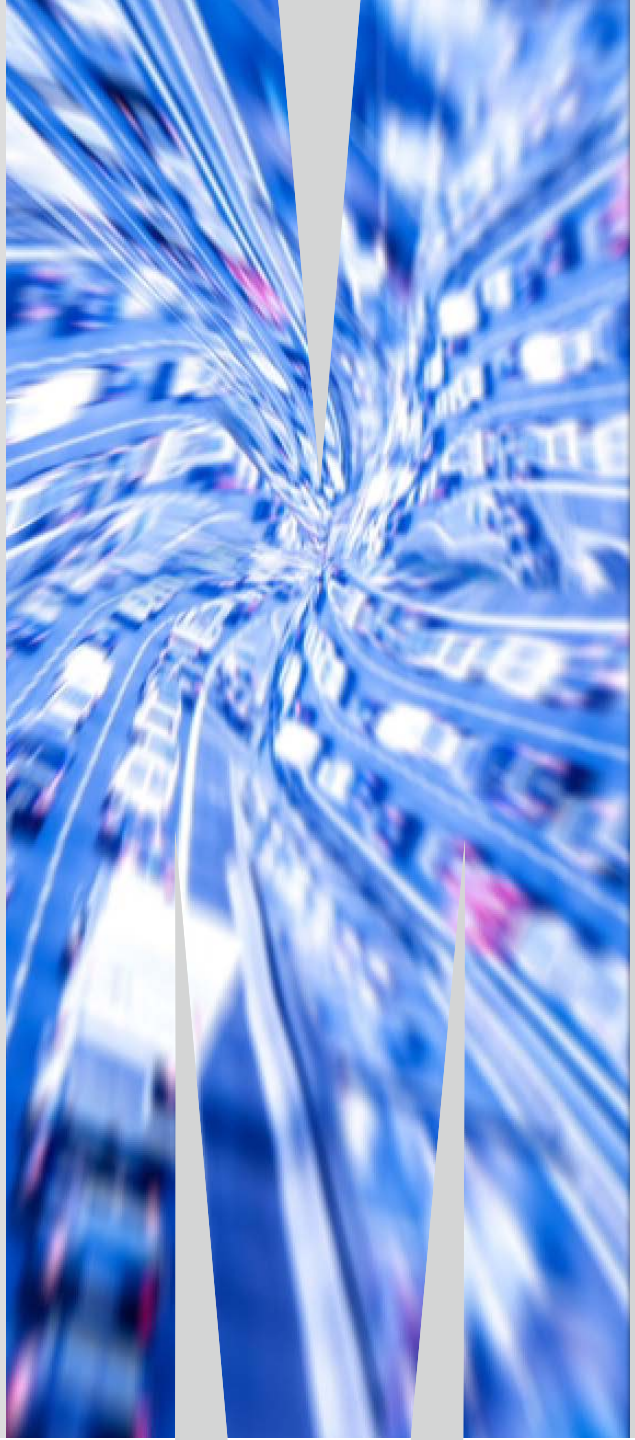
New Zealand Transport Agency
15th November, 2019
Wellington New Zealand

Transit Fightback – Pushback on Technology Hype for Stronger City Futures

Prof Graham Currie FTSE
Public Transport Research Group
Monash Institute of Transport Studies
Monash University, Australia

MONASH University

- Introduction
- The Hype
- Five Lies
- The Future
- Transit Fightback



This presentation is based on a research paper aimed to provoke new thinking on the topic of transport futures…

Source: [1]*Currie G (2018) 'LIES, DAMN LIES, AV'S, SHARED MOBILITY AND URBAN TRANSIT FUTURES' Journal of Public Transportation Special Issue on the Future of Public Transport.*

Journal of Public Transportation | scholarcommons.usf.edu/jpt
Vol. 21 No. 1 [2018] pp. 19-30

SPECIAL ISSUE The Future of Public Transportation

Lies, Damned Lies, AVs, Shared Mobility, and Urban Transit Futures

Graham Currie
Monash University

"There are three kinds of lies: lies, damned lies, and statistics."
Mark Twain or Benjamin Disraeli (Velleman 2008)[1]

Author's Note

Dear Reader: The editors of the Journal of Public Transportation have given me freedom. They have invited me to put thoughts on a page without the need for pedantic citation and attribution typical of writing in a leading international research journal. I have also been invited to be contemplative and personal, using words and phrases like I think, me, and my. For those of you used to a more formalized, "stodgy" citation full of academic prose, I apologize and ask that you take a deep breath and be calm. Ideas and communication don't always flow well from academic writing, particularly when trying to envision the future.

Introduction

It seems to me there is a gigantic lot of nonsense discussed about the future of transport and the future of public transport in particular. As a researcher in the field, I find my emotions boiling over. I get angry at blanket statements telling us public transport has no future and it seems to me much of what is talked about regarding transport futures flies in the face of facts and a long history of what knowledge has gleaned about the human condition, economics, cities, and travel. My hope is that readers will see prevailing discourse differently as a result of this paper and get to share my feelings on the matter. Either way, debating the issues is worthwhile and there are new perspectives of much value to debate.

[1] I wanted to start this piece with the famous Benjamin Disraeli quote on "lies, damned lies"; but in trying to find a source to cite the quote, I found that there is no known attribution to Disraeli and indeed that many think Mark Twain might be the source. Either way, I consider this confusion with ironic awe; what I thought was a foundation stone of thought about "the truth" may indeed be a lie. Perhaps this is a prophetic way to start this paper about transit futures.

http://dx.doi.org/10.5038/2375-0901.21.1.3
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…it was also part of a very successful special session held at the 2019 US Transportation Research Board in Washington DC, USA in January…

Transit Fightback: Pushback on Technology Hype for Stronger City Futures

Tuesday 15th January 3:45p.m. to 5:30p.m.
Room 145B, Washington Convention Centre

A tsunami of global media suggests autonomous vehicles and shared new mobility modes using private vehicles are solutions to the congestion, economic and environmental problems of growing cities. But much of this discussion is based on hype; the promotion of new technologies with little proof, feasibility and little basis in fact. Yet the global broadcasting of these over-hyped technologies is harming urban public transport systems globally; it is a widely held view that transit has no future as a result of new mobility. This session provides evidence that transit systems remain the core of solutions for congested cities. Evidence is shown that new mobility solutions using private vehicle travel remain problematic for growing cities.

Sponsored by AP000 the TRB Public Transportation Group

Presiding Officer: **Paul Skoutelas**
President and CEO, American Public Transportation Association (APTA)

Speakers:

Dr Graham Currie
Monash University

Lies, Damned Lies, AV's Shared Mobility and Urban Transit Futures

Christian Wolmar
Author of 'Driverless cars on a road to nowhere'

Driverless cars: future or fantasy

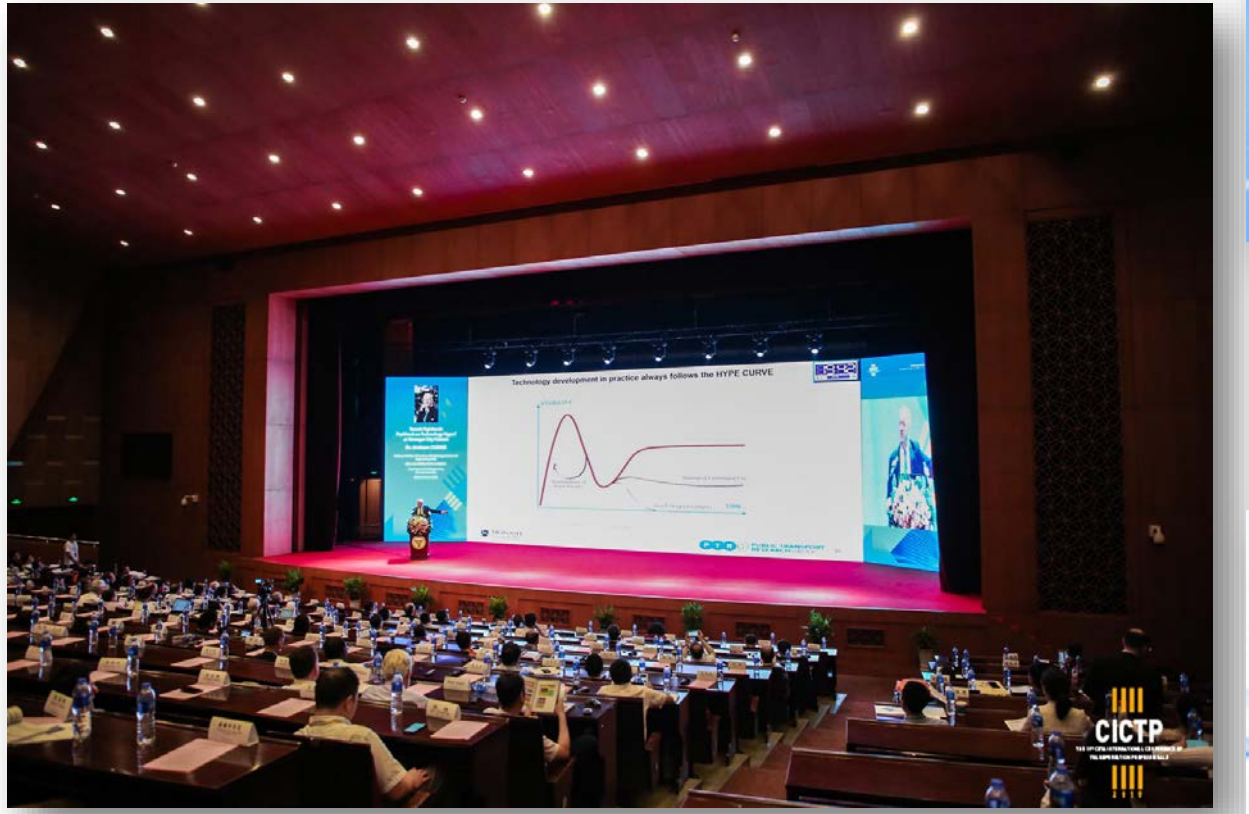
Jarrett Walker
Jarrett Walker & Associates

Lean into the Wind: Defending Our Cities from Technology Hype

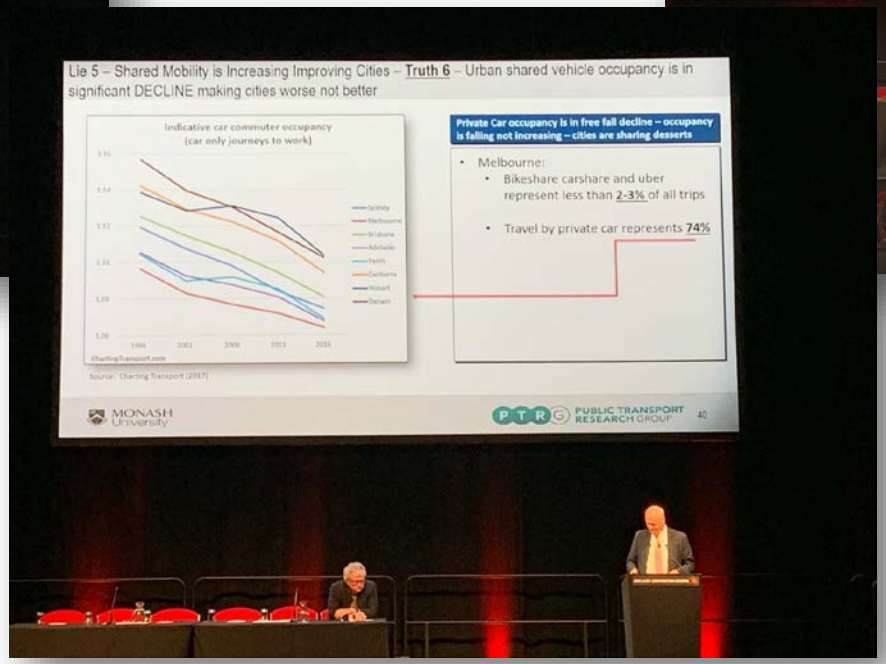
Dr Steven Polzin
University of South Florida

Positioning Transit to Compete as Technology Transforms Transportation

…and the China International Transport Research Conference (CICTP), Nanjing in July…

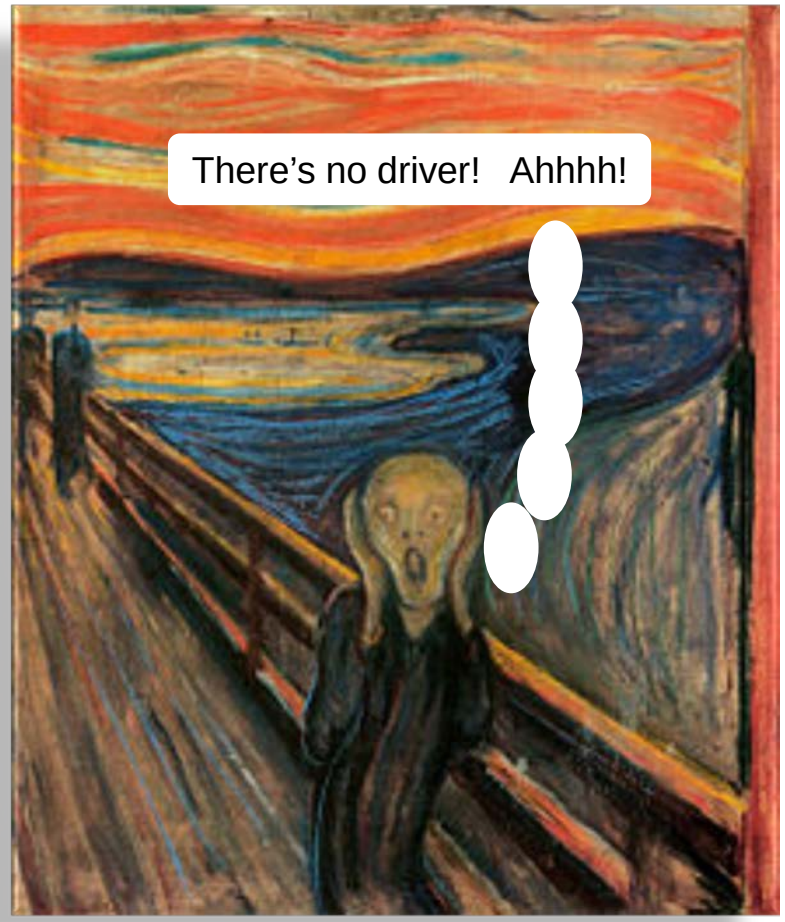


..and the Australasian Institute of Transport Planning and Management Annual Conference in Adelaide in August...



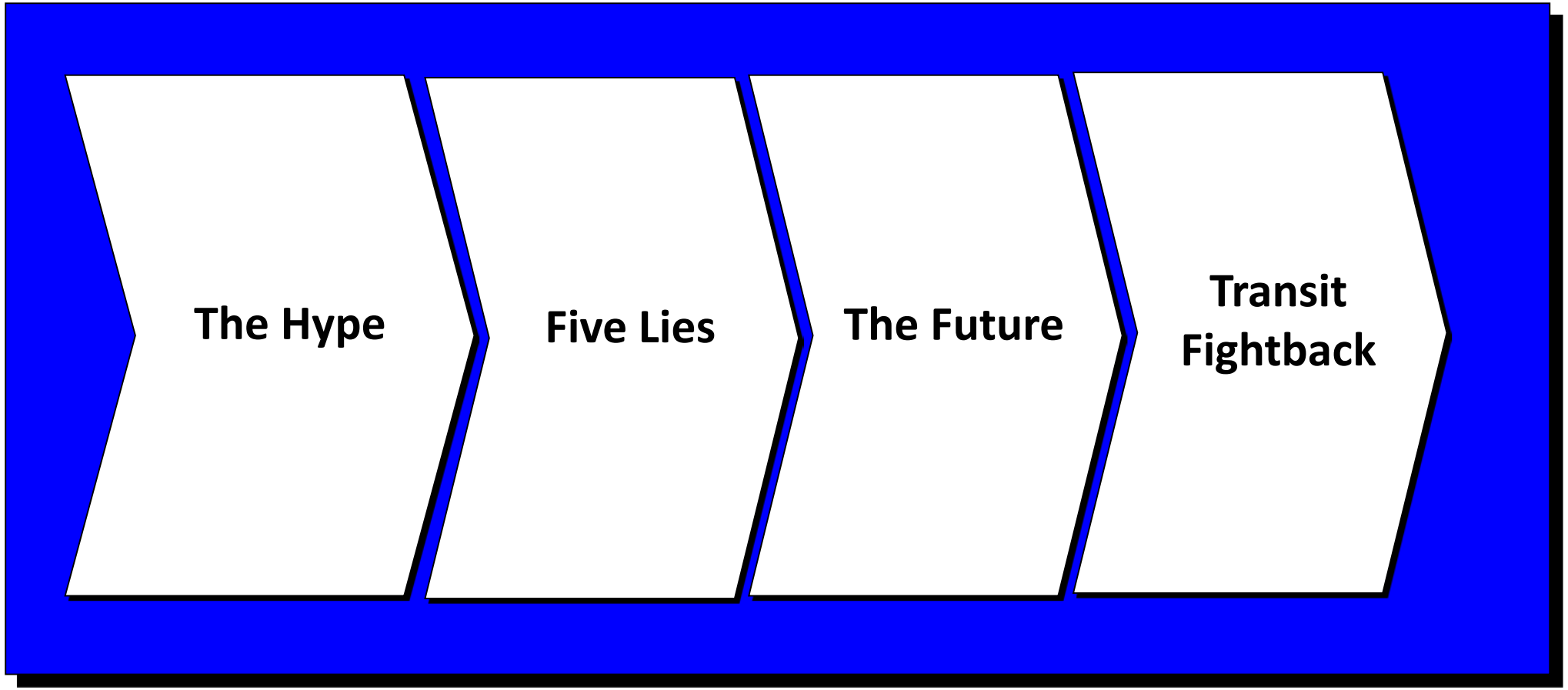
...it 'pushes back' on the endless hype and lies being spread about future mobility to rebase the future around public transport for cities...

- It aims to :
  - consider how "new mobility", "autonomous vehicles", "shared mobility" and "ride sharing" is going to impact cities in the future transit
  - Explore the future case for Urban Public Transport systems
  - Look at some new and interesting developments in the field
- It is going to debunk fallacies being promoted about new mobility and transit



Source: [1]*Currie G (2018) 'LIES, DAMN LIES, AV'S, SHARED MOBILITY AND URBAN TRANSIT FUTURES' Journal of Public Transportation Special Issue on the Future of Public Transport.*

…and is structured as follows



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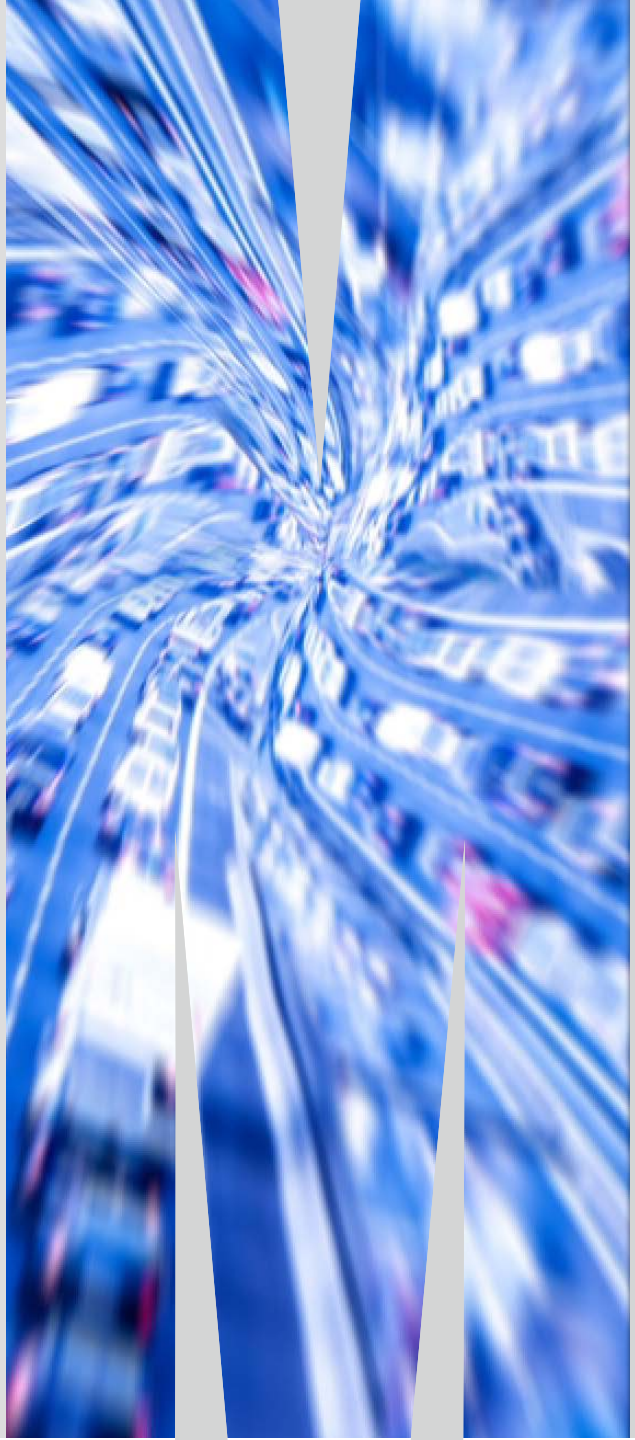
Introduction

The Hype

Five Lies

The Future

Transit Fightback

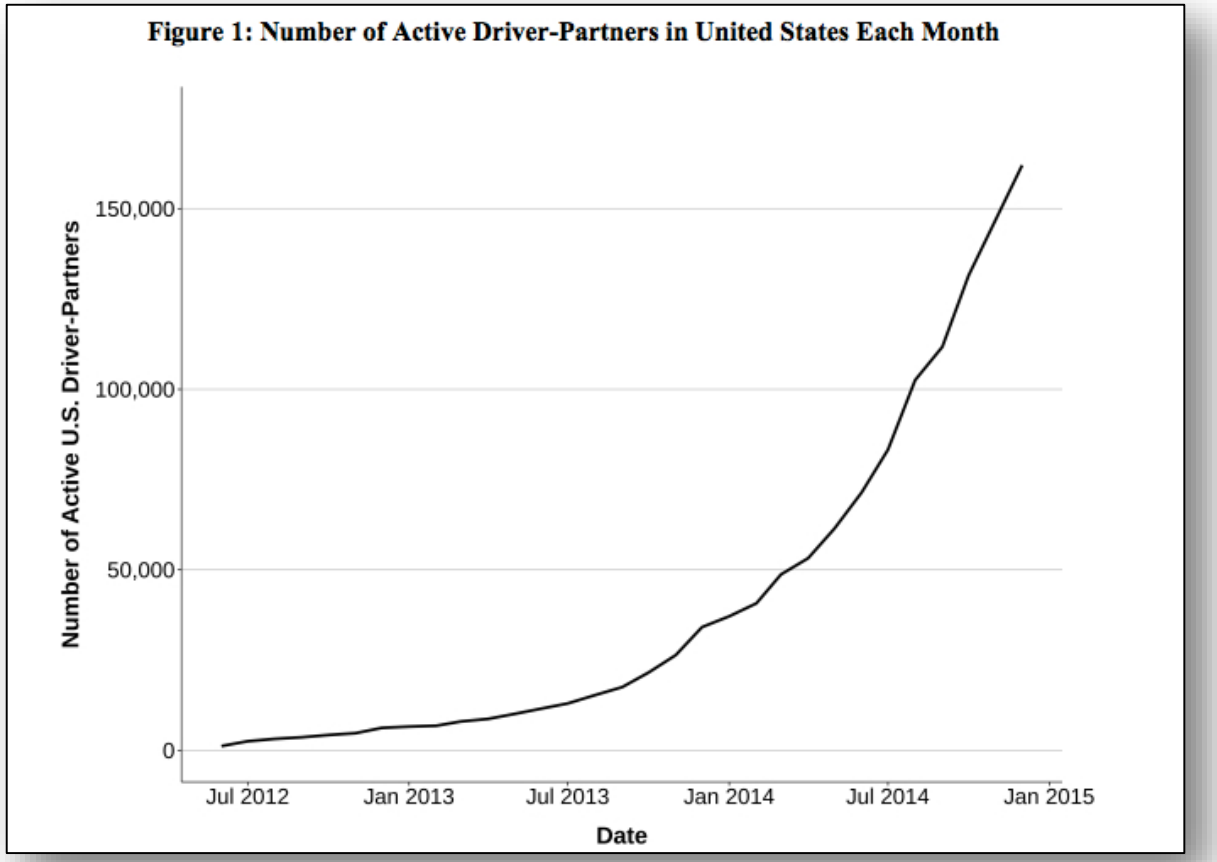


That amazing future we dreamed of…

..they say its going to happen with driverless cars.

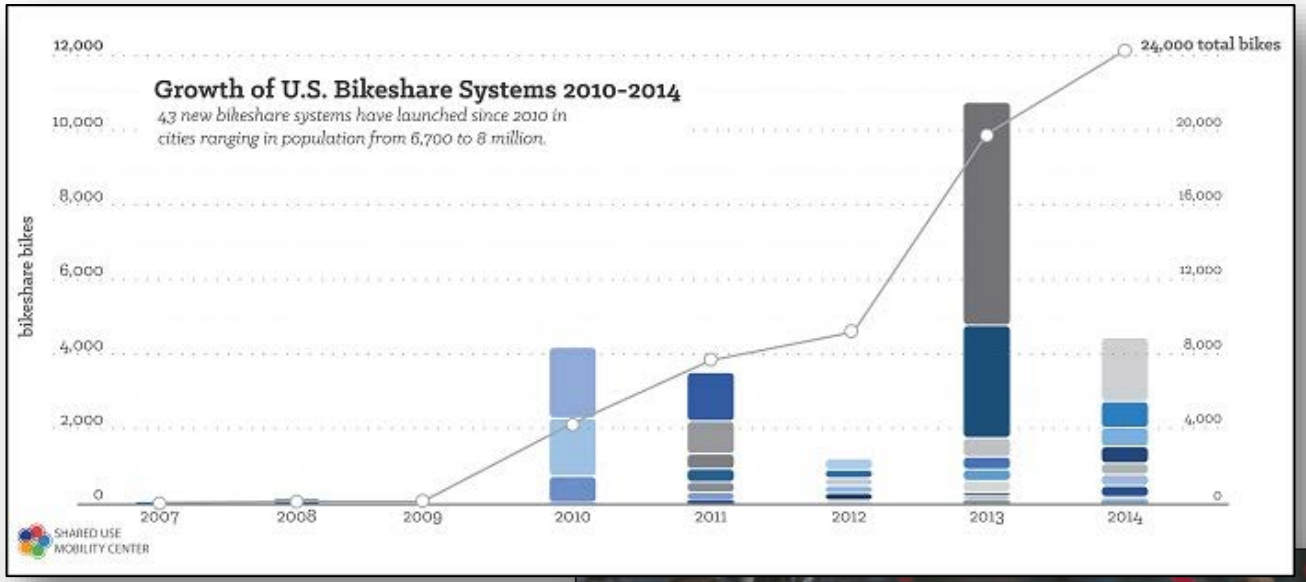
We can make good use of our time while [not] driving..

New shared mobility modes have disrupted the ‘bad old’ transport guys



Car sharing and bike sharing join a sharing economy transforming city life for the future

	2006	2008	2010	2012	2014
Members	346,610	670,822	1,163,645	1,788,027	4,842,616
Membership Growth Rate		39%	32%	24%	65%
Vehicles	11,501	19,403	31,967	43,554	104,125
Fleet Growth Rate		30%	28%	17%	55%
Member-Vehicle Ratio	30.1	34.6	36.4	41.1	46.5



Is it the end of transit? Hasn't this happened before?

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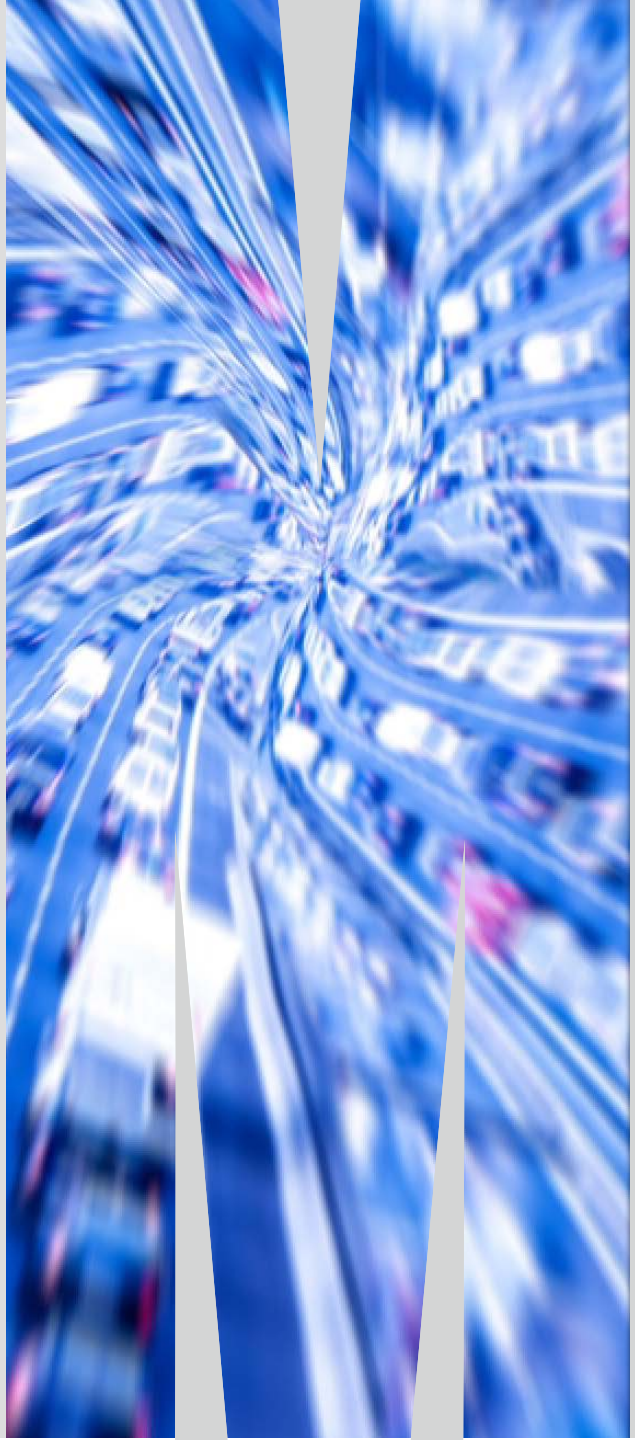
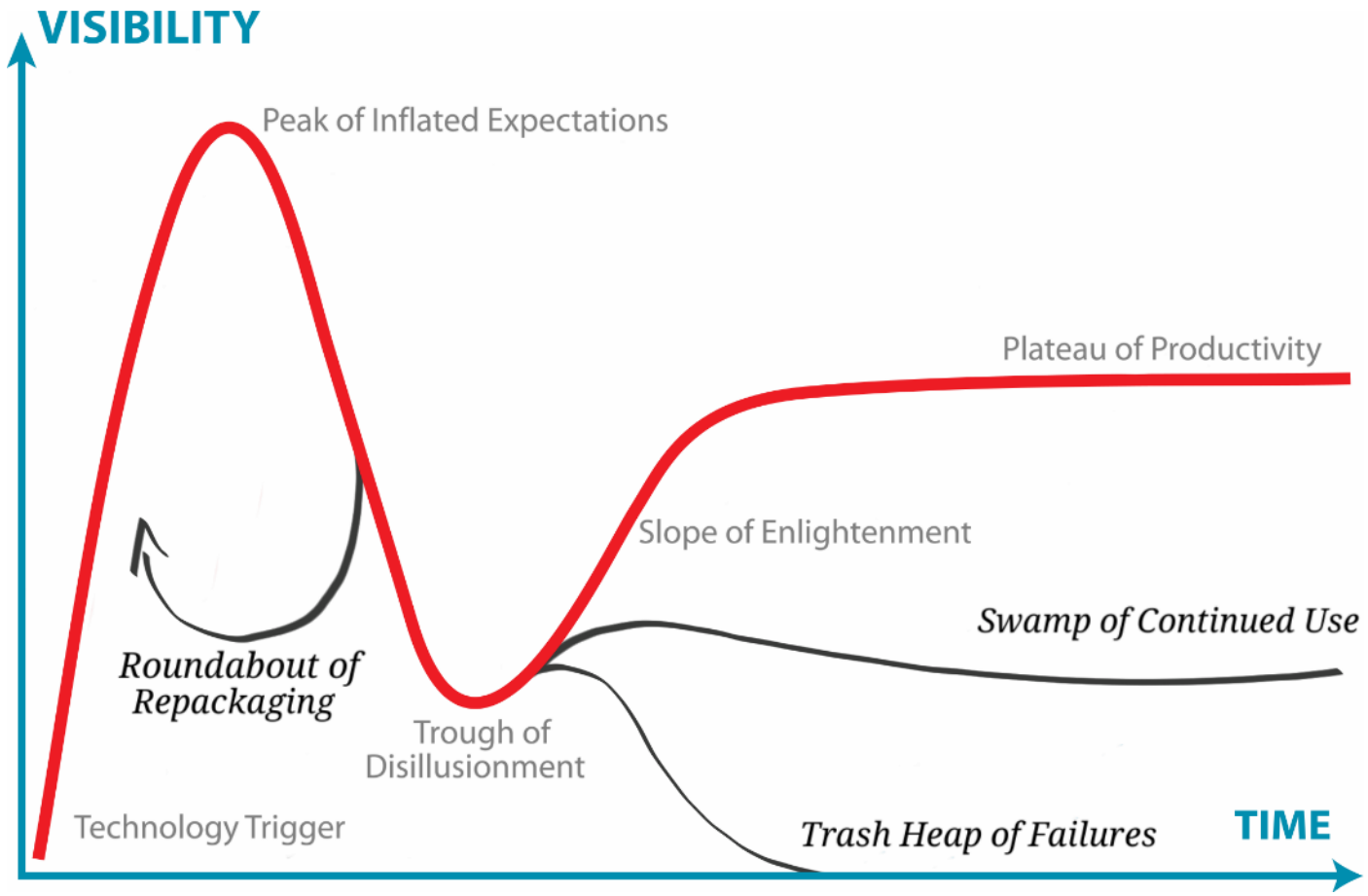


Technology development in practice always follows the HYPE CURVE

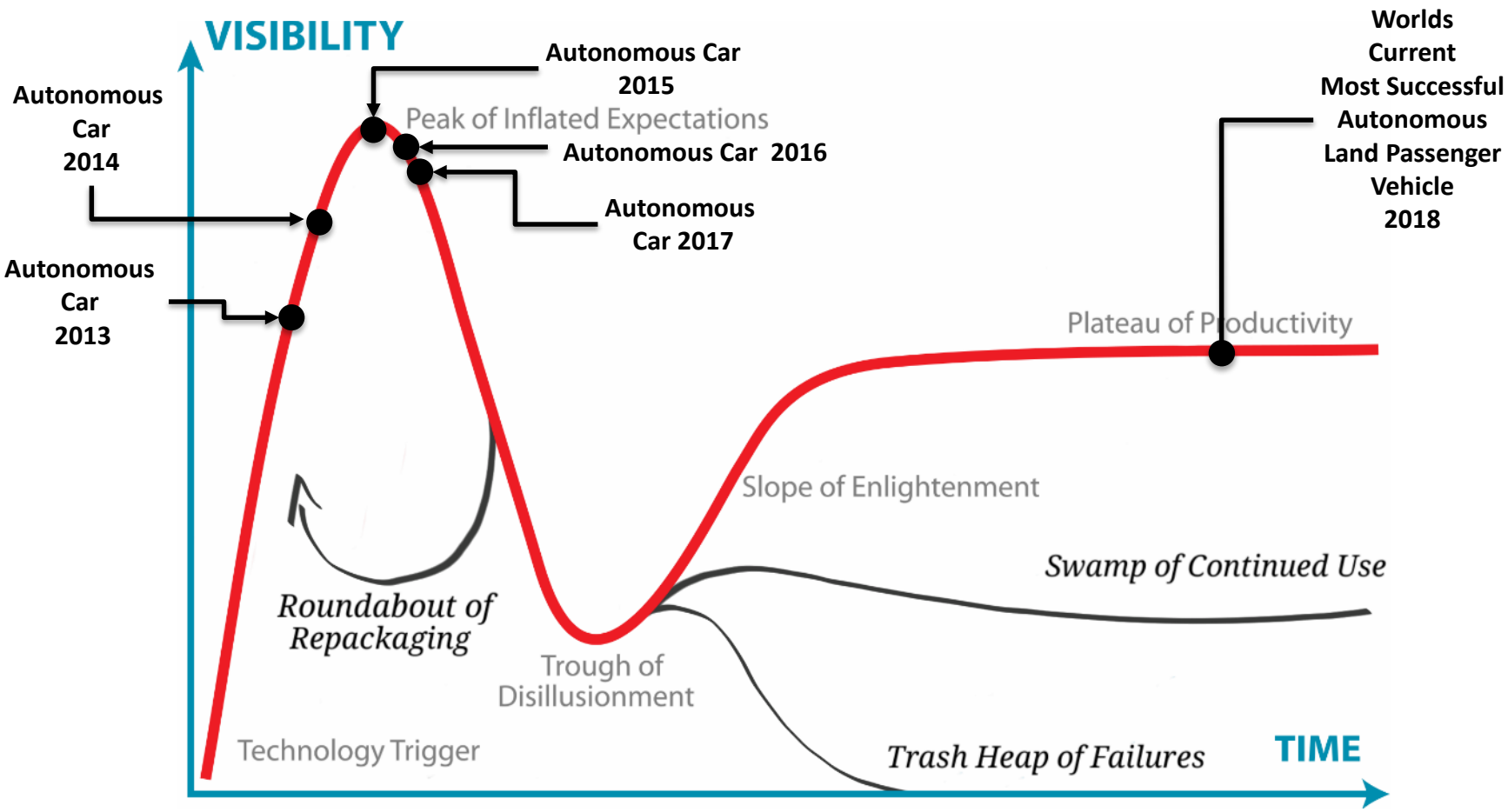


Source: Gartner; https://www.gartner.com/newsroom/id/3784363

Plenty of new tech ideas said to ‘revolutionise the world are proven impractical – but they were all ‘over sold’ at the beginning

The Trash Heap of Failures

The Autonomous Car – Contemporary Progress



Source: Gartner; https://www.gartner.com/newsroom/id/3784363

Lie 1 – Autonomous Cars are the END of Transit

Lie 1 – Autonomous Cars are the END of Transit

The Atlantic

Popular Latest Sections Magazine More

The End of Public Transit?

Start-ups are proving more efficient than government in areas like transportation. Should some services be privatized?

THE ATLANTIC

COULD TRANSIT START-UPS BE THE END OF PUBLIC TRANSPORTATION?

Traffic in San Francisco

Start-ups like Uber have successfully disrupted the cab industry and revolutionized cities so residents don't have to rely on needing their own car. However, they're also have a deep effect on public transit.

CATO INSTITUTE

The End of Transit and the Beginning of the New Mobility: Policy Implications of Self-Driving Cars

SHAR

Policy Forum

October 14, 2014
12:00PM to 1:30PM EDT

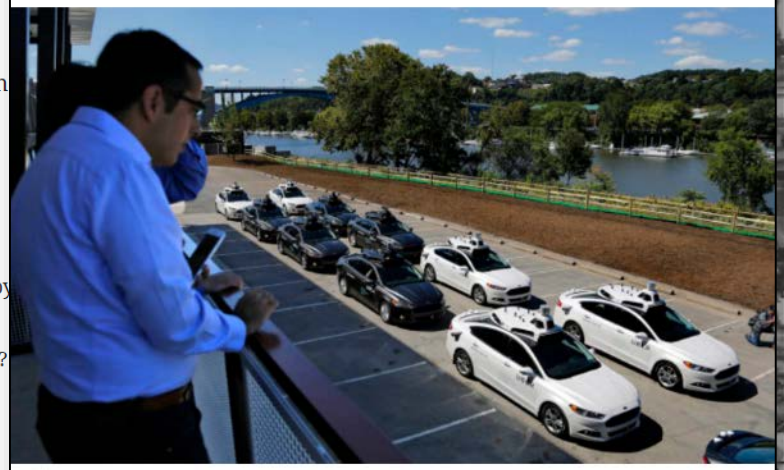
Hayek Auditorium

Featuring **Randal O'Toole**, Senior Fellow, Cato Institute; **Marc Scribner**, Research Fellow, Competitive Enterprise Institute; an **Adam Thierer**, Senior Research Fellow, Mercatus Center; moderated by **Matthew Feeney**, Policy Analyst, Cato Institute.

Experimental self-driving cars have successfully operated more than 700,000 miles on American highways. Such cars will be on the market by 2020 and will radically transform the 21st century. What should Washington policymakers know about the future of American mobility? Randal O'Toole will describe the implications of self-driving cars for urban transit and regional transportation planning. Marc Scribner will discuss the laws and regulations that should govern self-driving cars. Adam Thierer will review the privacy implications of self-driving cars. Please join us for a preview of the future of American transportation.

Driverless cars could make mass transit obsolete

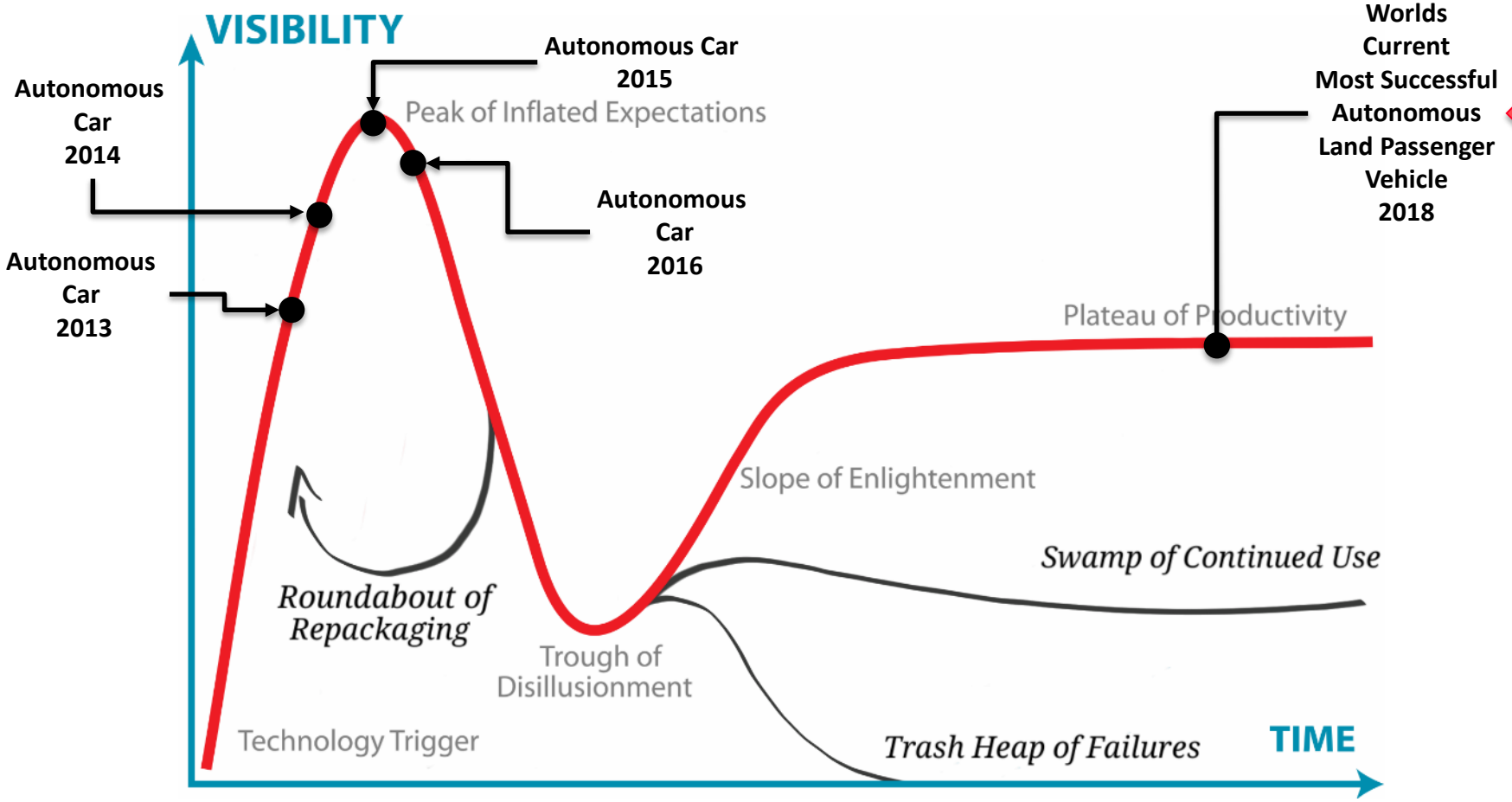
BY DAVE ROSS
OCTOBER 25, 2016 AT 9:27 AM



A group of self driving Uber vehicles position themselves to take journalists on rides during a media preview at Uber's Advanced Technologies Center in Pittsburgh. Driverless

PTRG PUBLIC TRANSPORT RESEARCH GROUP

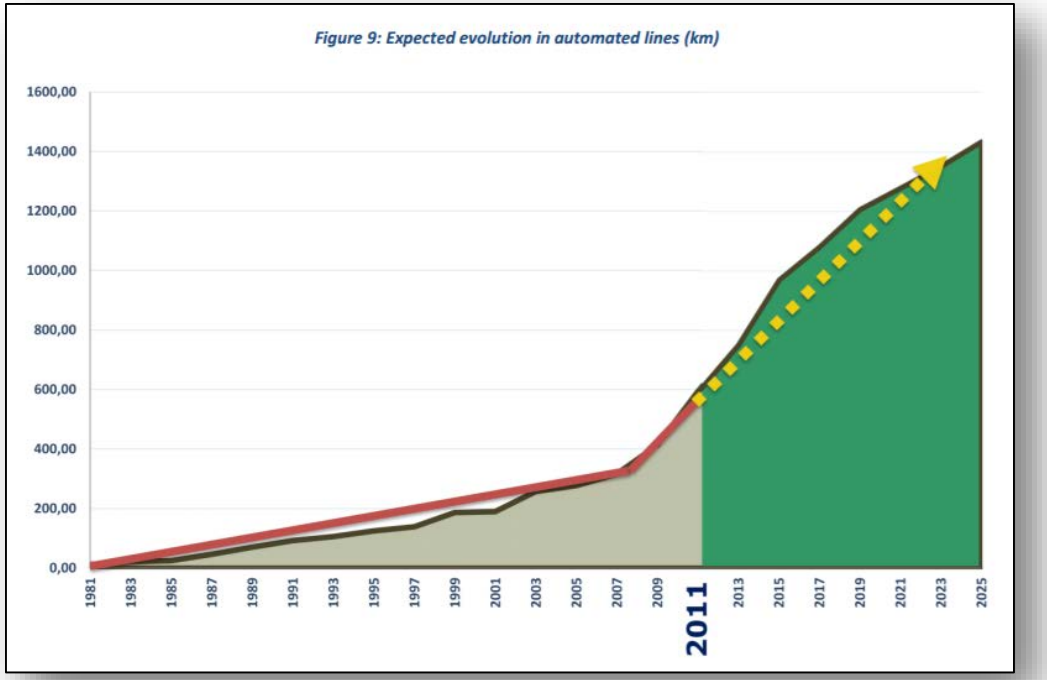
The Autonomous Car – Contemporary Progress



DRIVERLESS TRAINS

Source: Gartner; https://www.gartner.com/newsroom/id/3784363

Lie 1 – Autonomous Cars are the END of Transit – Truth 1 - Most travel by AV's is on Driverless Trains which is booming – Transit dominates Autonomous Vehicle travel



Progress in Driverless Train Development (UITP)

40% of all urban passenger trains in Asia have no driver

SITCE Conference, Singapore, 2018

Lie 2 – Autonomous Cars will Reduce Congestion

Lie 2 – Autonomous Cars will Reduce Congestion

Autonomous Cars will Reduce Congestion - Evidence

- Kanaris et al (1997) - +200% on freeways due to zero traffic conflicts
- Kesting et al (2008) – eliminate all delays with intersection with autonomic weaving in all directions
- Li et al (2013) – Intersection remote control – 31-37% capacity improvement

They are ALL maths/simulation studies – ALL THEORY - no actual human trials where this is proven

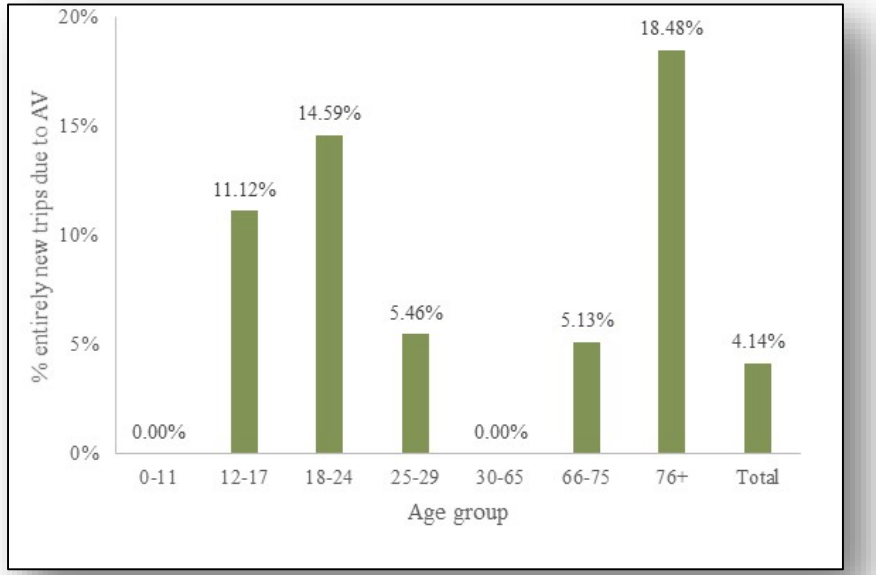
Lie 2 – Autonomous Cars will Reduce Congestion – Truth 2 – Humans life in cities is not possible or desirable with the Platooning and Intersection Weaving required for AV cars to work in city streets

ILLUSTRATION: DOUG CHAYKA

Truth 3 - recent research suggests AV cars might actually slow traffic flow and increase traffic volume – this is not a solution to urban traffic congestion

- Finding a of a recent review of AV futures research:
  - AV car operation "may increase congestion, energy, pollution and roadway costs"
    - By increasing total vehicle travel (generated trips from non-drivers [10-14%], empty positioning trips)
    - By increase vehicle size (need space for mobile offices, bedrooms)
    - By being personalised [sharing is unlikely – see lie 4] occupancy will decline, suggesting more vehicles on the road
    - If they follow speed, safety and traffic laws vehicles may reduce speeds
    - Some passenger may want to rest, have lower speed to help them work – some vehicles may need to wait for human instructions

Forecast Trip Generation from 'Transport Disadvantaged' Groups Resulting from Widespread Driverless Vehicle Availability (at low cost)



Source: Truong LT, De Gruyter C, Currie G and Delbosc A (2017) 'Estimating the Trip Generation Impacts of Autonomous Vehicles on Car Travel in Victoria, Australia' TRANSPORTATION November 2017, Volume 44, Issue 6, pp 1279-1292.

Source: "Autonomous Vehicle Implementation Predictions - Implications for Transport Planning" Todd Litman 26 Nov 2018 Victoria Transport Policy Institute

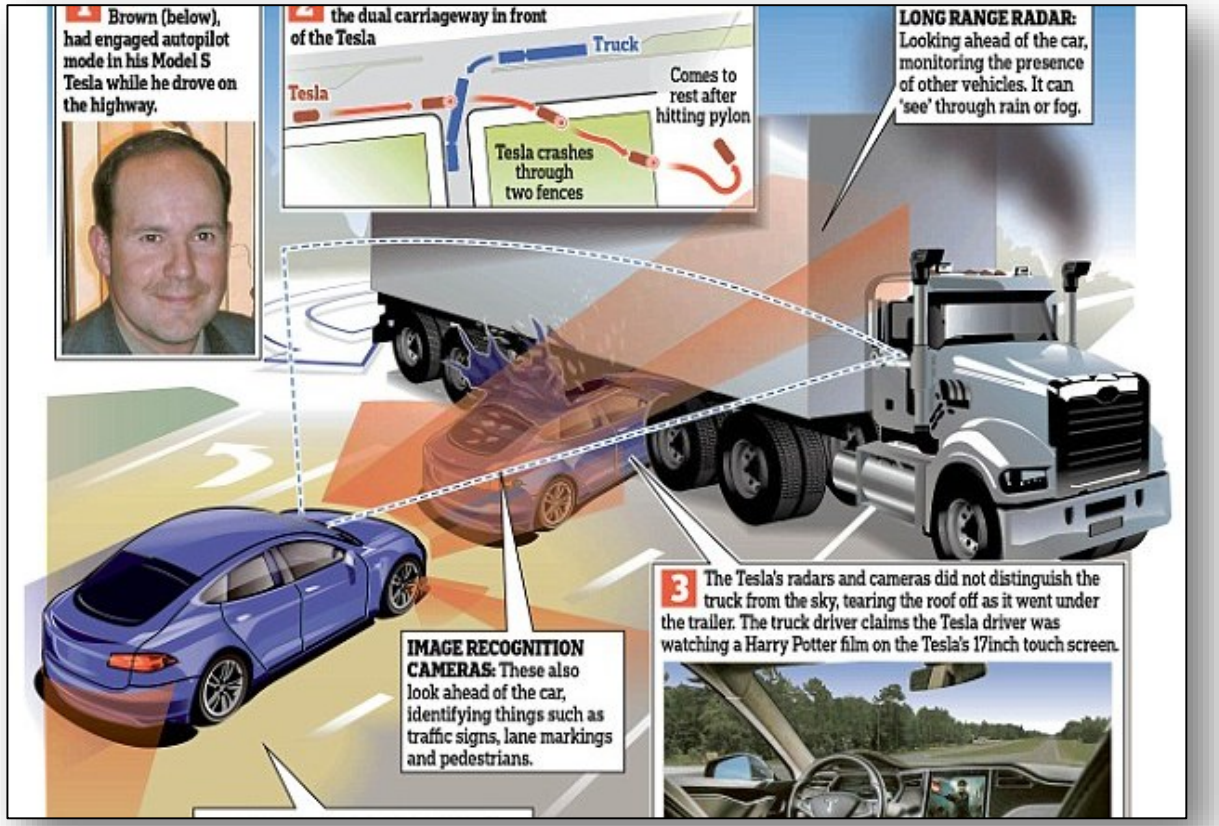
Lie 3 – Autonomous Cars will Vastly Improve Car Safety

Lie 3 – Autonomous Cars will Vastly Improve Car Safety

The AV Car Safety Hype

- 90%/95% of all car crashes are caused by Human Error (Treat, 1977)
- Remove Humans = Remove Crashes

Lie 3 – Autonomous Cars will Vastly Improve Car Safety – Truth 4 – Autonomous cars are LESS safe than human driven cars



The Death of Joshua Brown – May 2016

(JDA Journal – Sandy Murdock Sep 2018)

The Debate

- Elon Musk statement (May 2016):
  - Tesla has run 130M miles and this was their 1st death (**1 death per 130M Miles**)
  - In the US human driven cars have road deaths of 1/100M miles
  - There – AC's safer
- BUT: Rand Corporation (2016) says: threshold for AV's to be safer than human cars is **1 death per 250M miles**

Source: Christian Wolmar 'Driverless cars : on a road to nowhere'

Lie 3 – Autonomous Cars will Vastly Improve Car Safety – Truth 4 – Autonomous cars are LESS safe than human driven cars

The Death of Elaine Herzberg – March 2018

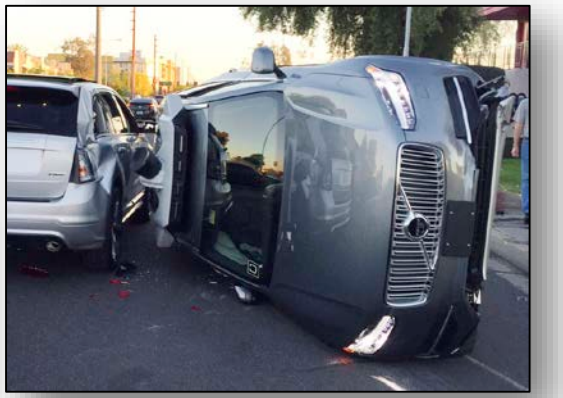
The Debate

- Elon Musk statement (May 2016):
  - Tesla has run 130M miles and this was their 1st death (**1 death per 130M Miles**)
  - In the US human driven cars have road deaths of 1/100M miles
  - There – AC's safer
- BUT: Rand Corporation (2016) says: threshold for AV's to be safer than human cars is **1 death per 250M miles**

Source: Christian Wolmar 'Driverless cars : on a road to nowhere'

Lie 3 – Autonomous Cars will Vastly Improve Car Safety – Truth 4 – Autonomous cars are LESS safe than human driven cars

- Finding a of a recent review of AV futures research:
  - "Autonomous vehicles may be no safer per mile than an average driver, and may increase total crashes when self- and human driven vehicles mix" Sivak and Schoettle (2015a)
  - Any potential "net safety gains are significantly reduced if this technology increases total vehicle travel" Groves and Kalra (2017)



Tempe Florida

Mountain View California

Source: "Autonomous Vehicle Implementation Predictions - Implications for Transport Planning" Todd Litman 26 Nov 2018 Victoria Transport Policy Institute

Lie 4 – Shared Mobility is Shared Mobility

- Sharing:

  "to Use, **Occupy** or Enjoy Something with Another or Other Persons"

Lie 4 – Shared Mobility is Shared Mobility – Truth 5 - Shared Mobility Has VERY LOW occupancy – its NOT really shared

- Sharing:

  "to Use, **Occupy** or Enjoy Something with Another or Other Persons"

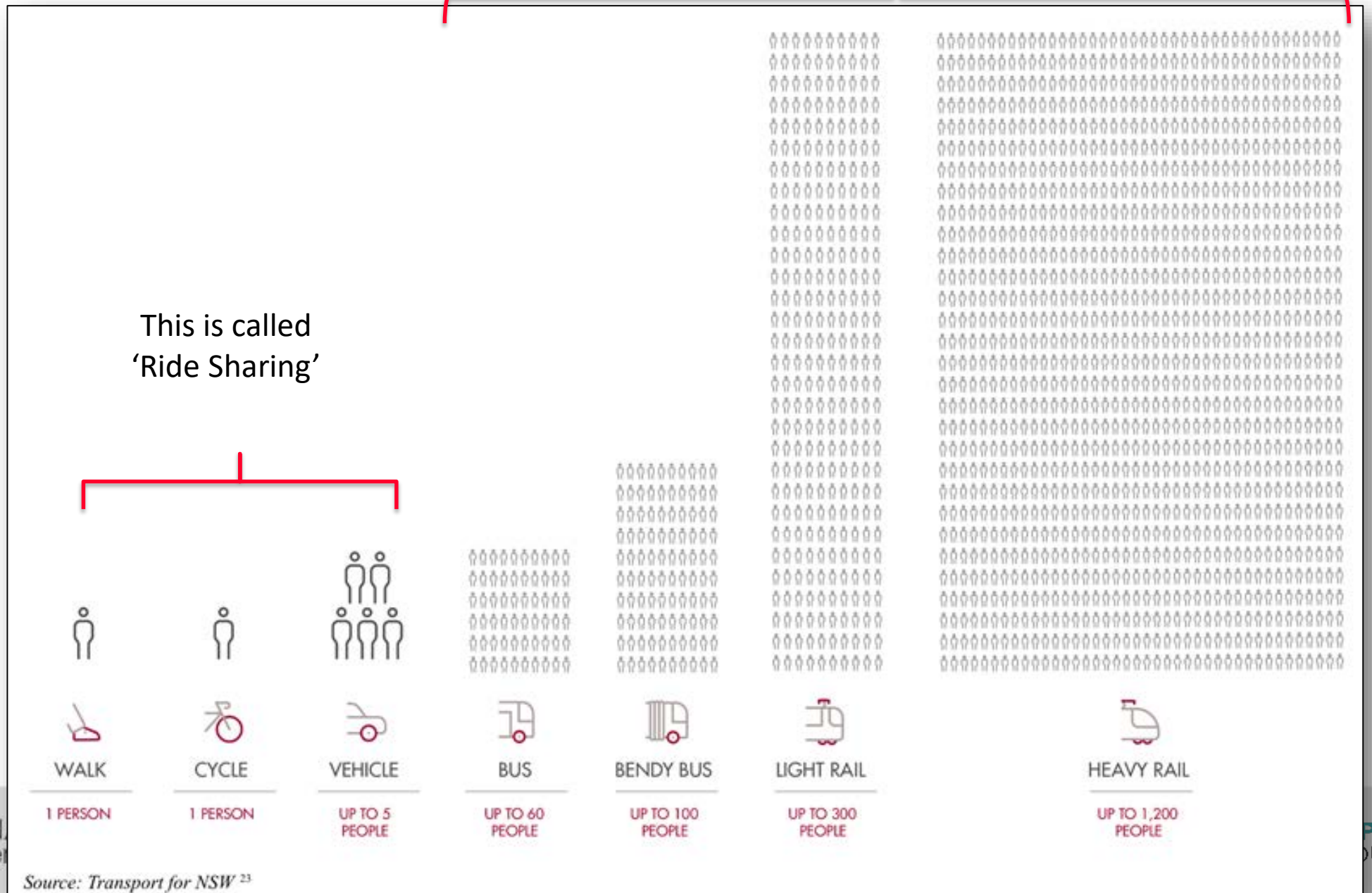
The Evidence

- Uber assumed to have the same occupancy of 1.66 per vehicle (including the driver)
  - Source: San Francisco County Transportation Authority (2017) 'TNC's Today'
- CarShare – average vehicle occupancy is 1.44 (including the driver)
  - Source: Cervero, R Golub A and Nee B (2007) 'San Francisco City CarShare: Longer-Term Travel-Demand and Car Ownership Impacts' Institute of Urban and Regional Development University of California at Berkeley
- Bike Share – Vehicle Occupancy = 1

Lie 4 – Shared Mobility is Shared Mobility – Truth 5 - Shared Mobility Has VERY LOW occupancy – its NOT really shared

This is not called ‘Ride Sharing’

This is called
‘Ride Sharing’



Source: Transport for NSW [23]

Lie 5 – Shared Mobility is Increasing Improving Cities

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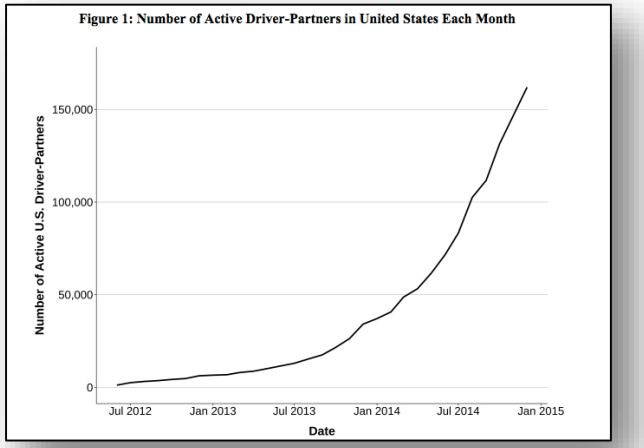
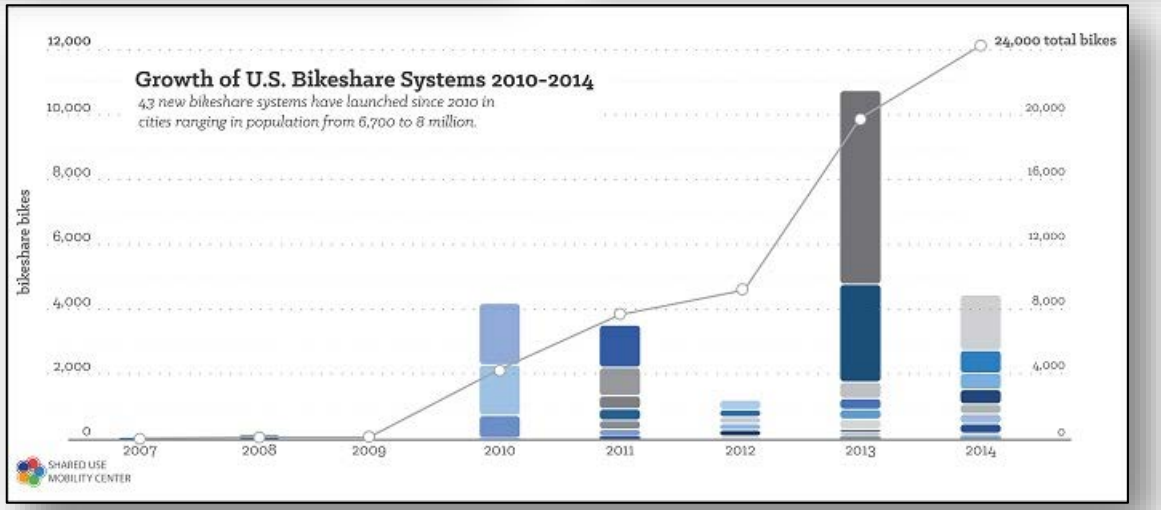
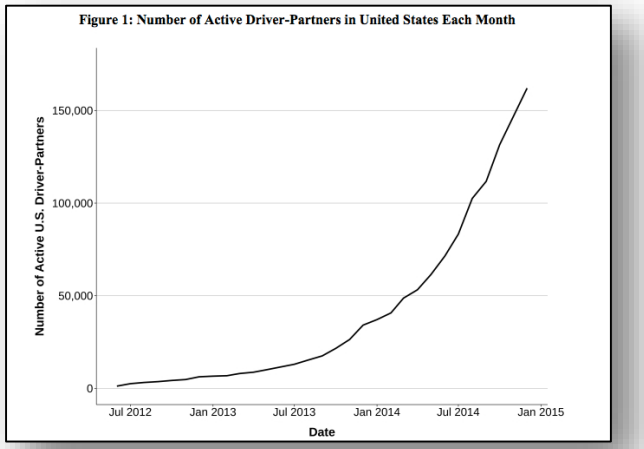
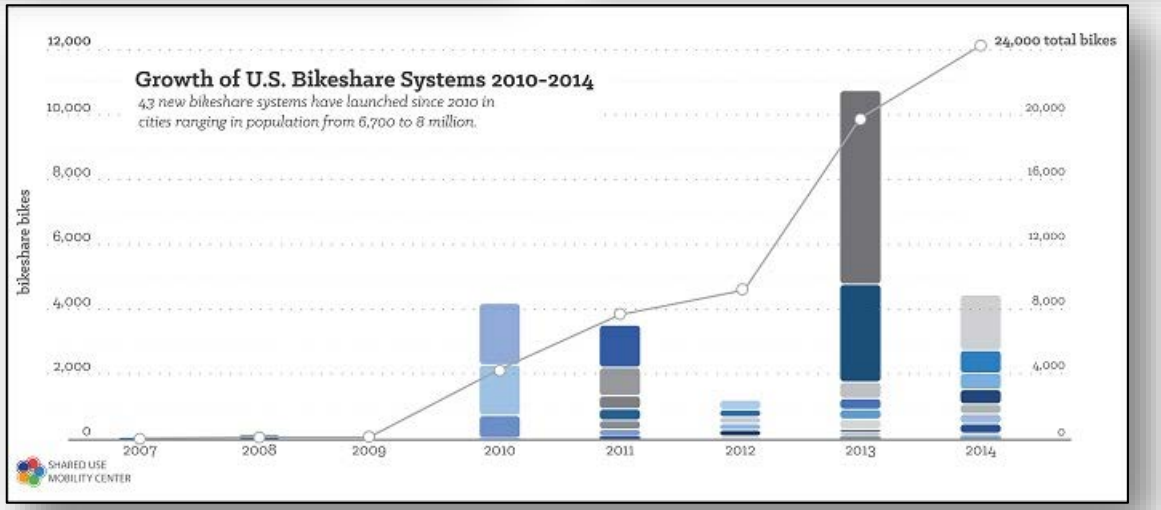




Lie 5 – Shared Mobility is Increasing Improving Cities – Truth 6 – Urban shared vehicle occupancy is in significant DECLINE making cities worse not better

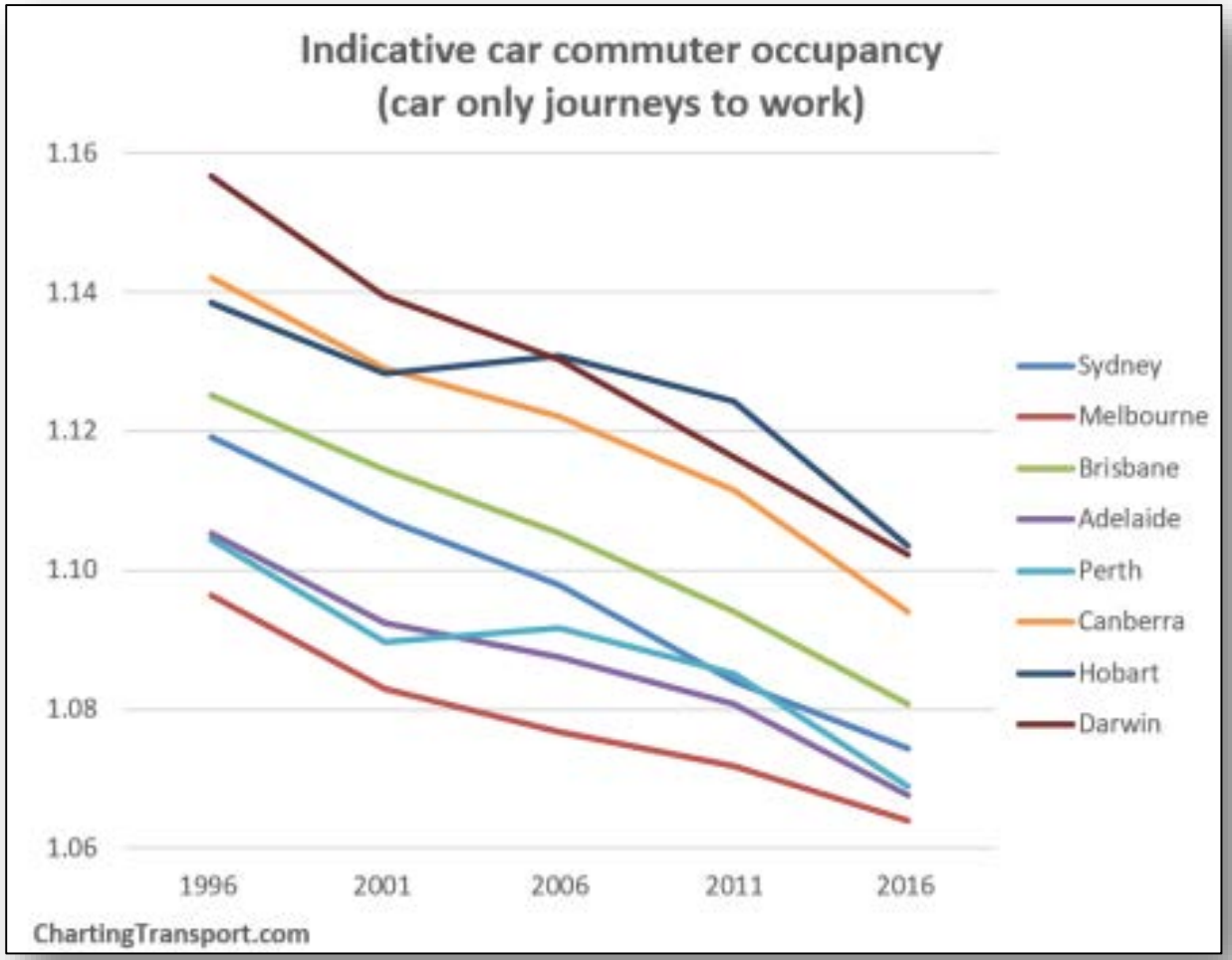




The Evidence – Shared Mobility modes represent very small amounts of travel – the private car DOMINATES

- Melbourne:
  - Bikeshare carshare and uber represent less than **2-3%** of all trips
  - Travel by private car represents **74%**

Lie 5 – Shared Mobility is Increasing Improving Cities – Truth 6 – Urban shared vehicle occupancy is in significant DECLINE making cities worse not better

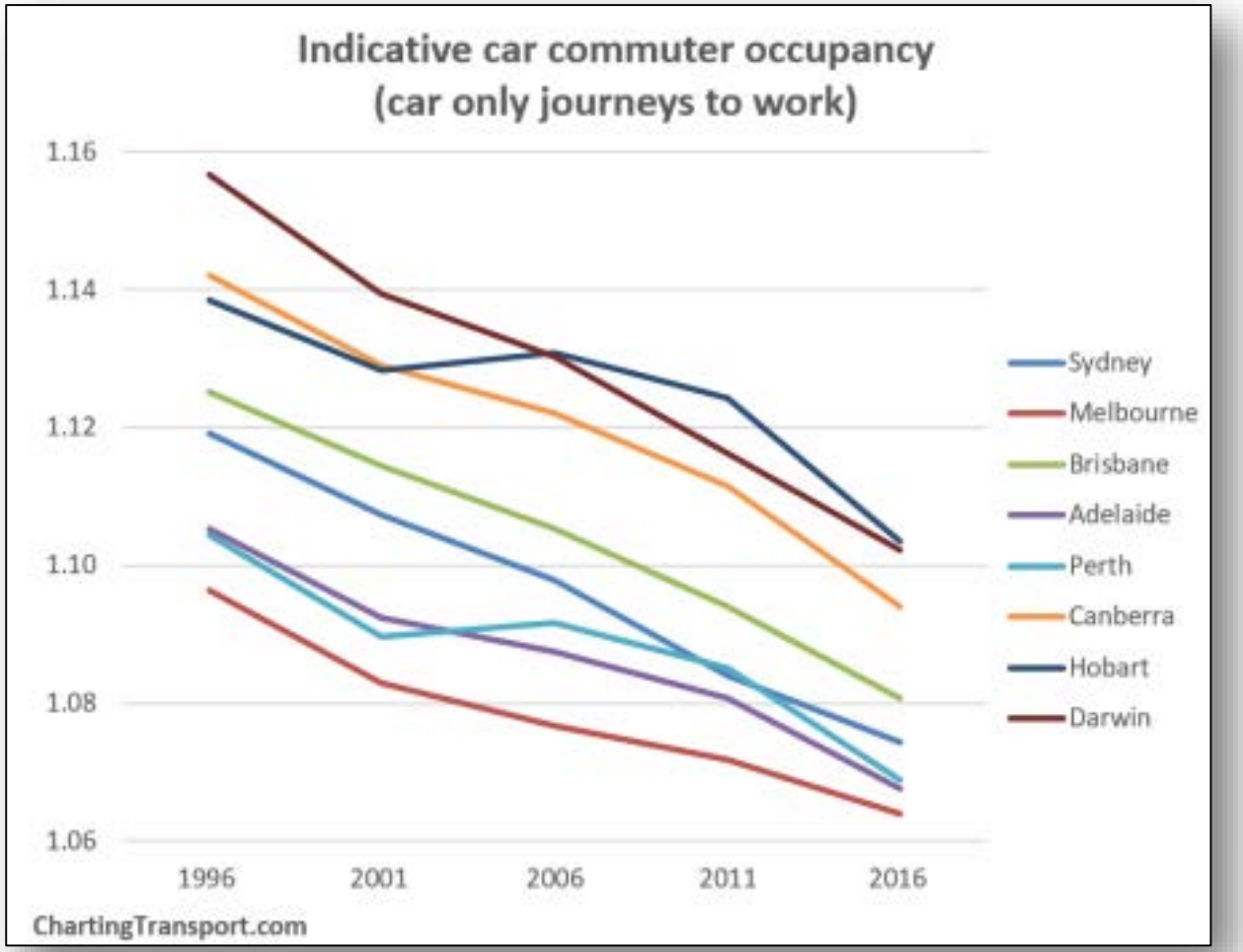


Source: Charting Transport (2017)

Private Car occupancy is in free fall decline – occupancy is falling not increasing – cities are sharing desserts

- Melbourne:
  - Bikeshare carshare and uber represent less than **2-3%** of all trips
  - Travel by private car represents **74%**

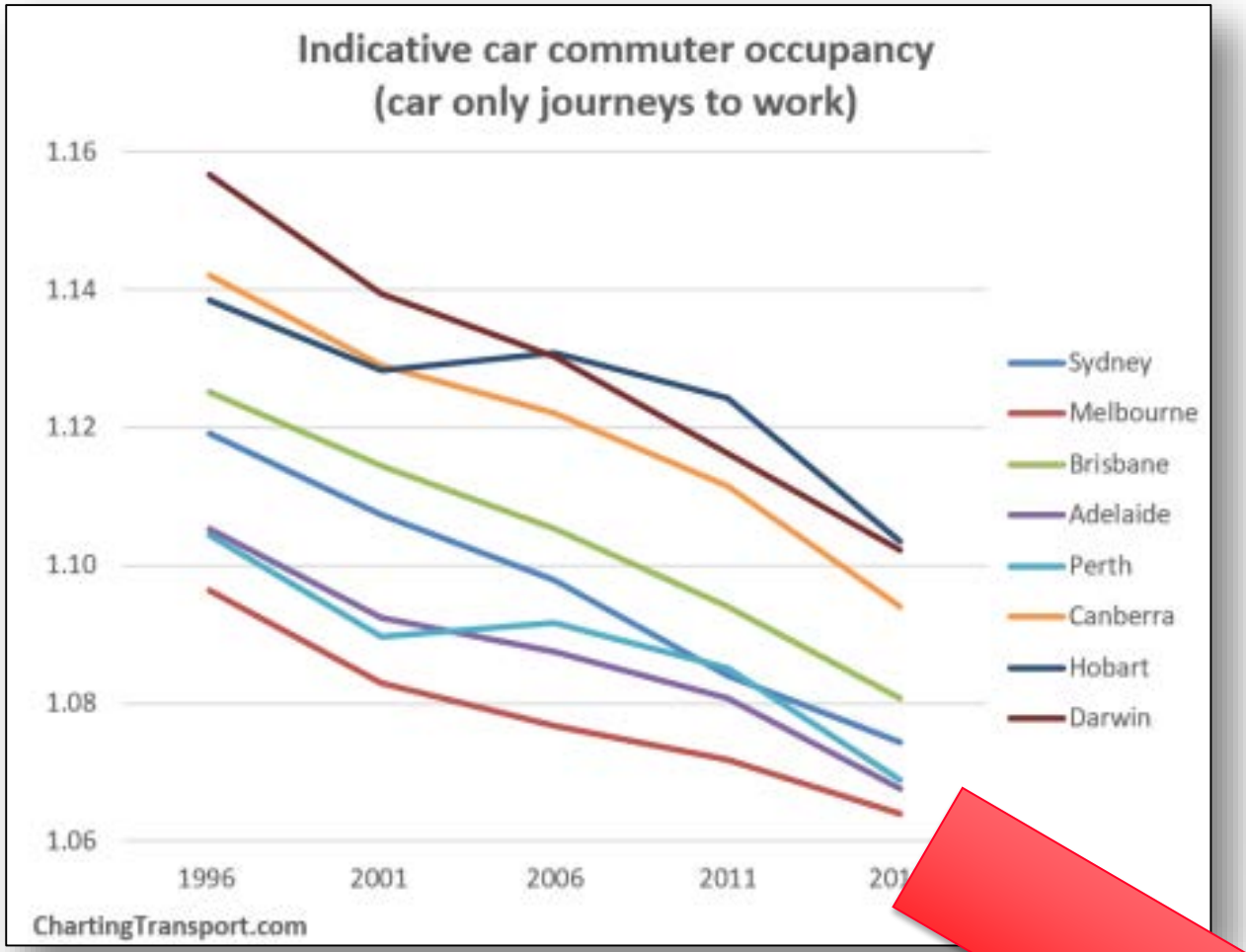
Lie 5 – Shared Mobility is Increasing Improving Cities – Truth 6 – Urban shared vehicle occupancy is in significant DECLINE making cities worse not better



Source: Charting Transport (2017)

So our congested traffic carries less and less people each year

…but with Autonomous cars repositioning without passengers – Occupancy can fall BELOW 1 – just what congested cities need; more cars carrying nobody!



Source: Charting Transport (2017)

So our congested traffic carries less and less people each year

AV cars can be empty on repositioning trips which means occupancy can fall BELOW one

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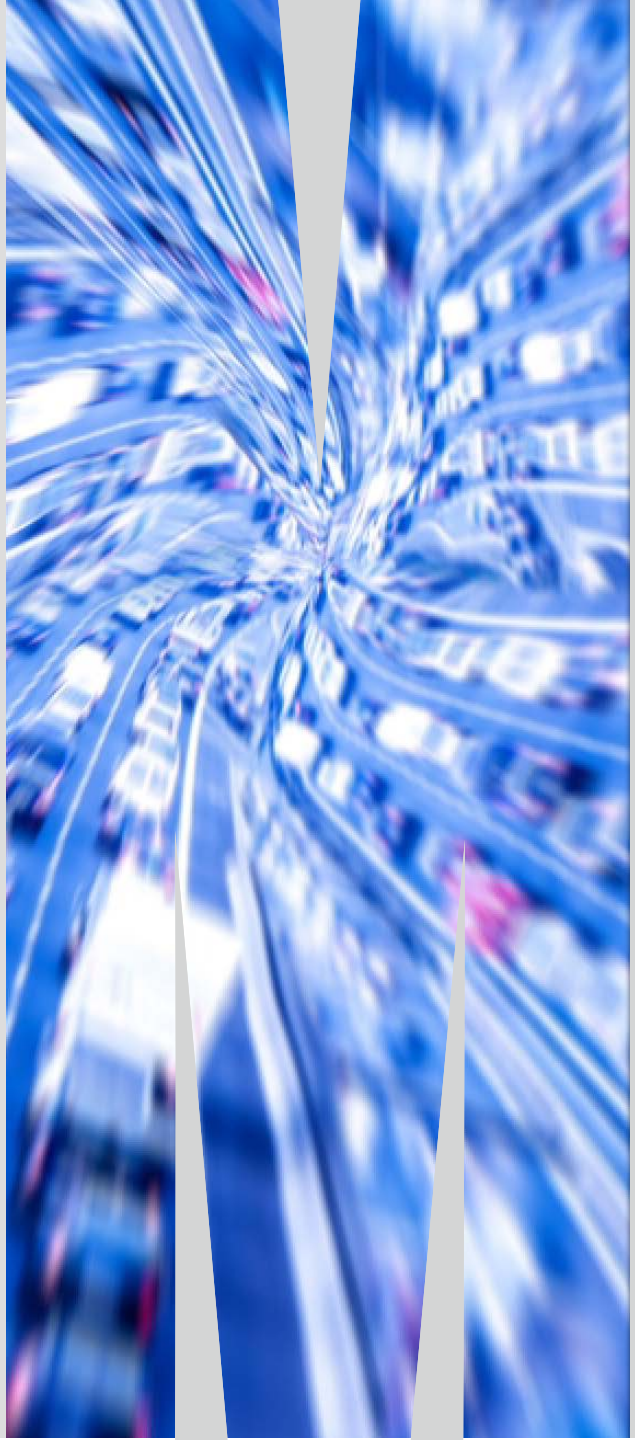


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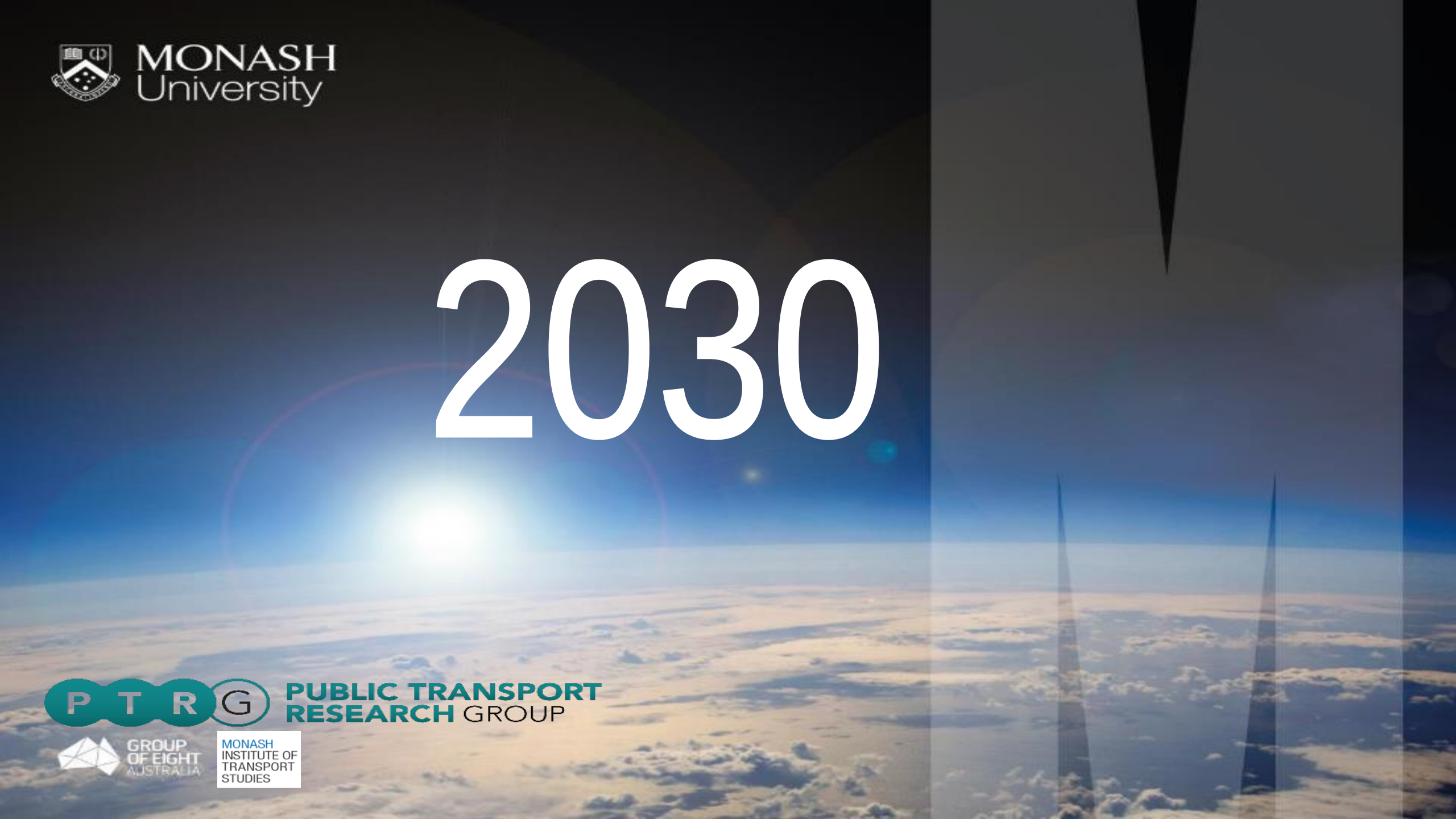
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Cities; humanities future

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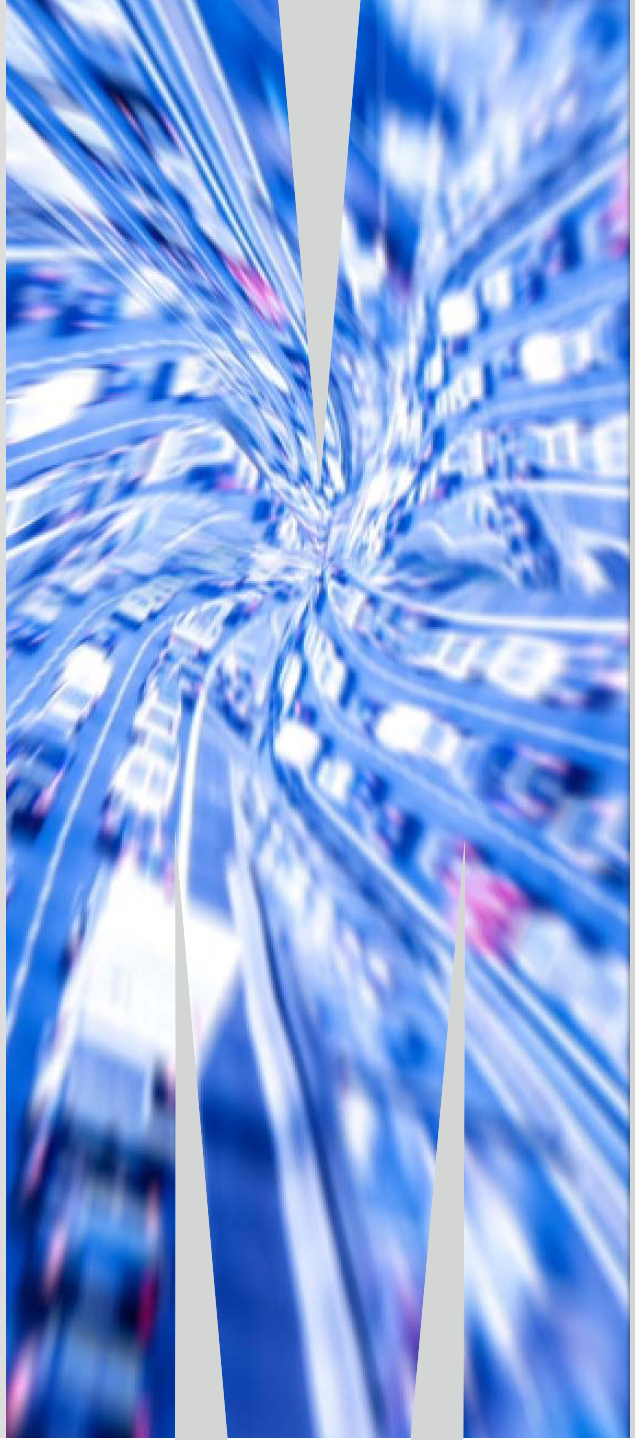
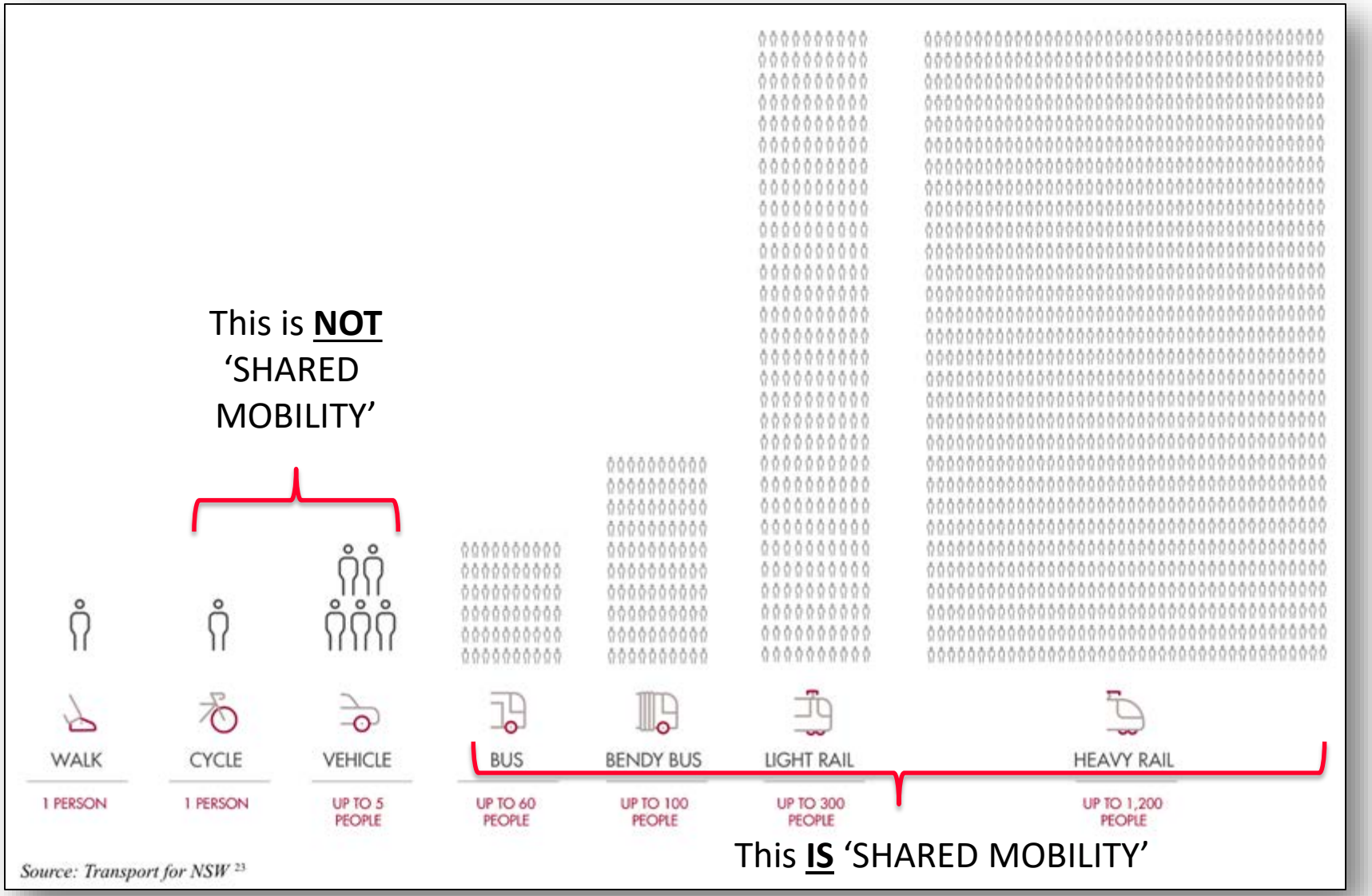
The Future

Transit Fightback

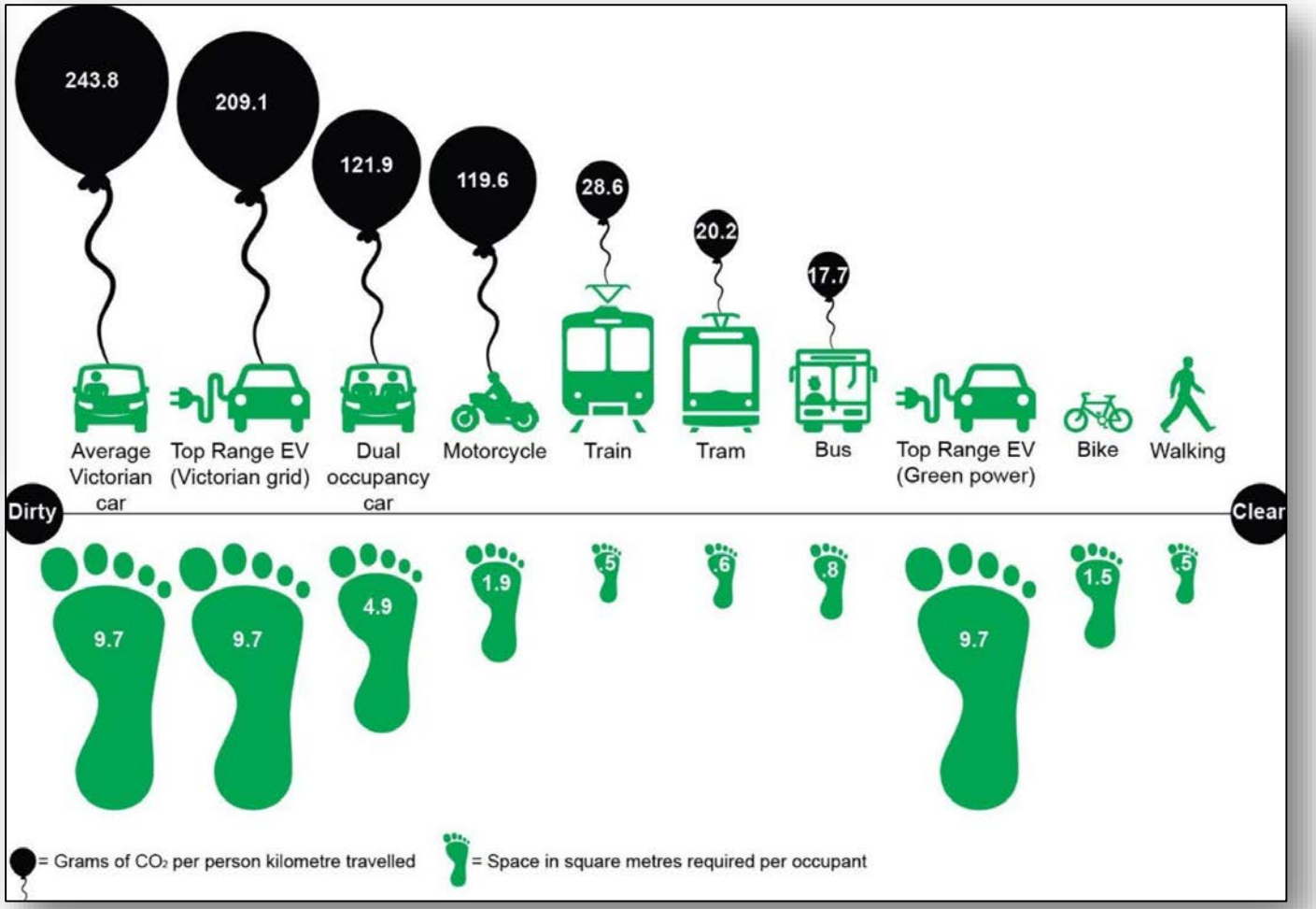


Public Transport is the most efficient form of SHARED MOBILITY



Cities need modes with shared occupancy that are SPACE EFFICIENT…

...and ENVIRONMENTALLY EFFICIENT



Source: Elliot Fishman - Institute of Sensible Transport (2019)

Transit Fightback involves a new concept: TRANSIT FUSION – adoption of new tech to improve service and modes by integration of transport and customer experience infrastructure

Transit runs the Car Share Scheme

First-Last Mile Tech to Transit Nodes

Autonomous Trains are a great example of Transit Fusion with considerable benefits for passengers and operators

Benefits of AV Rail:

- Lower operating costs
  - Paris Metro 30% reduction Ossent T (2010)
- Increased capacity:
  - shorter headways (half length twice frequency; Wang et al, 2016)
  - higher speed (shorter terminus turnaround, meticulous speed adherence)
  - tighter dwell time
- Increased vehicle capacity (no driver cabins and associated space, 6% increase; Ossent T 2010)
- More reliable/robust (33% of 5-min delay incidents removed; Melo PC et al 2011, , availability 99-99.9% vs 96-98%, Mohan S, Morrison S, 2013)
- Lower energy use (30% reduction, Cox CJ, 2011)
- Increased ridership due to higher frequency Graham DJ et al (2009)
- General safety improvement

Bus Rapid Transit IS Transit Fusion; Rubber Tired Railways; cost effective adaptation of new technologies

Overall recognise the five lies about urban transit futures – FIGHTBACK with the six truths to improve cities into the future

Over Hyped LIES	TRUTH
1. Autonomous Cars are the END of Transit	Truth 1 - Most travel by AV's is on Driverless Trains which is booming – Transit dominates Autonomous Vehicle travel
2. Autonomous Cars will Reduce Congestion	Truth 2 – Human life in cities is not possible or desirable with the Platooning and Intersection Weaving required for AV cars to work in city streets
	Truth 3 - recent research suggests AV cars might actually slow traffic flow and increase traffic volume – this is not a solution to urban traffic congestion
3. Autonomous Cars will vastly improve Car Safety	Truth 4 – Autonomous cars are LESS safe than human driven cars
4. Shared Mobility is Shared Mobility	Truth 5 - Shared Mobility Has VERY LOW occupancy – its NOT really shared
5. Shared Mobility is Increasing Improving Cities	Truth 6 – Urban shared vehicle occupancy is in significant DECLINE making cities worse not better

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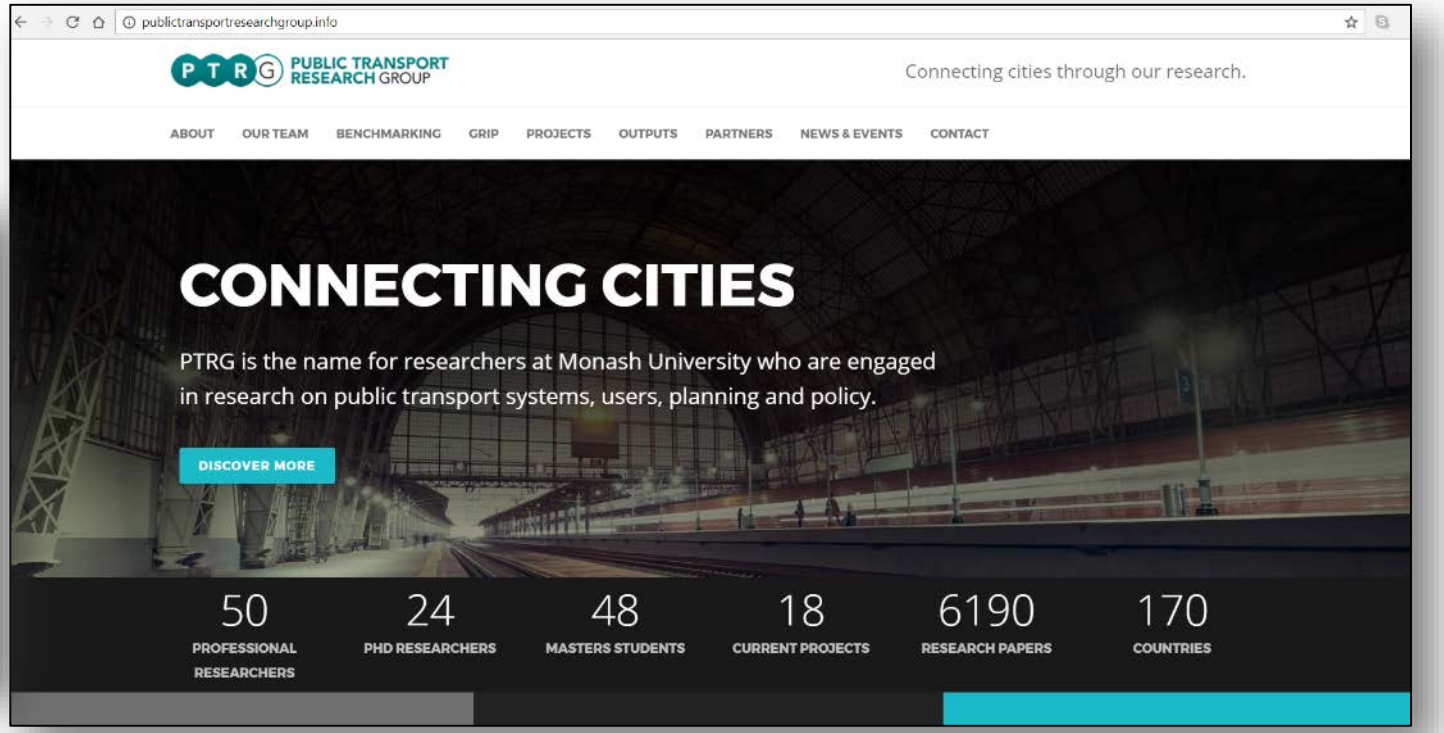

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