since evasion is accidental/unintended
- Ticketing competence a valuable concept in understanding accidental fare evasion

Source: Currie G and Delbosc A (2017) 'An Empirical Model for the Psychology of Deliberate and Unintentional Fare Evasion'  
TRANSPORT POLICY Volume 54, February 2017, Pages 21–29



# Research Collaboration Ideas – Sensitivity of fare evasion rates to ticket checking



## Key Points

- Doubling ticket inspection rate from 1.31% (average rate in 2011) to 2.62% would act to reduce fare evasion on trams from 18.13% to 12.26%.
- doubling rates acts to reduce fare evasion rates by about a third.
- Implies an elasticity of about -0.32

## PTRG Overview

### HOT COLLABORATION TOPICS

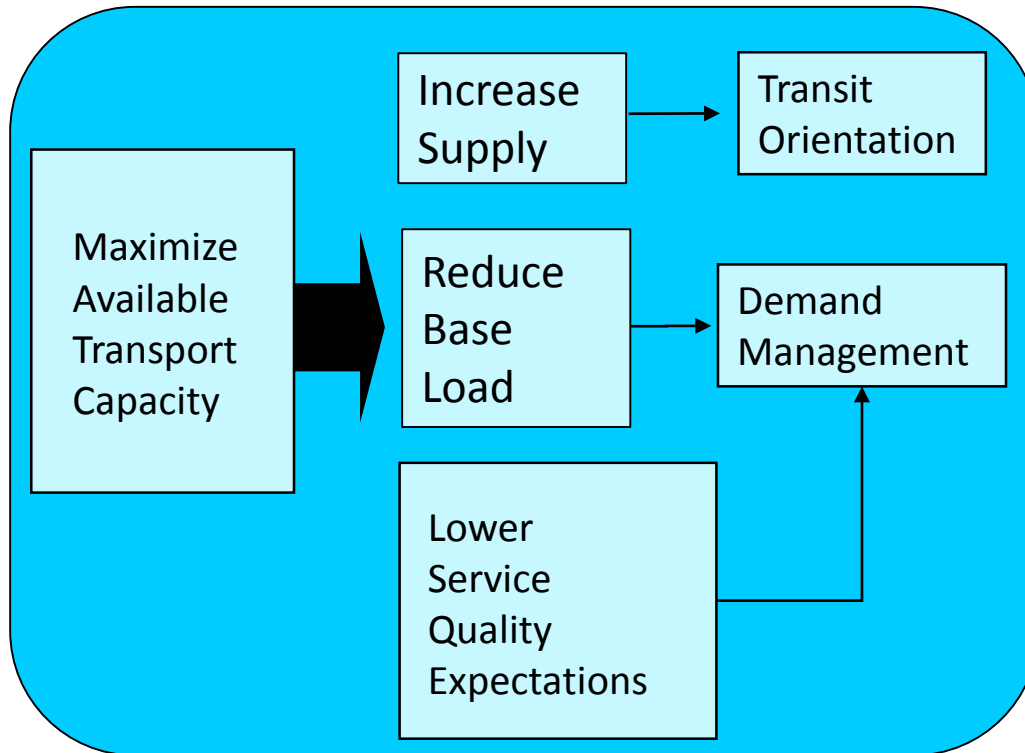
1. Optimising Revenue Protection
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# Monash research identified the approach used to manage PLANNED disruption in congested summer Olympic games host cities

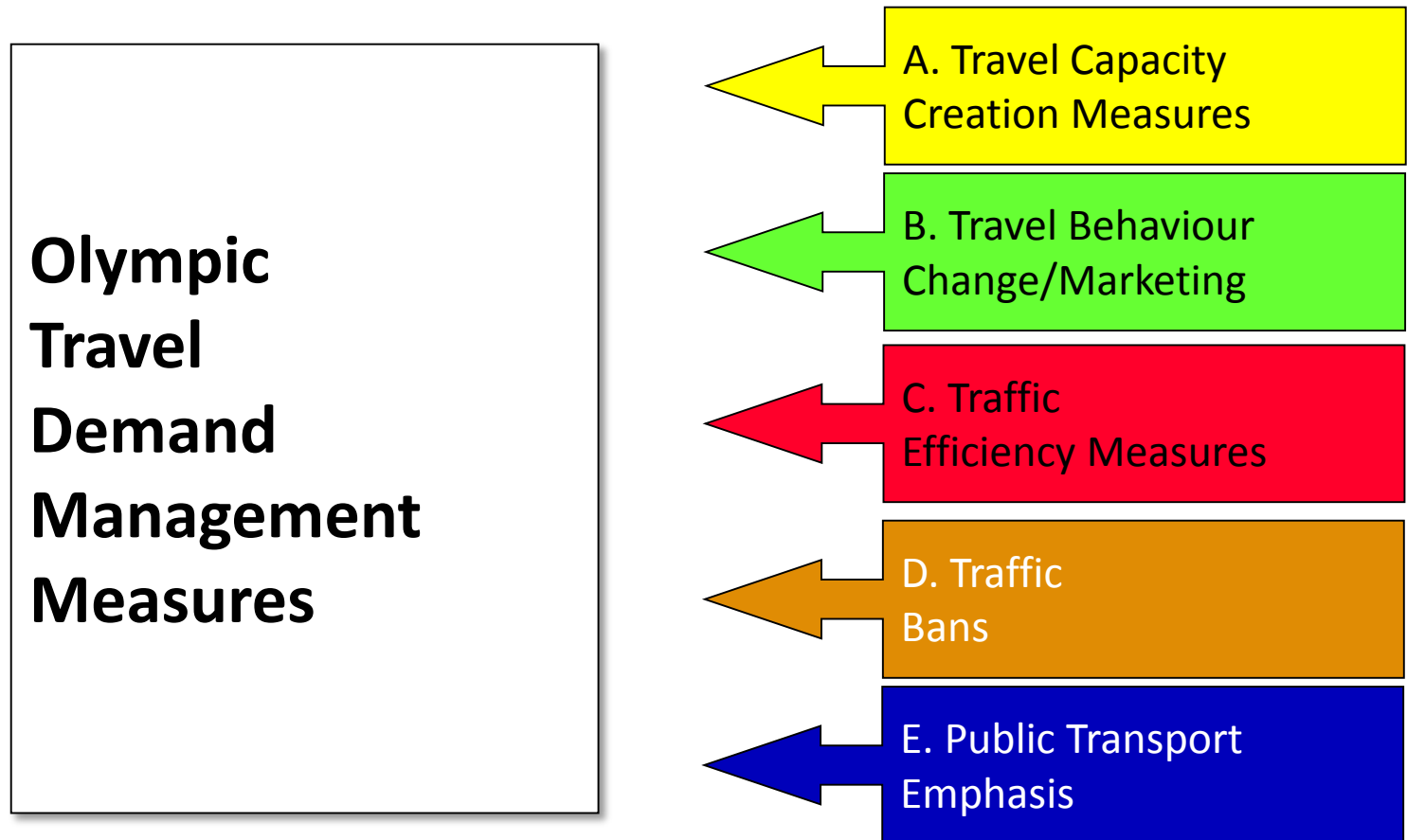
## Olympic Transport Approach



Source: Currie G and Delbosc (2011) 'Assessing Travel Demand Management for the Summer Olympic Games' TRANSPORTATION RESEARCH RECORD Journal of the Transportation Research Board Volume 2245 / 2011 Pages 36-48



# 5 key strategies are adopted; for B: travel behaviour change...



Source: Currie G and Delbosc (2011) 'Assessing Travel Demand Management for the Summer Olympic Games' TRANSPORTATION RESEARCH RECORD Journal of the Transportation Research Board Volume 2245 / 2011 Pages 36-48

# Active behaviour change aim to match demand to available capacity

<b>B. Travel Behaviour Change/Marketing</b>	<b>London 2012</b>	<b>Athens 2004</b>	<b>Sydney 2000</b>	<b>Atlanta 1996</b>	<b>Barcelona 1992</b>	<b>Soeul 1988</b>	<b>Los-Angeles 1984</b>	<b>Moscow 1980</b>	<b>Salt Lake 2002</b>
<b>The big scare, travel warnings &amp; communications strategies</b>	✓	✓	✓	✓			✓		✓
<b>Employer/business telecommuting/ work retiming</b>	✓	✓	✓	✓					
<b>Test events as education</b>	✓	✓	✓						
<b>Spectator public transport use education</b>	✓		✓						✓
<b>Resident public transport use education</b>	✓		✓						✓
<b>Affected business/community consultation and travel plans</b>	✓	✓	✓	✓			✓		✓

# Monash developed the concept of the 'Big Scare' - highly successful in reducing base load

B. Travel Behaviour Change/Marketing	London 2012	Athens 2004	Sydney 2000	Atlanta 1996	Barcelona 1992	Soeul 1988	Los-Angeles 1984	Moscow 1980	Salt Lake 2002
The big scare, travel warnings & communications strategies		<div>The "Big Scare" - Communication Strategy</div> <ul style="list-style-type: none"> <li>Developed after Atlanta 1996                             <ul style="list-style-type: none"> <li>Stop 'Over-Promising'</li> <li>UNDER PROMISE AND OVER DELIVER</li> <li>Its not possible to cater for total demand so tell people to SCARE them into thinking about alternative options</li> <li>Morally Wrong? – Its ALSO telling the TRUTH</li> </ul> </li> </ul>							
Employer/business telecommuting/ work retiming	✓								
Test events as education	✓								
Spectator public transport use education	✓								
Resident public transport use education	✓								
Affected business/community consultation and travel plans	✓	✓	✓	✓			✓		✓

Source: Currie, G Jones, A and Woolley J (2015) 'Travel Demand Management and the 'Big Scare' - Impacts and Lessons on Travel in London during the 2012 Olympic Games' TRANSPORTATION RESEARCH RECORD Volume 2469 pp 11-22

# Pro-active communications strategies create doubt about normal travel options – combined with....

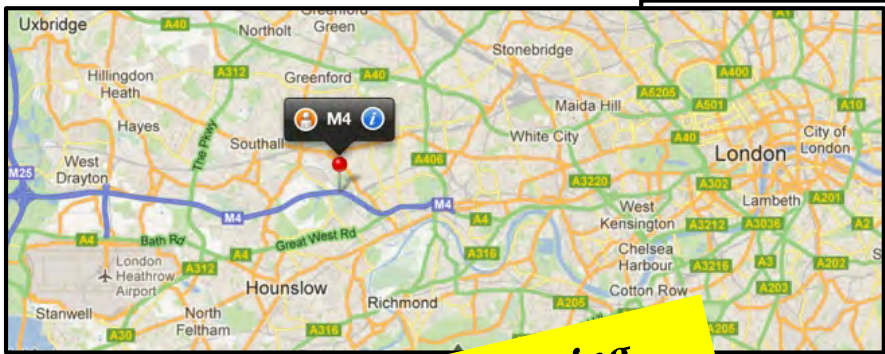
B. Travel Behaviour Change/Marketing	London 2012	Athens 2004	Sydney 2000	Atlanta 1996	Barcelona 1992	Soeul 1988	Los-Angeles 1984	Moscow 1980	Salt Lake 2002
The “Big Scare” - Communication Strategy									
The big scare, travel warnings & communications strategies		<div> <ul style="list-style-type: none"> <li>London 2012 – Business Advice                             <ul style="list-style-type: none"> <li>Find the travel hot spots</li> <li>Plan ahead</li> <li>Consider all your travel options</li> <li>Avoid the busiest times if you can</li> <li>Avoid driving into affected areas if you can</li> </ul> </li> <li>Simple Marketing Message                             <ul style="list-style-type: none"> <li>“Have a Pint”</li> </ul> </li> <li>Key Messages                             <ul style="list-style-type: none"> <li>Reduce</li> <li>Reroute</li> <li>Retime</li> <li>Remode</li> </ul> </li> </ul> </div>							
Employer/business telecommuting/ work retiming	✓								
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...(free) media 'hysteria' – much influence was leveraged to reduce demand

# Pre Games – Media Traffic Chaos “Hysteria”



**Fears of Olympic road chaos as main motorway from Heathrow to London is closed for at least FIVE days due to cracked viaduct**

**Emergency plans being drawn up as Olympic road stays shut**



**London 2012 Olympics travel chaos: live**



**51km jam: Olympians stall London**

...(free) media influence was leveraged to reduce demand

## Pre Games – Media “Hysteria” on Traffic Chaos

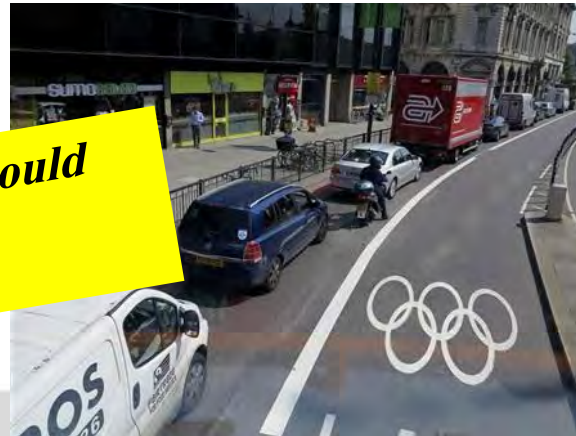
**London Cab Drivers Protest  
Olympic Dedicated Traffic  
Lanes**



**London cabbies block traffic  
in Olympic protest**



**Horse-drawn hearses could  
hijack Olympic lanes  
'Coffin on a Bus'**





...(free) media influence was leveraged to reduce demand

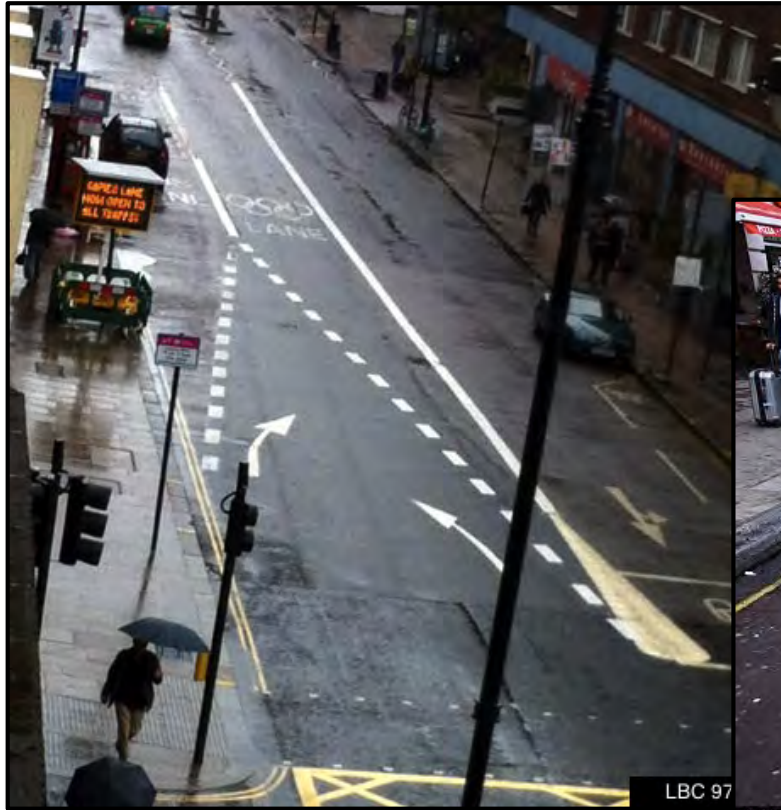
## Pre Games – Media “Hysteria” on Traffic Chaos



**Greenpeace Polar Bears Close  
Olympic Transport**

...(free) media influence was leveraged to reduce demand

## Pre Games – Media “Hysteria” on Traffic Chaos



*Lost! Games Lanes cause chaos and leave athletes unimpressed*



*London's hydrogen buses grounded during Olympics due to security fears!*



...(free) media influence was leveraged to reduce demand

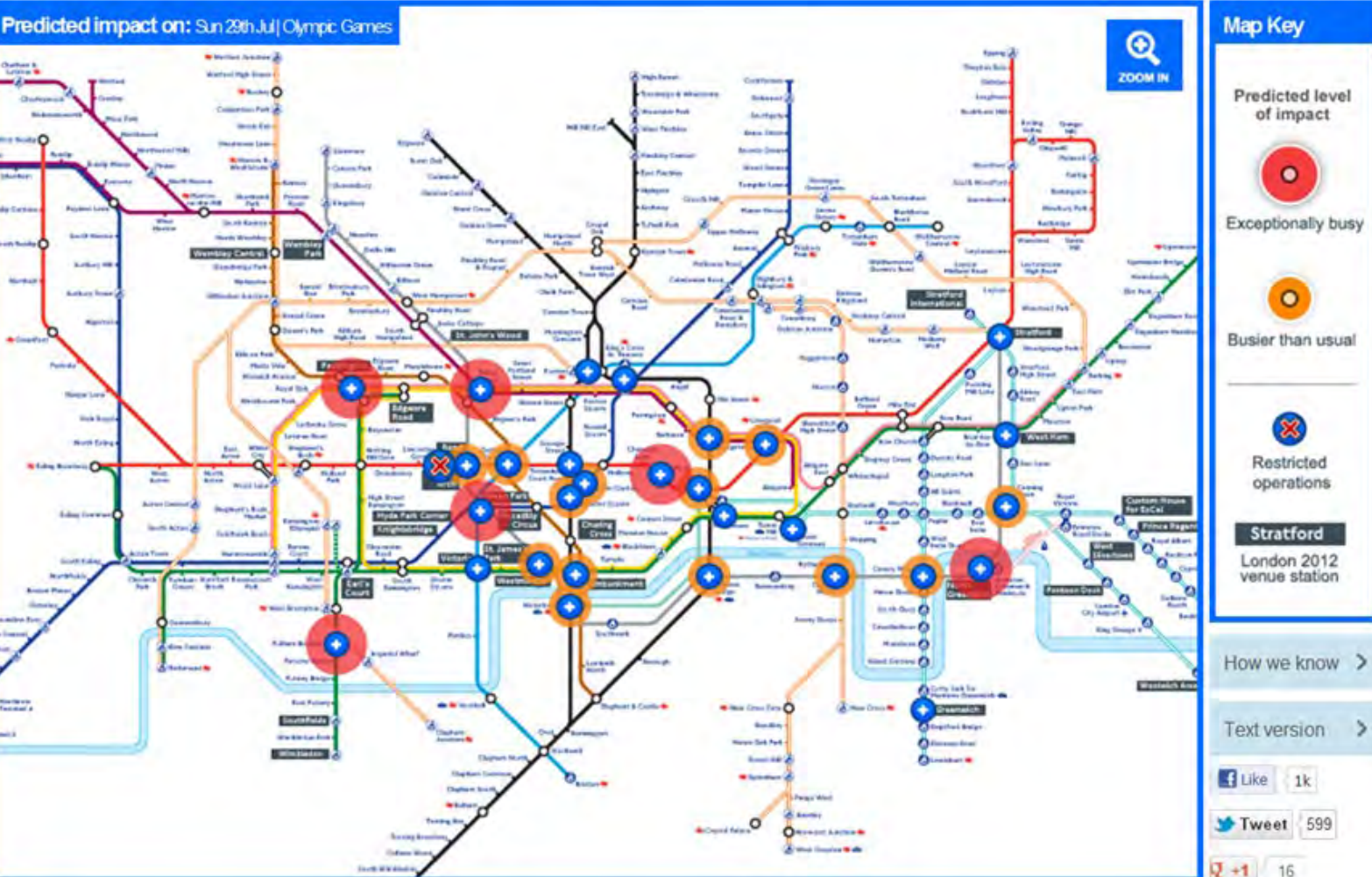
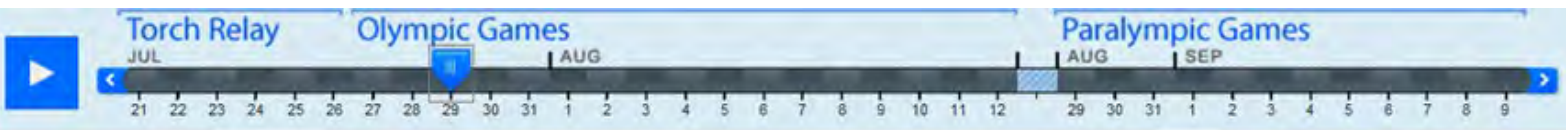
## Pre Games – Media “Hysteria” on Traffic Chaos

*Travel misery signals more trouble ahead during Olympic Games*



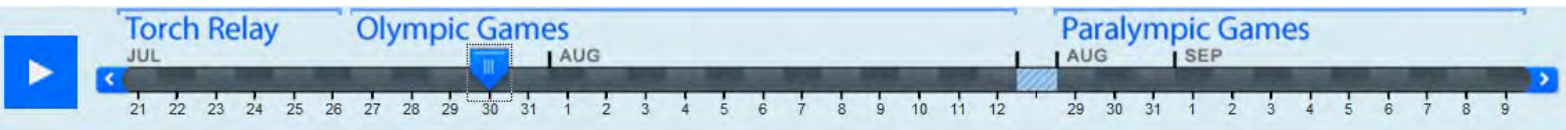
*A 'perfect traffic storm' will bring Olympic chaos to London as 33% more cars clog roads and motors crawl along at 12mph*

# 'Keep ahead of the games website – a modelling innovation

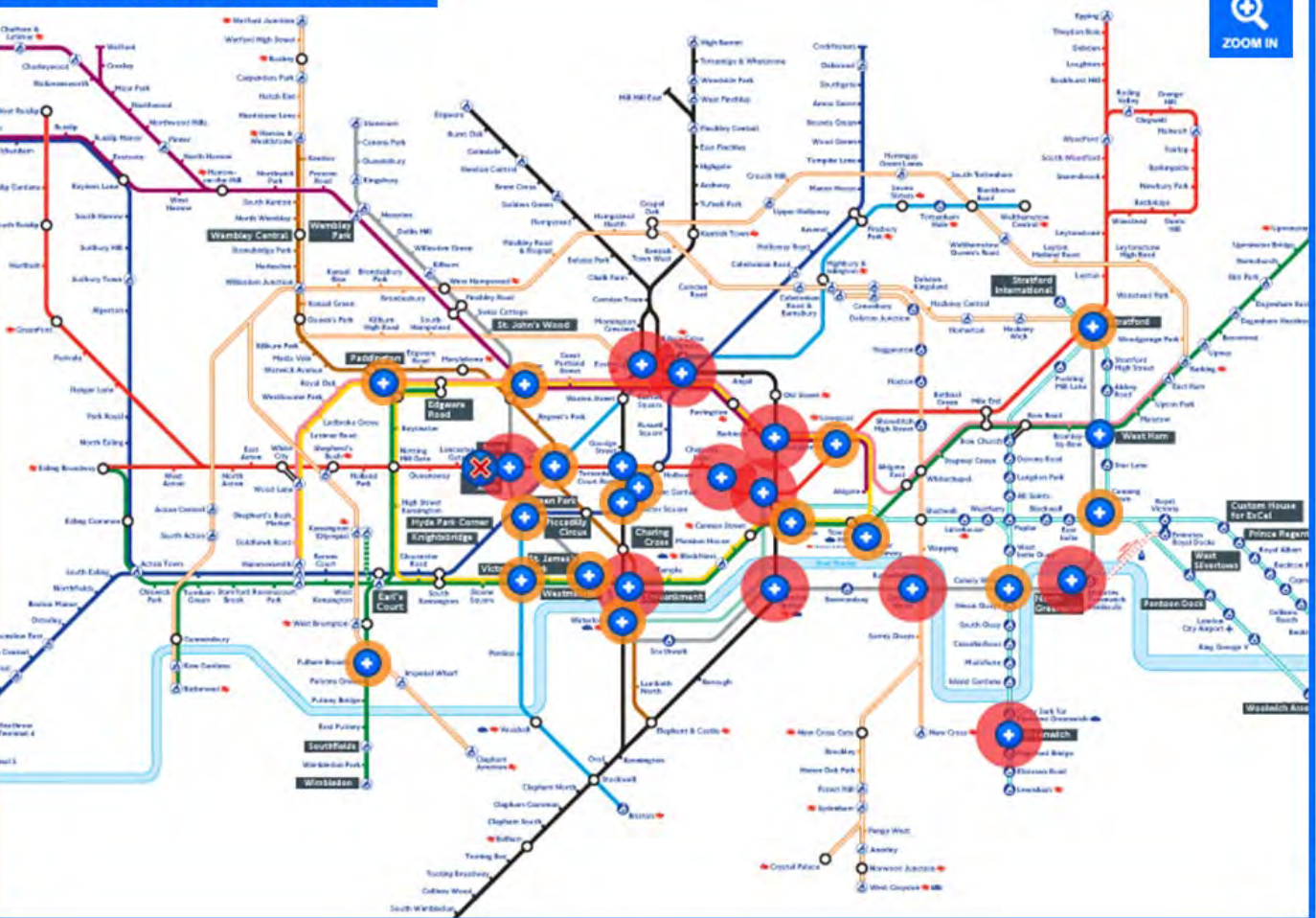




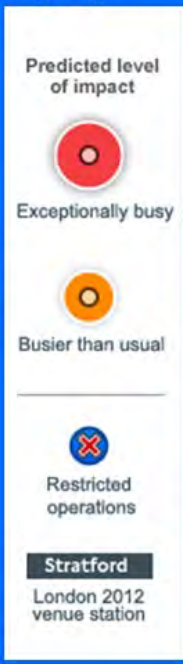
# 'Keep ahead of the games website – a modelling innovation



Predicted impact on: Mon 30th Jul Olympic Games



Map Key



How we know >

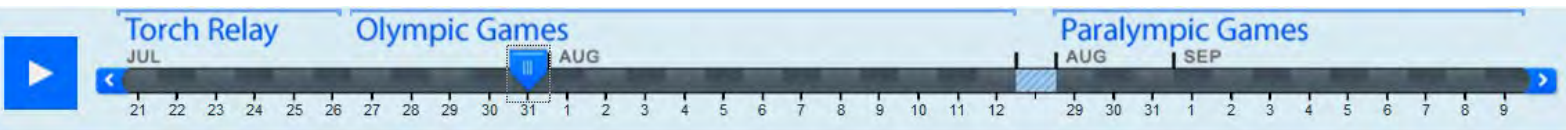
Text version >

Like 1k

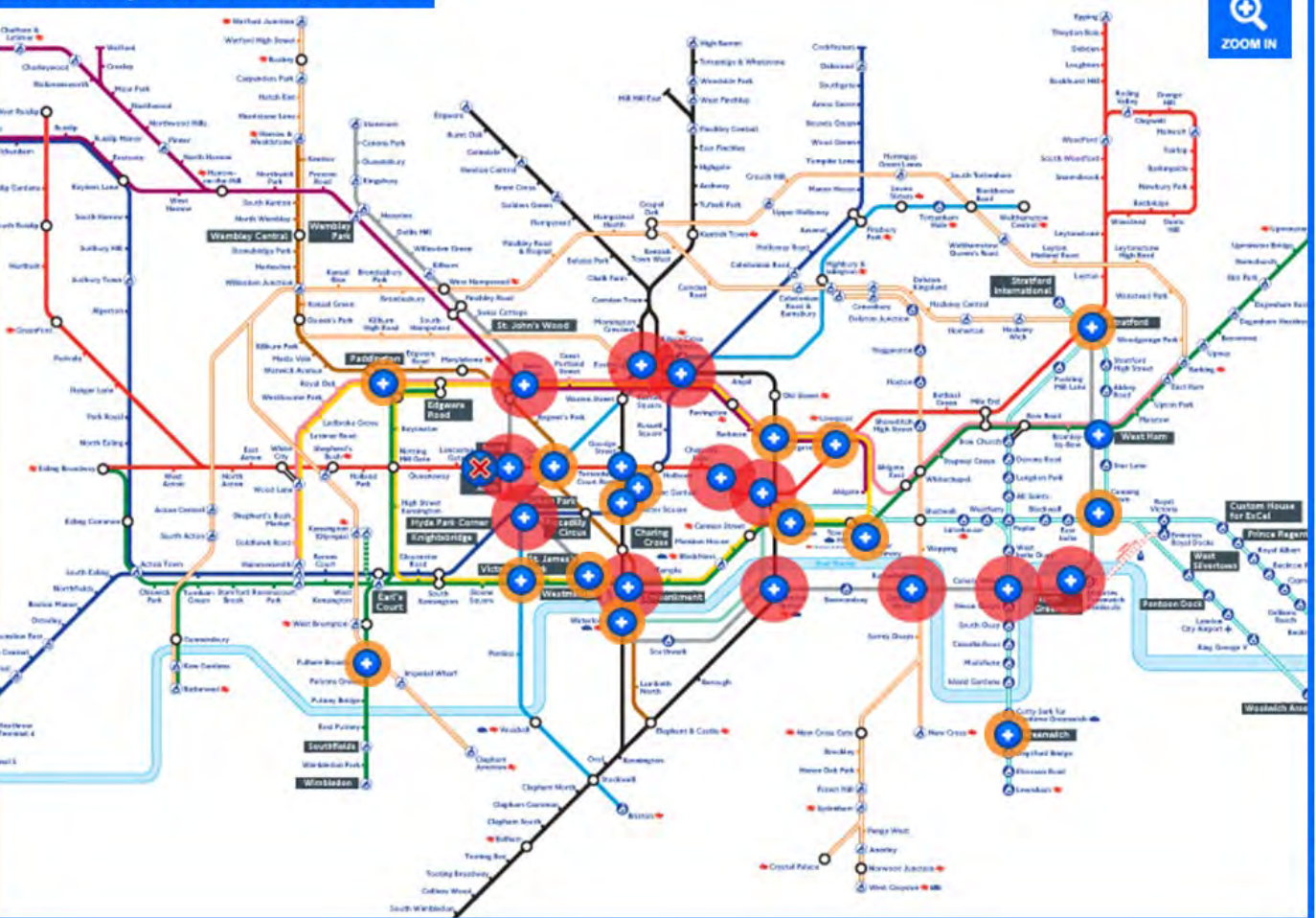
Tweet 599

+1 16

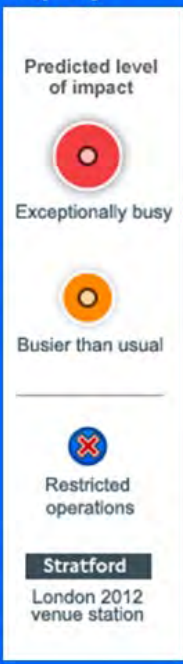
# 'Keep ahead of the games website – a modelling innovation



Predicted impact on: Tue 31st Jul Olympic Games



Map Key



How we know >

Text version >

Like 1k

Tweet 599

+1 16



# Games Time

# EXPECTATIONS

*Ghost town London:  
'Victims of our own  
success'*



# REALITY

# Games Time – where have all the people gone?



London Bridge



Westminster



Hammersmith



Earl's Court

Media Banner  
"Ghost Town London"



# Traders complain about lack of business



**Olympics-London  
tourist trade suffers  
from Olympic  
effect**

**Olympics Hurt  
London Store Sales  
as Shoppers Stay  
Away From City**

# Games Time – Public Transport Working Well

*Gold-star performance by transport on first full working day of Olympics*

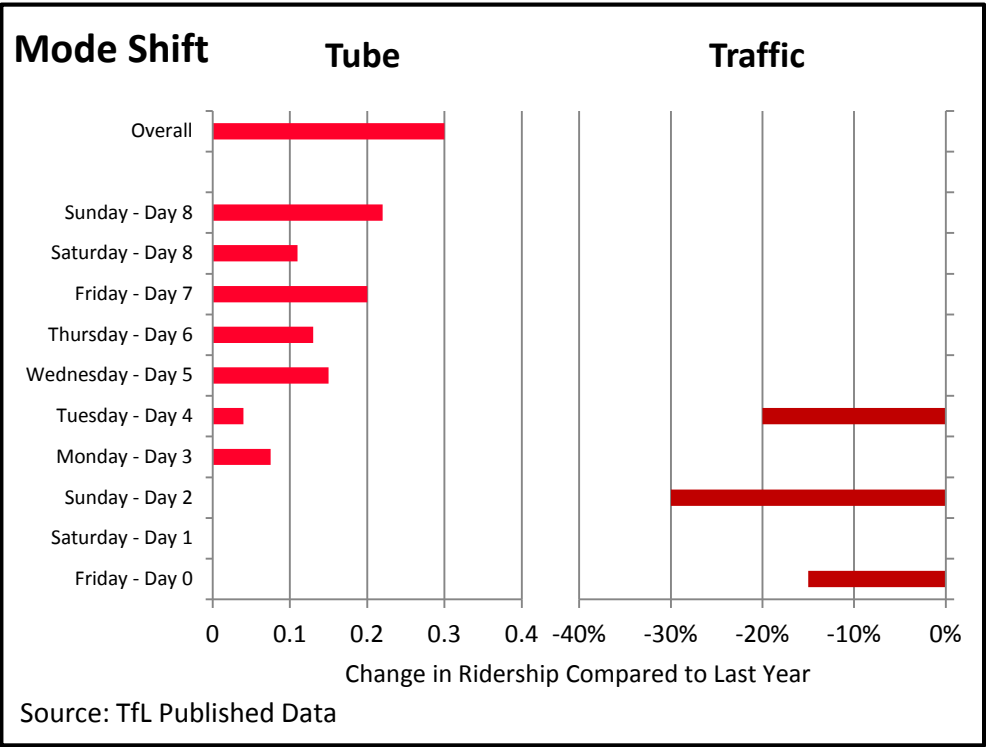


Press Reports – Day 3  
Many reports of Public Transport working very smoothly; trains buses very quiet; tube/trains “fantastic” – some commuters complain they get to work too early





# Games Time – Transit Mode Shift....

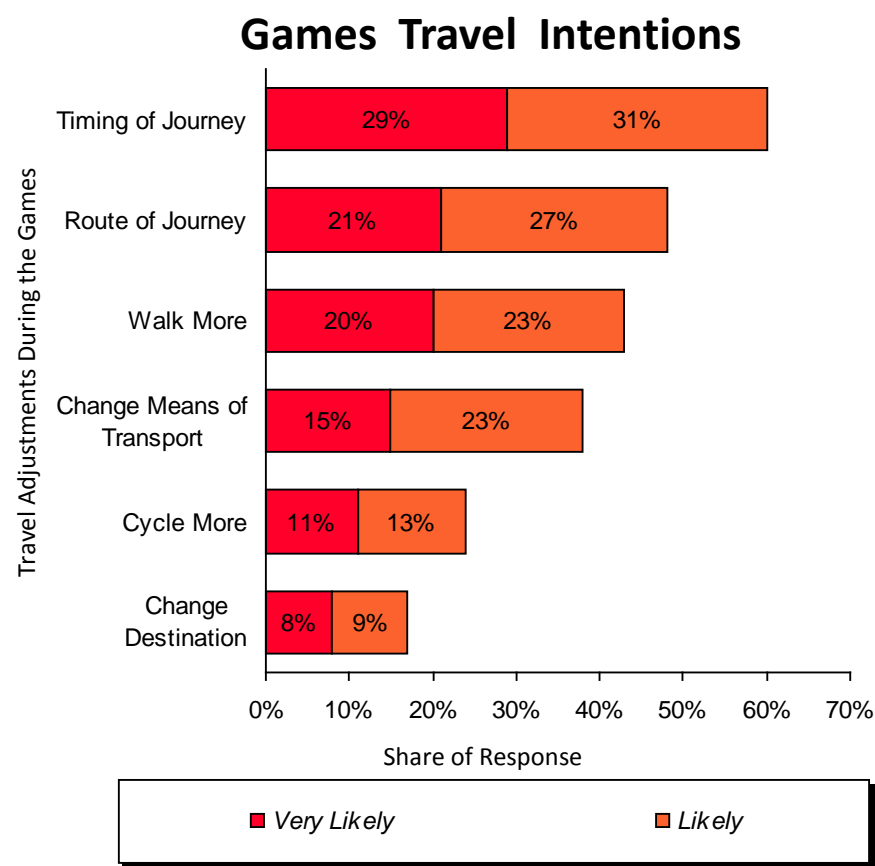


Commuter Quote: Day 3  
*Is it just me or is public transport actually quieter than normal? Can we host the Olympic Games more often please*

Day 11 – Tuesday 7<sup>th</sup> LUL carries 4.5M passengers – Largest demand in all History

Source: Journey Maker Survey

# Games Time – Transit Mode Shift....



Source: Journey Maker Survey

### Business/Commuter Intentions

- Work from Home**
  - 65% commuters said they would do this
  - 59% of businesses said they were happy for employees to work from home
- Other options**
  - Vacation (Sydney = 27%)
  - 10% of Britons leaving the UK during the games (Assoc of British Travel Agents)

Source: Monash Business Survey – preliminary results

...consistent with previous games

### Atlanta 1996

- Perceived that peak congestion reduced by 30%
- Radial traffic down 4-6%
- Peaks more spread

### Sydney 2000

- Peak road travel times reduced by 50%
- Road traffic between 10-20% less than normal

### Athens 2004

- Travel time reductions of up to 66% reported by media (2hrs to 40 mins for travel across city)
- F Dimou – Coutroubas reports 30% base load reduction on main roads

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# PTRG led a major international research exploring links between Social Exclusion transport and quality of life



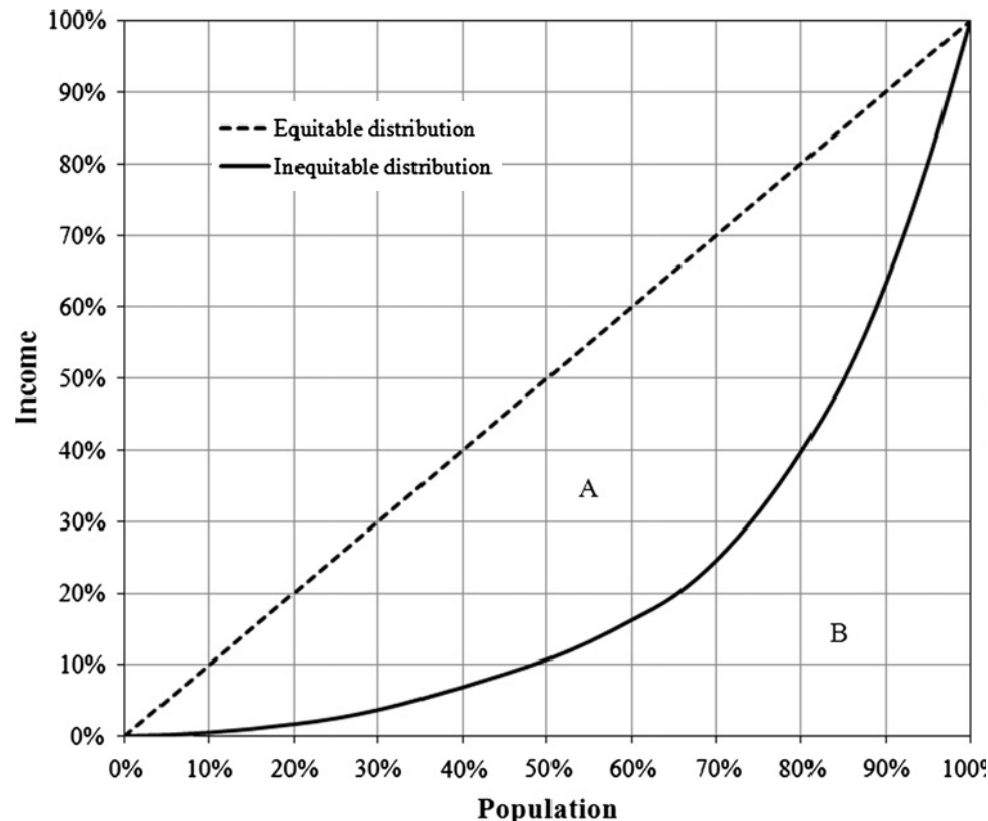
Brotherhood of St Laurence  
Working for an Australia free of poverty



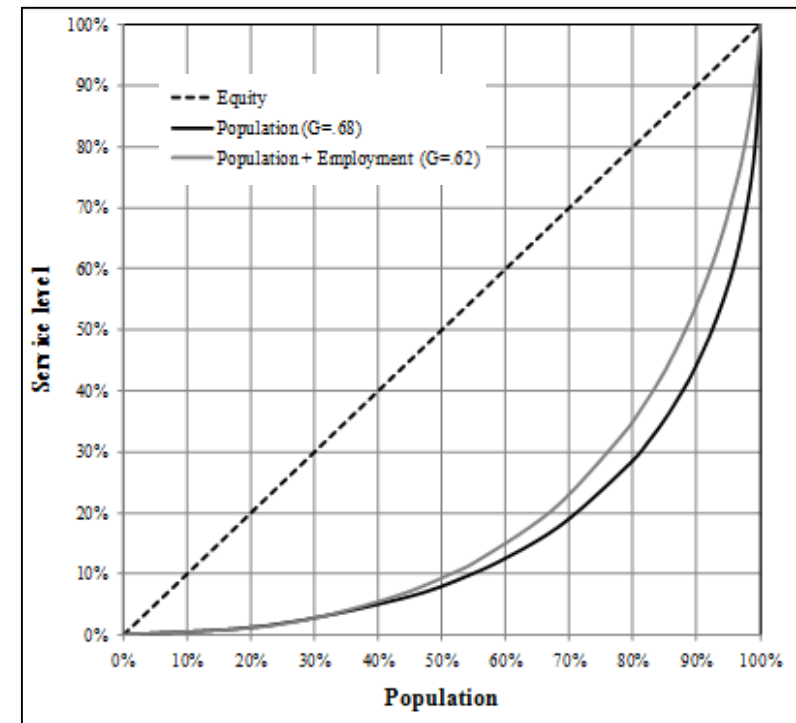


# Measuring social equity across transport markets – Lorenze curves and Gini coefficients

Income by Population



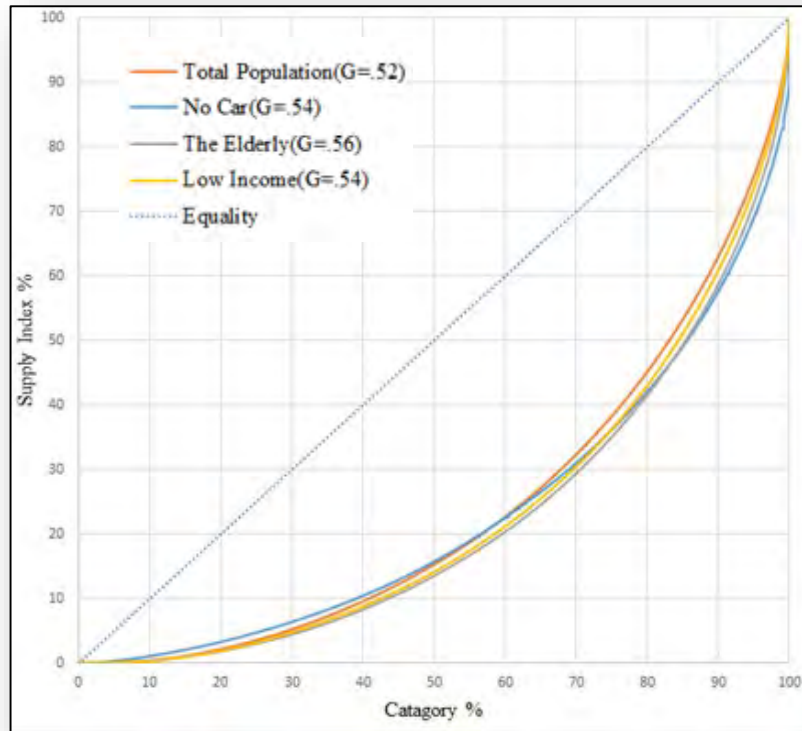
Service Supplied by Population



Source: Delbosc A and Currie, G. (2011) 'Using Lorenz Curves to Assess Public Transport Equity' JOURNAL OF TRANSPORT GEOGRAPHY Volume 19, Issue 6, November 2011, Pages 1252-1259

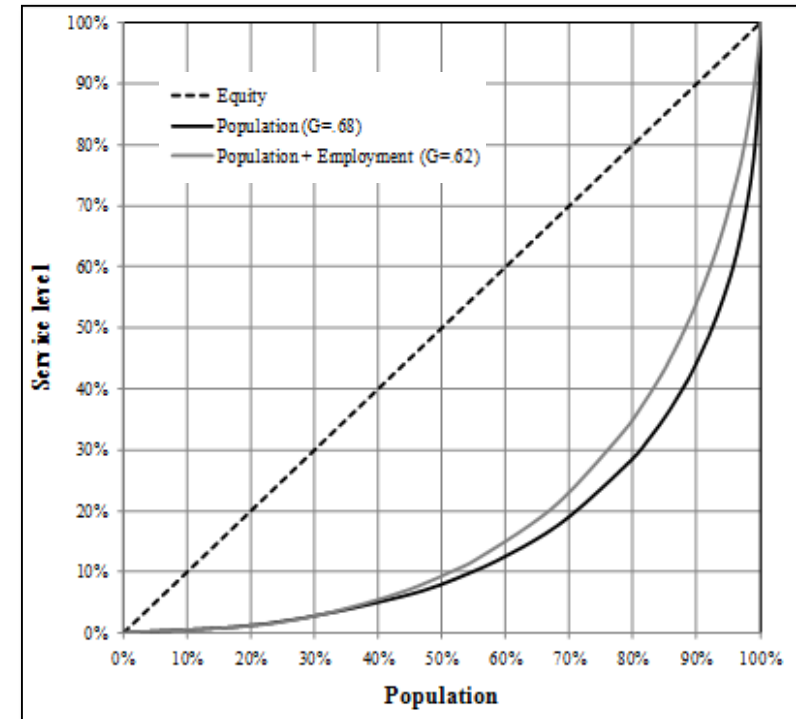
# Measuring social equity across transport markets – Lorenze curves and Gini coefficients

Service Supplied by Population



Source: Ricciardi, A Xia C, Currie G (2015) 'Exploring Public Transport Equity between Separate Disadvantaged Cohorts: A Case Study in Perth, Australia' JOURNAL OF TRANSPORT GEOGRAPHY Volume 43, February 2015, Pages 111-122

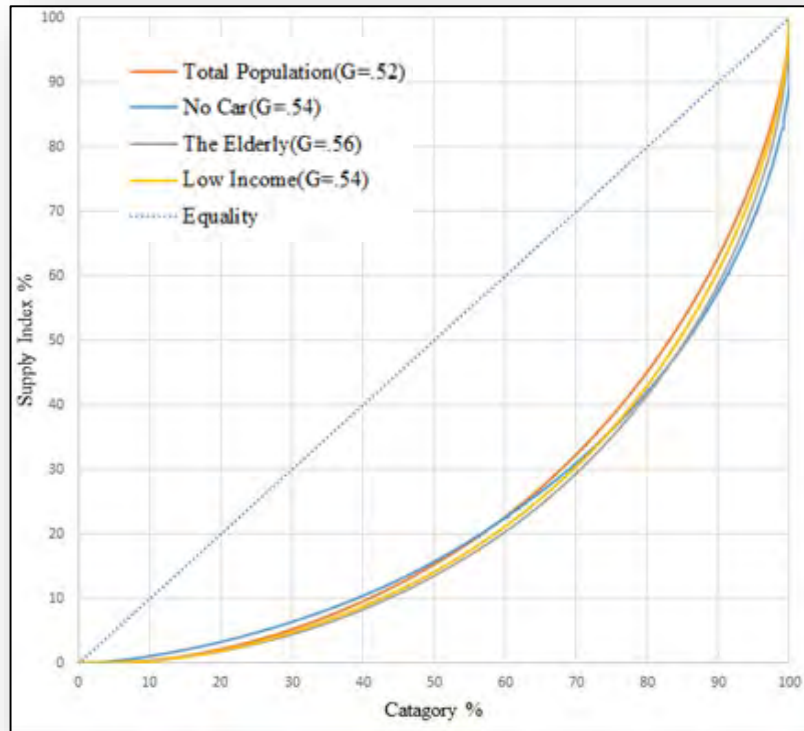
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# Measuring social equity across transport markets – Lorenze curves and Gini coefficients

**Service Supplied by Population**



**Table 2. Lorenz Curve Analysis Results – Perth and some comparative data for Melbourne**

Group	Gini Coefficient	Implied Share Resident Population Receiving Following Share of Public Transport Services	
		70%	90%
Total Population Based Analysis			
Perth	0.52	33%	63%
Melbourne	0.68	19%	44%
Separate Disadvantage Group Cohort Analysis			
The Elderly	0.56	29%	58%
Low Income	0.54	30%	60%
No Car	0.54	31%	57%

Source: Ricciardi, A Xia C, Currie G (2015) 'Exploring Public Transport Equity between Separate Disadvantaged Cohorts: A Case Study in Perth, Australia' *JOURNAL OF TRANSPORT GEOGRAPHY* Volume 43, February 2015, Pages 111-122

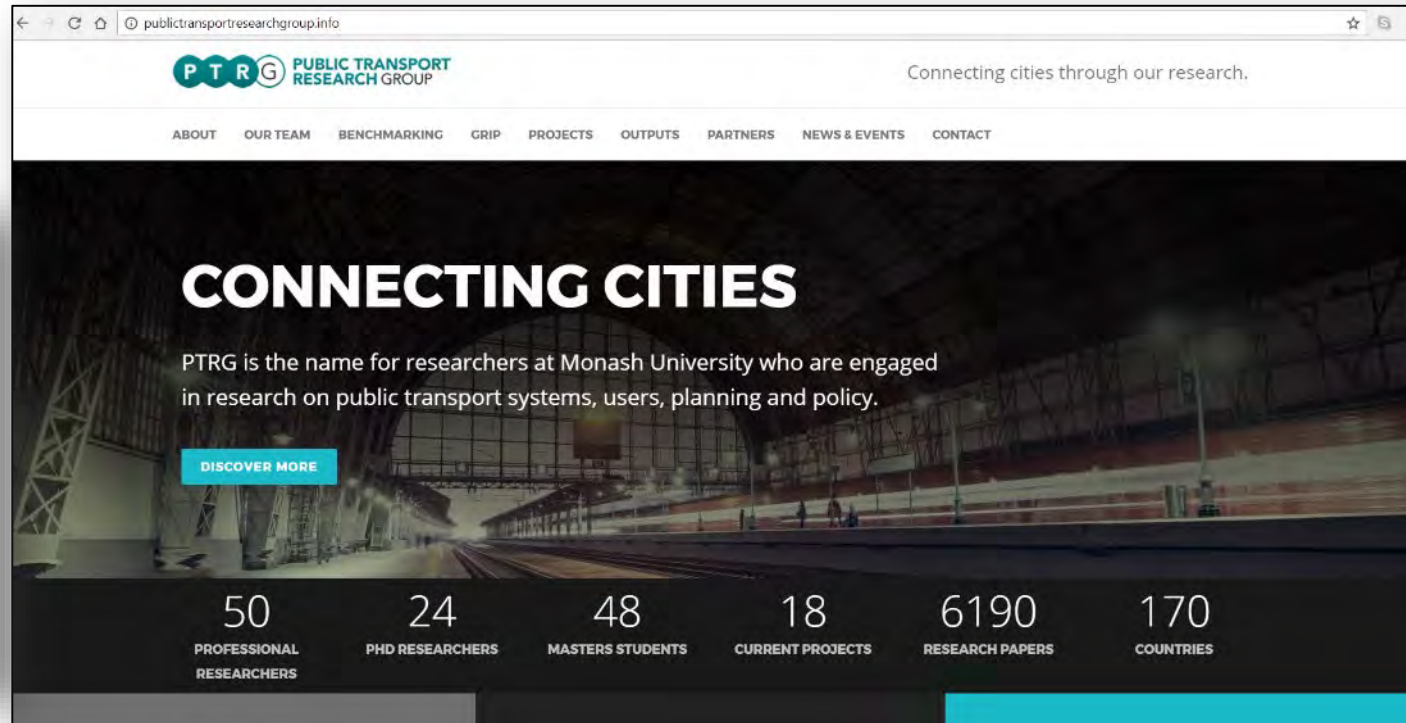
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