

# 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: <sup>1</sup>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*.



Free access online at:

<https://scholarcommons.usf.edu/jpt/vol21/iss1/3/>



... it was 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 15<sup>th</sup> 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:



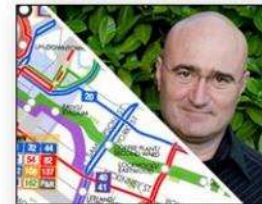
**Dr Graham Currie**  
Monash University

**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 2019...



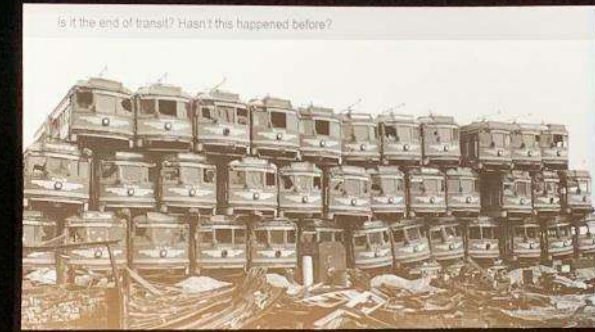
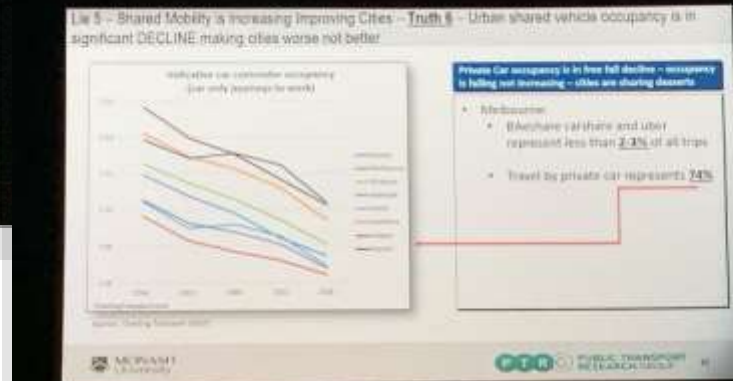
# ..and the Australasian Institute of Transport Planning and Management Annual Conference in Adelaide in August 2019.

**MONASH University**  
ACTPM National Traffic and Transport Conference 2019  
Keynote Session - 8:45-10:30 Thursday 1st August 2019  
Hall 10, Adelaide Convention Centre, Adelaide, Australia

## 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

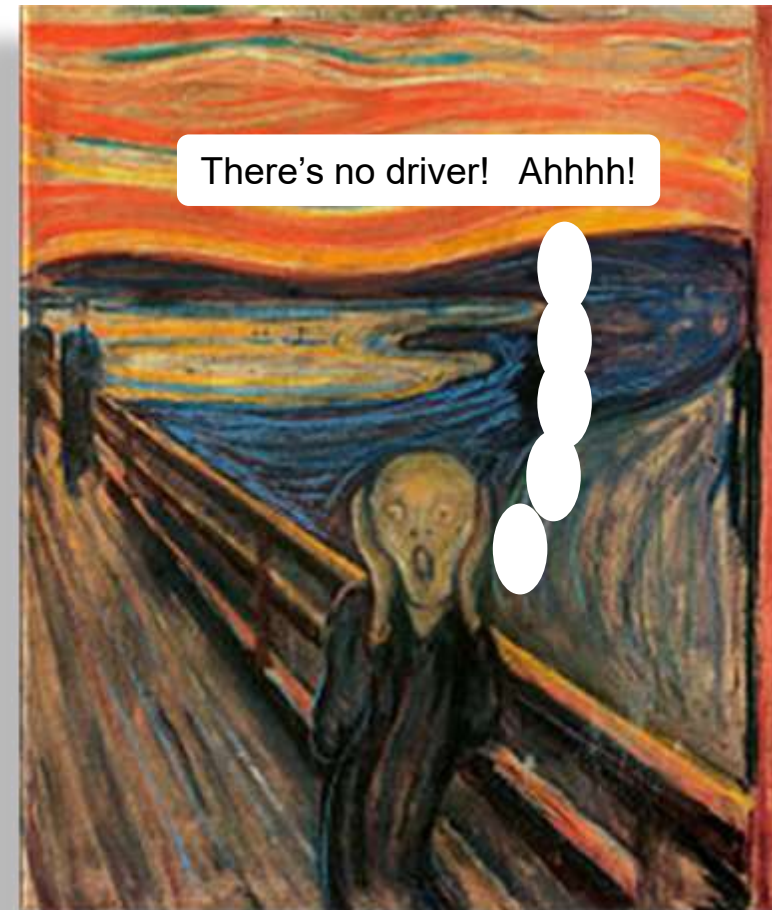
**PTRG** PUBLIC TRANSPORT RESEARCH GROUP  
GROUP OF DEPT OF CIVIL ENGINEERING





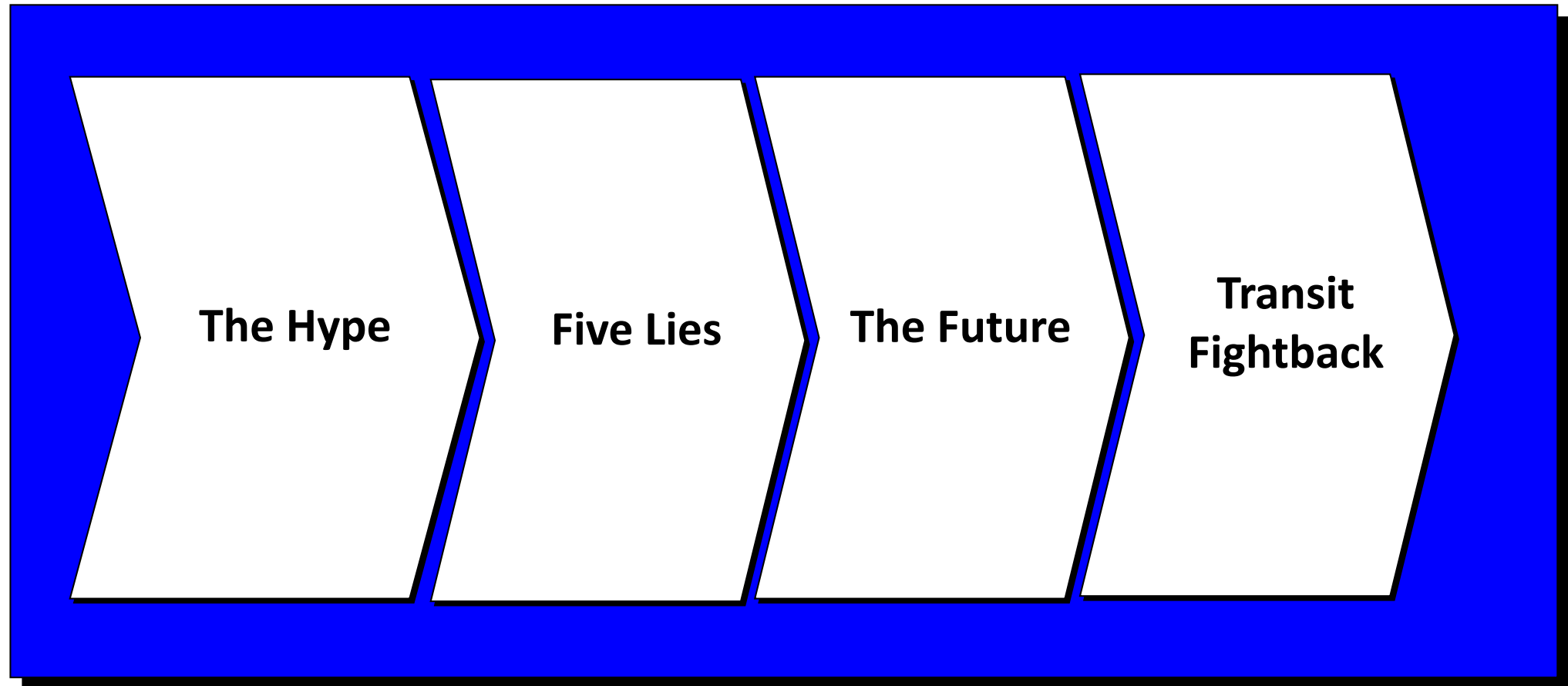
...it 'pushes back' on the endless hype and lies being spread about future mobility to rebase the future around public transport for cities...

- 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: <sup>1</sup>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







**MONASH**  
University

**Introduction**

**The Hype**

**Five Lies**

**The Future**

**Transit Fightback**



That amazing future we dreamed of...





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



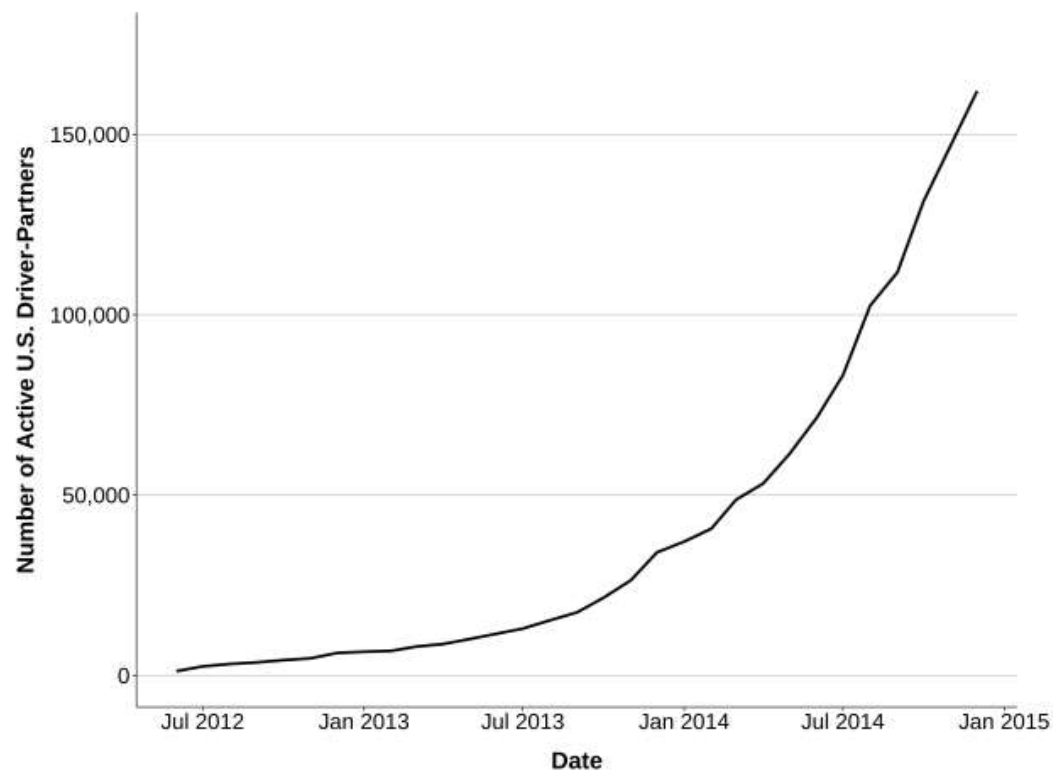
We can make good use of our time while [not] driving..



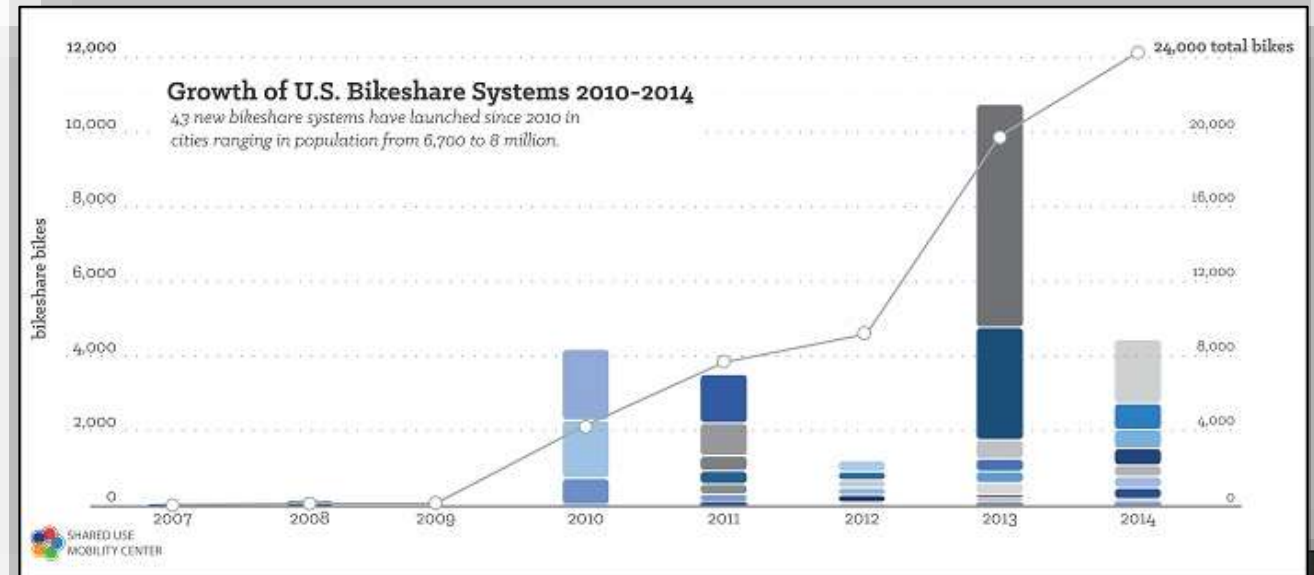


# New shared mobility modes have disrupted the 'bad old' transport guys

Figure 1: Number of Active Driver-Partners in United States Each Month



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





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





**MONASH**  
University

**Introduction**

**The Hype**

**Five Lies**

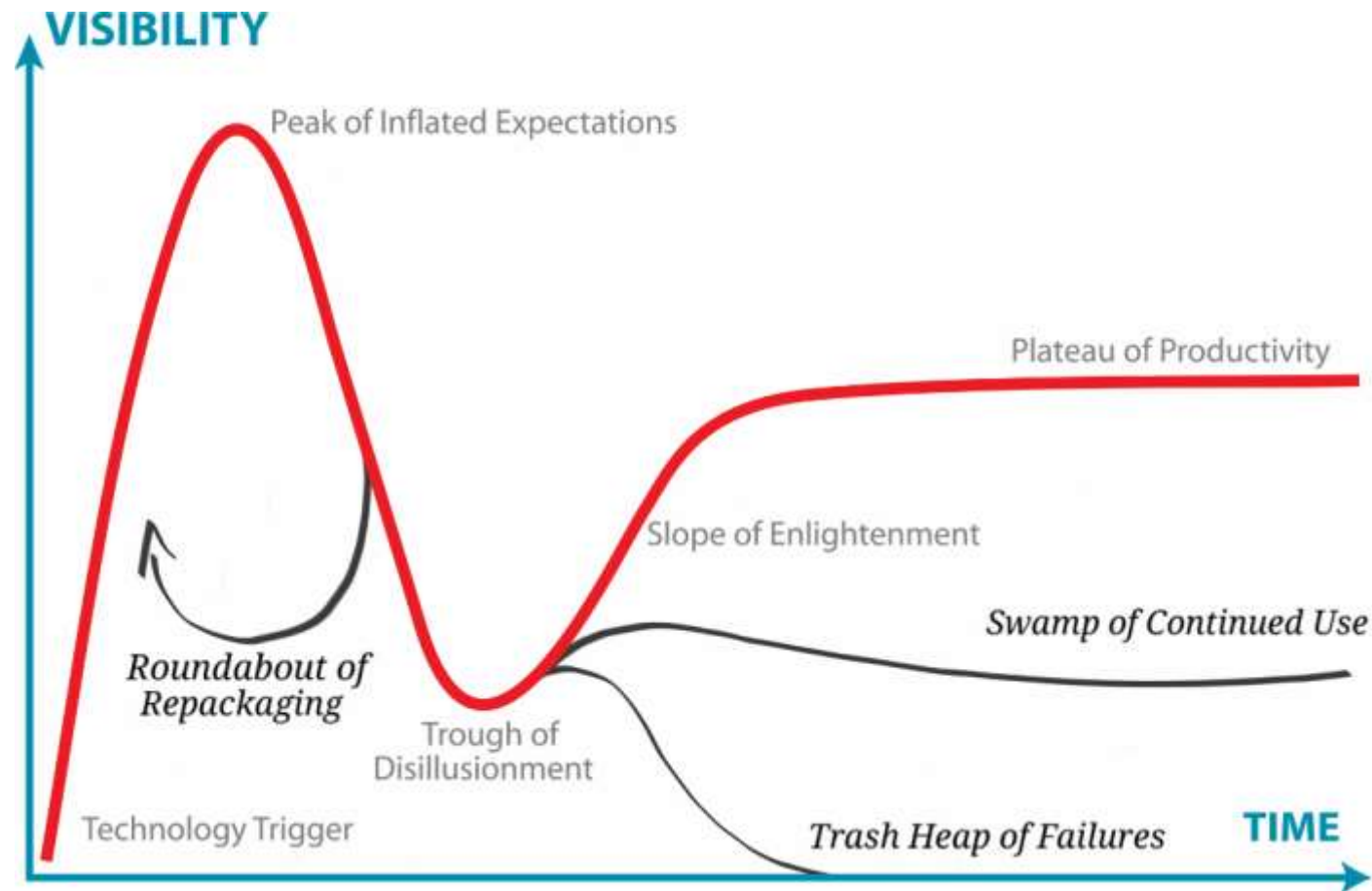
**The Future**

**Transit Fightback**





# Technology development in practice always follows the HYPE CURVE

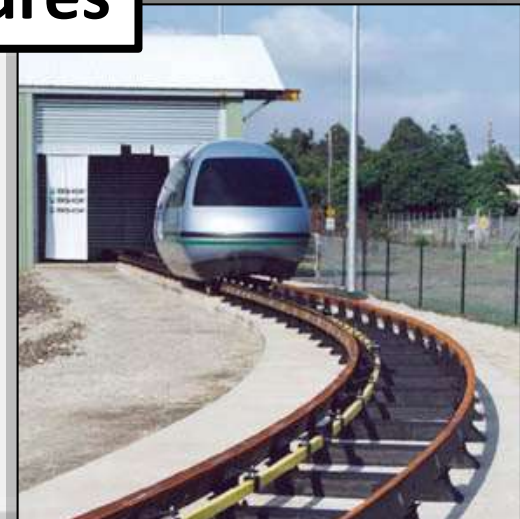
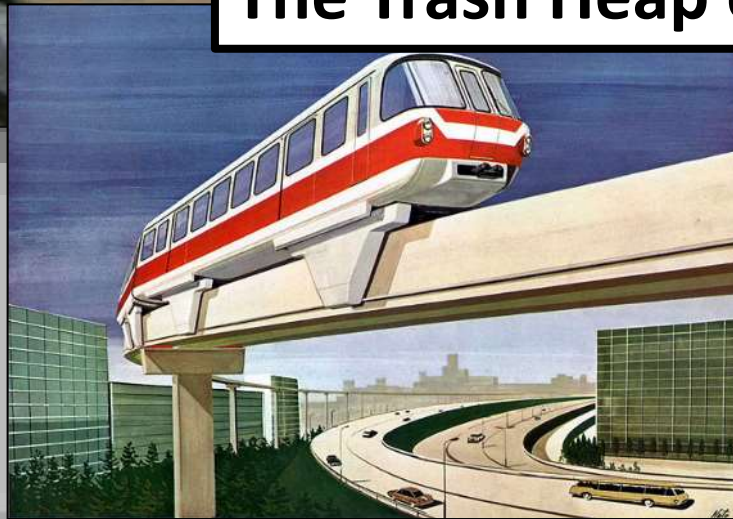


Source: Gartner; <https://www.gartner.com/newsroom/id/3784363>

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

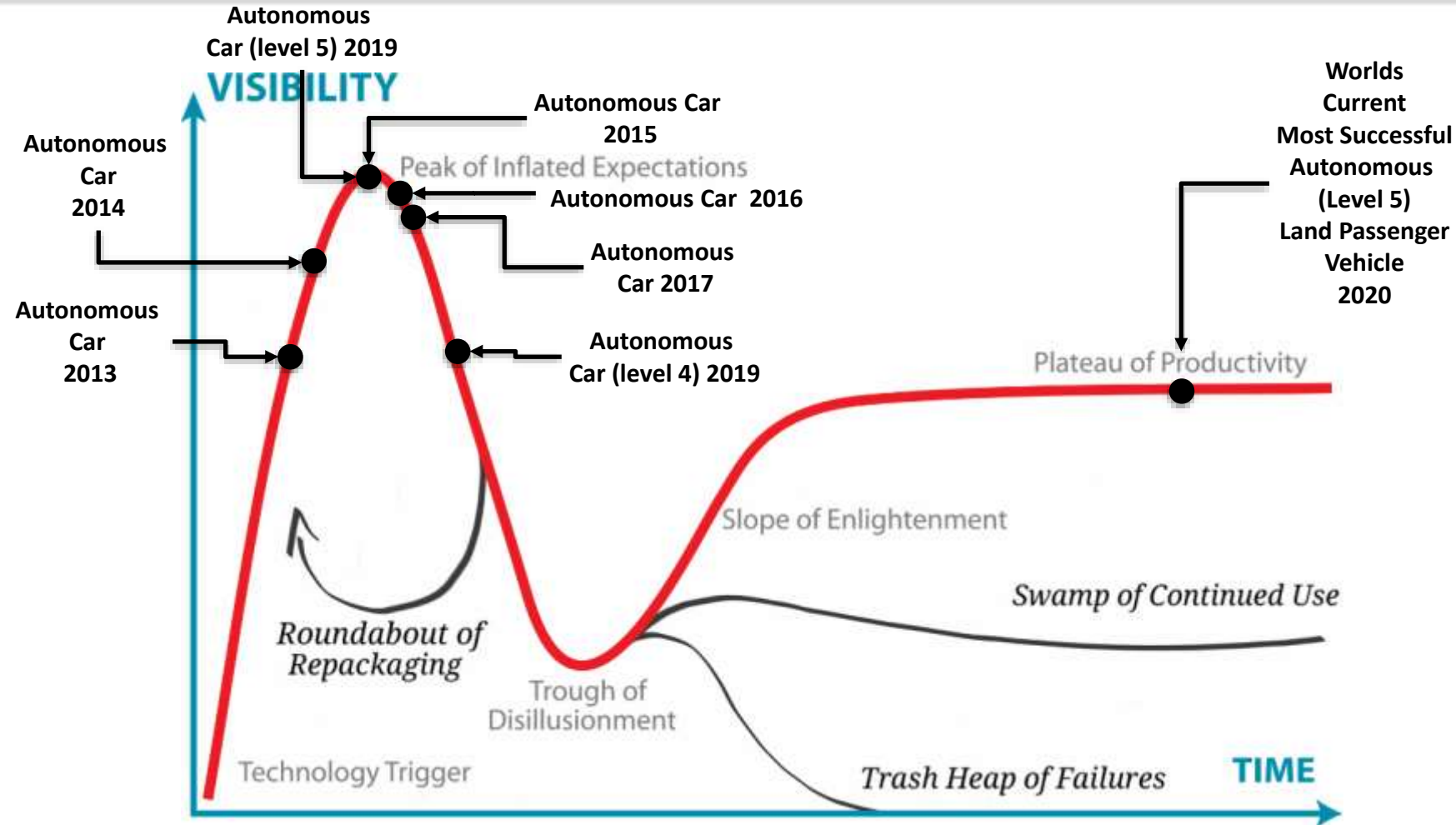


## The Trash Heap of Failures





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

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; and **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.

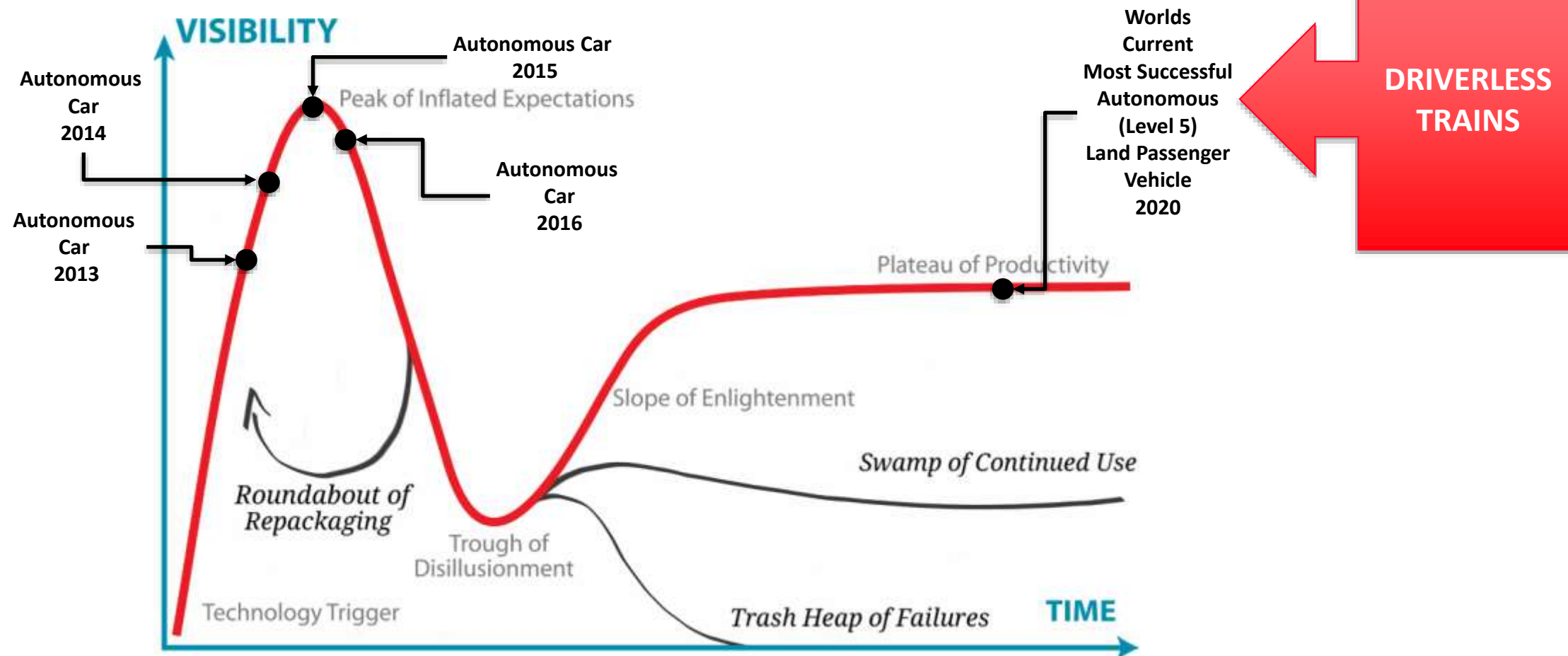
## Driverless cars could make mass transit obsolete

BY DAVE ROSS  
OCTOBER 25, 2015 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.

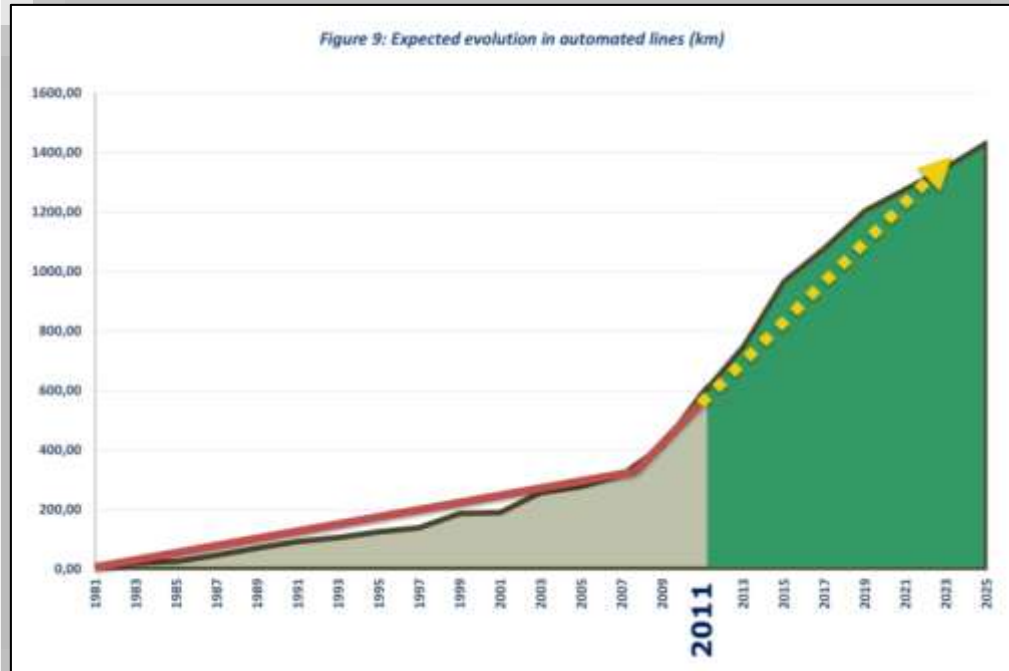
# The Autonomous Car – Contemporary Progress



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

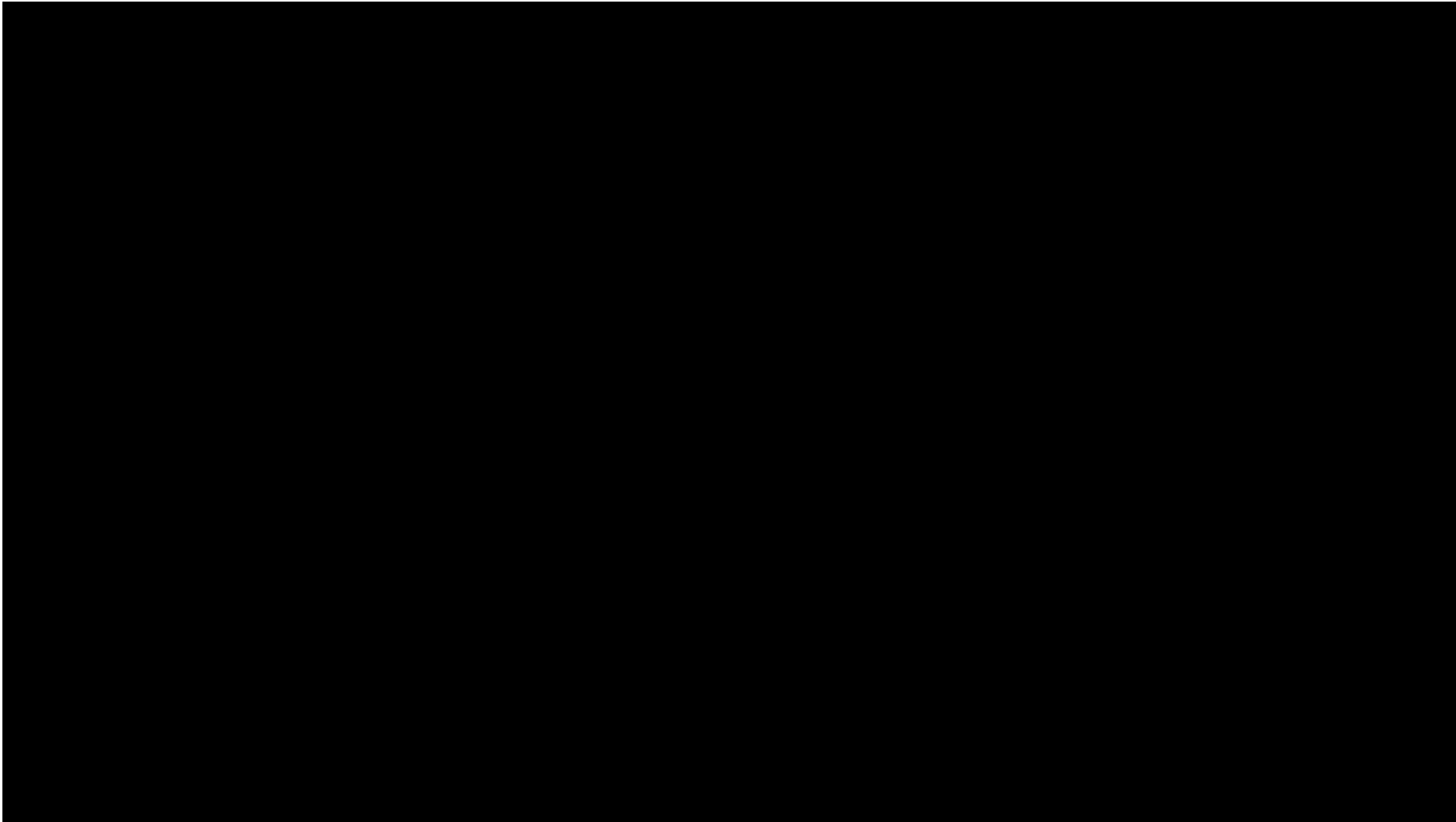
### Autonomous Cars will Reduce Congestion - Evidence

- 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 – Human life in cities is not possible or desirable with the Platooning and Intersection Weaving required for AV cars to work in city streets



Rush Hour (2015) Black Sheep Productions, Livschitz, F 2015, viewed 5 July 2018, <https://www.bsfilms.me/>

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



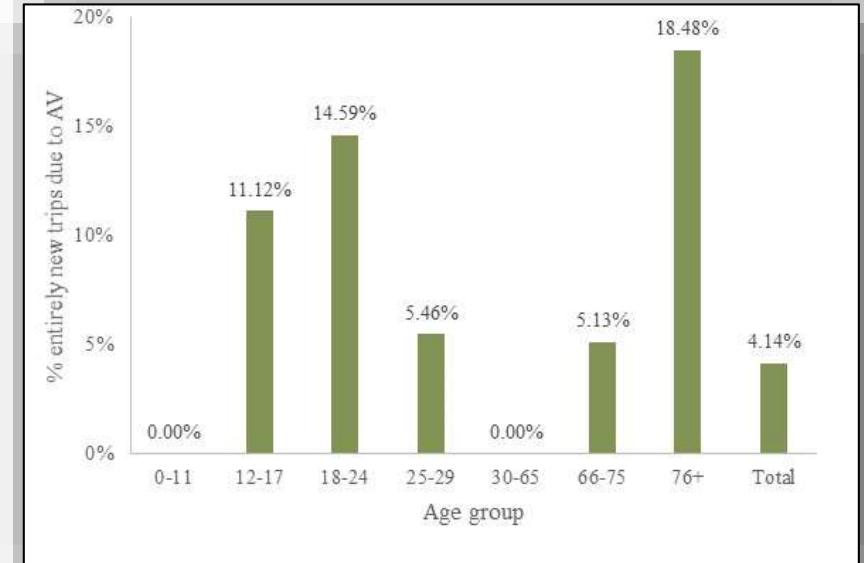
ILLUSTRATION: DOUG CHAYKA



# **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

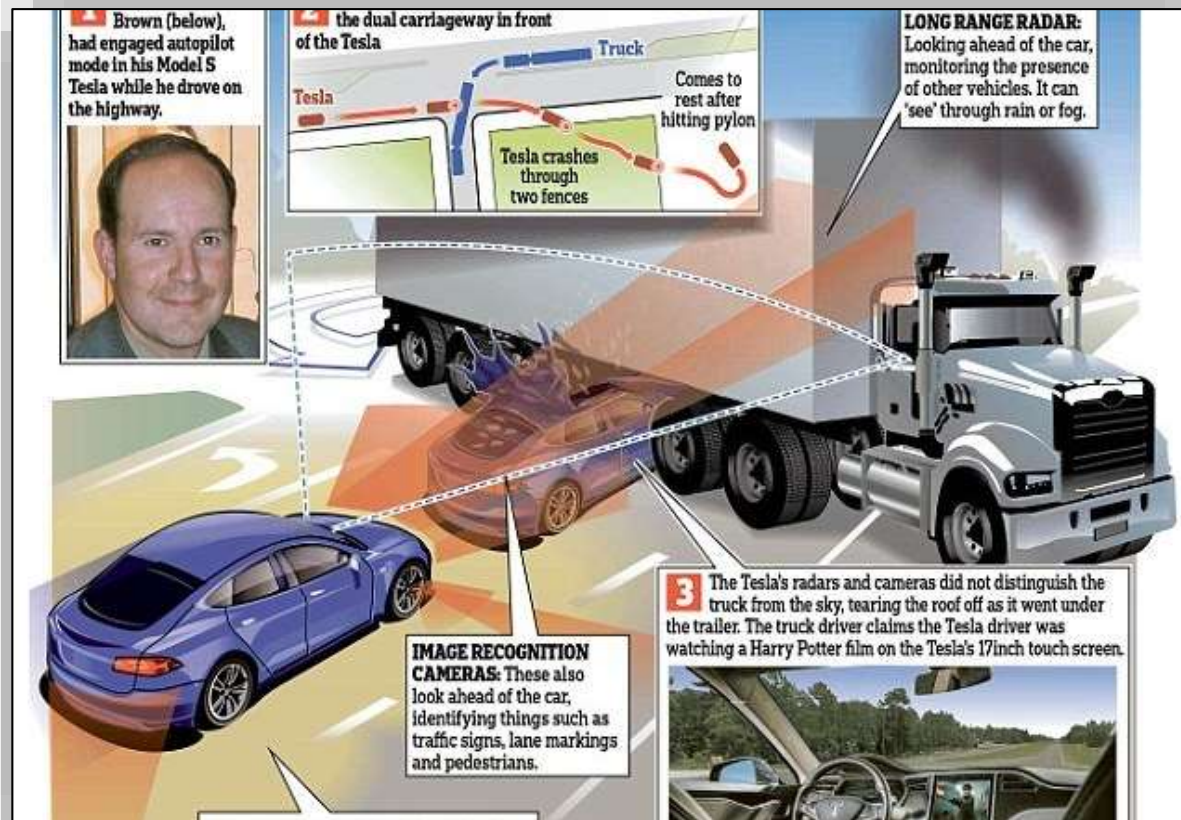
# **Lie 3 – Autonomous Cars will Vastly Improve Car Safety**

## 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 1<sup>st</sup> 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 1<sup>st</sup> 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)



Mountain View California



Tempe Florida



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

## 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”



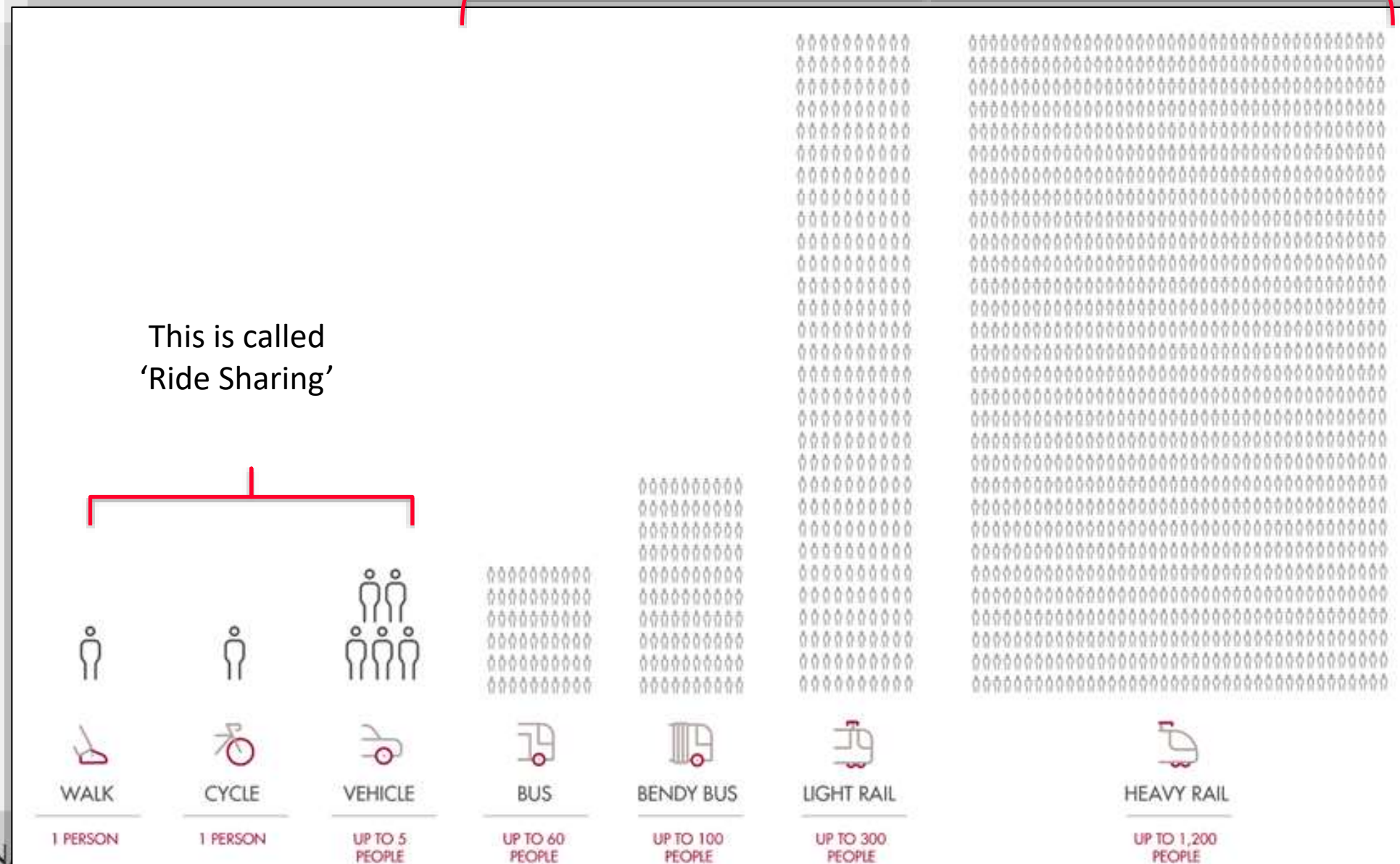
## The Evidence

- 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



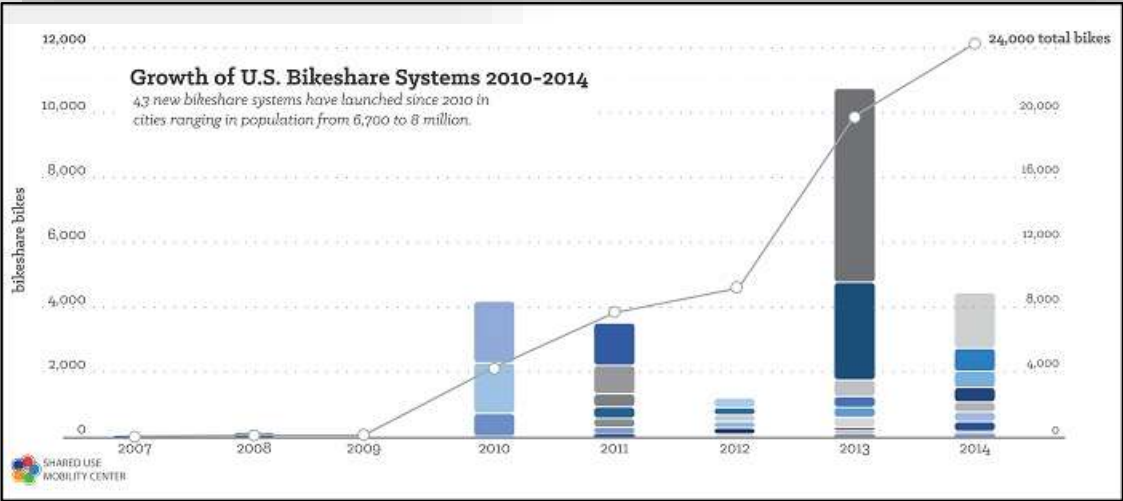
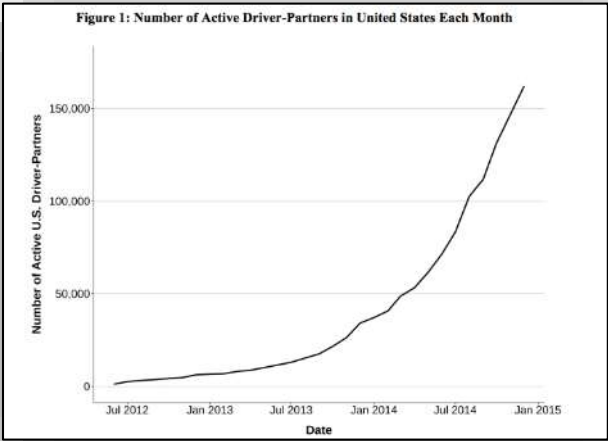
# Lie 4 – Shared Mobility is Shared Mobility – Truth 5 - Shared Mobility Has VERY LOW occupancy – its NOT really shared

This is not called 'Ride Sharing'



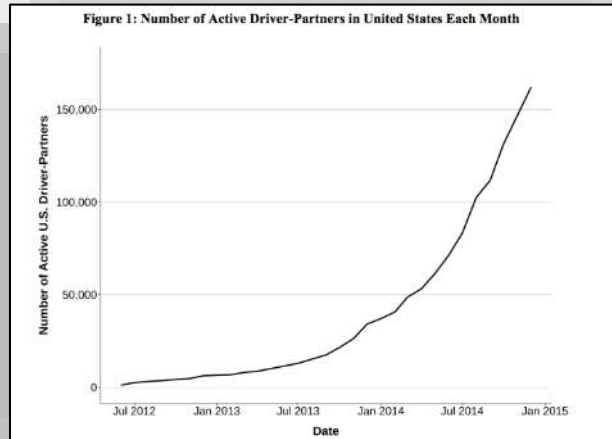
# **Lie 5 – Shared Mobility is Increasing Improving Cities**

# Lie 5 – Shared Mobility is Increasing Improving Cities



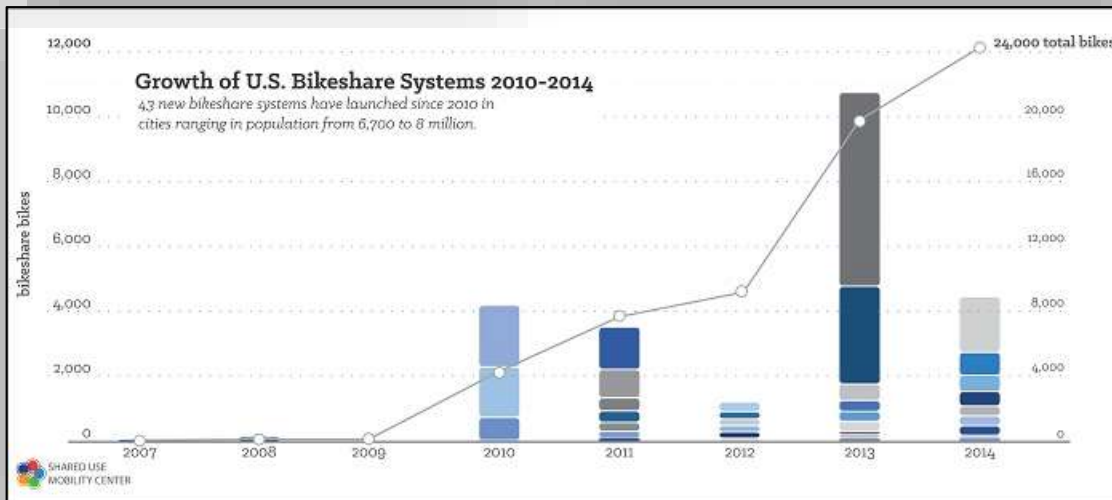


# Lie 5 – Shared Mobility is Increasing Improving Cities – Truth 6 – Urban shared vehicle occupancy is in significant DECLINE making cities worse not better

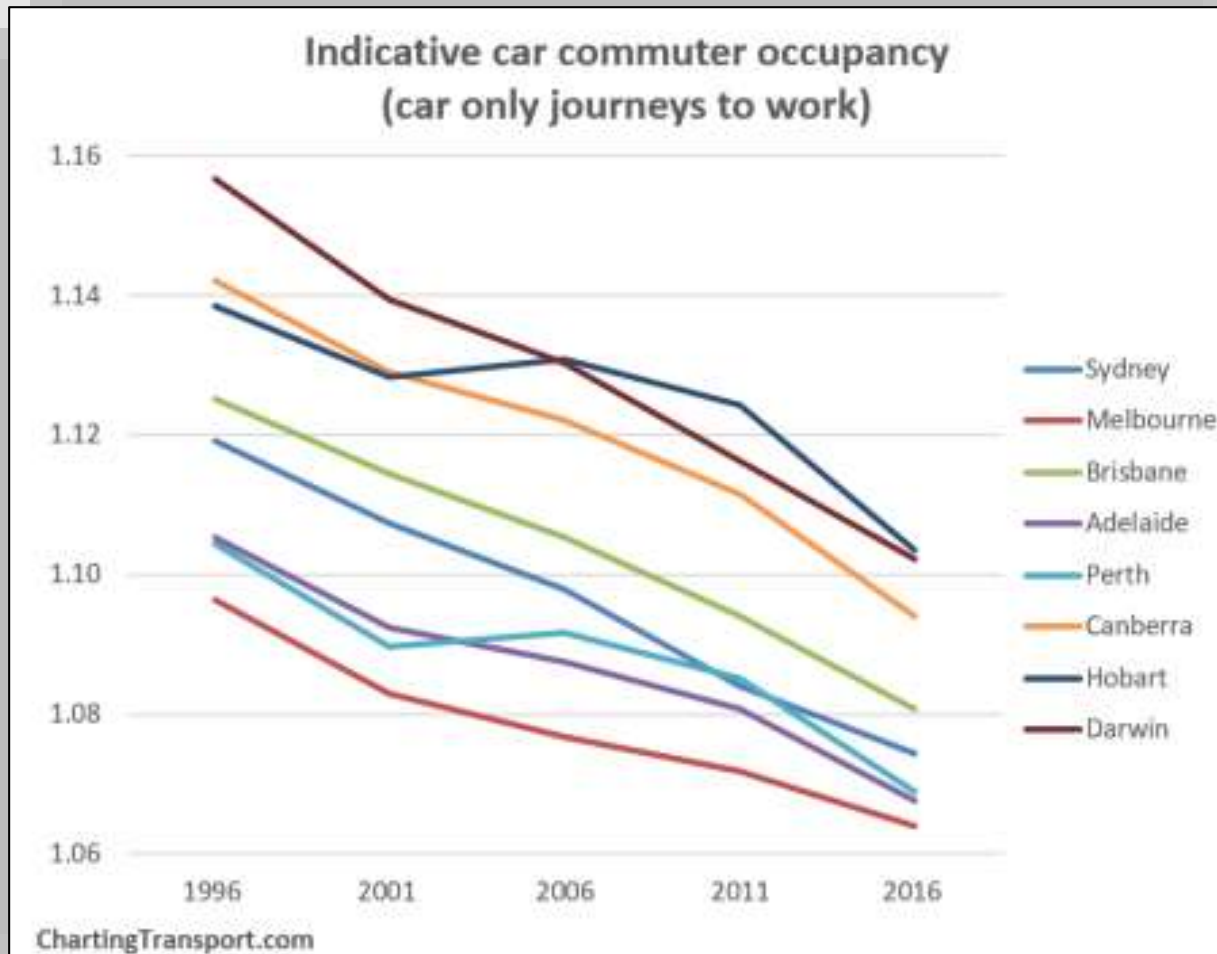


The Evidence – Shared Mobility modes represent very small amounts of travel – the private car **DOMINATES**

- 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

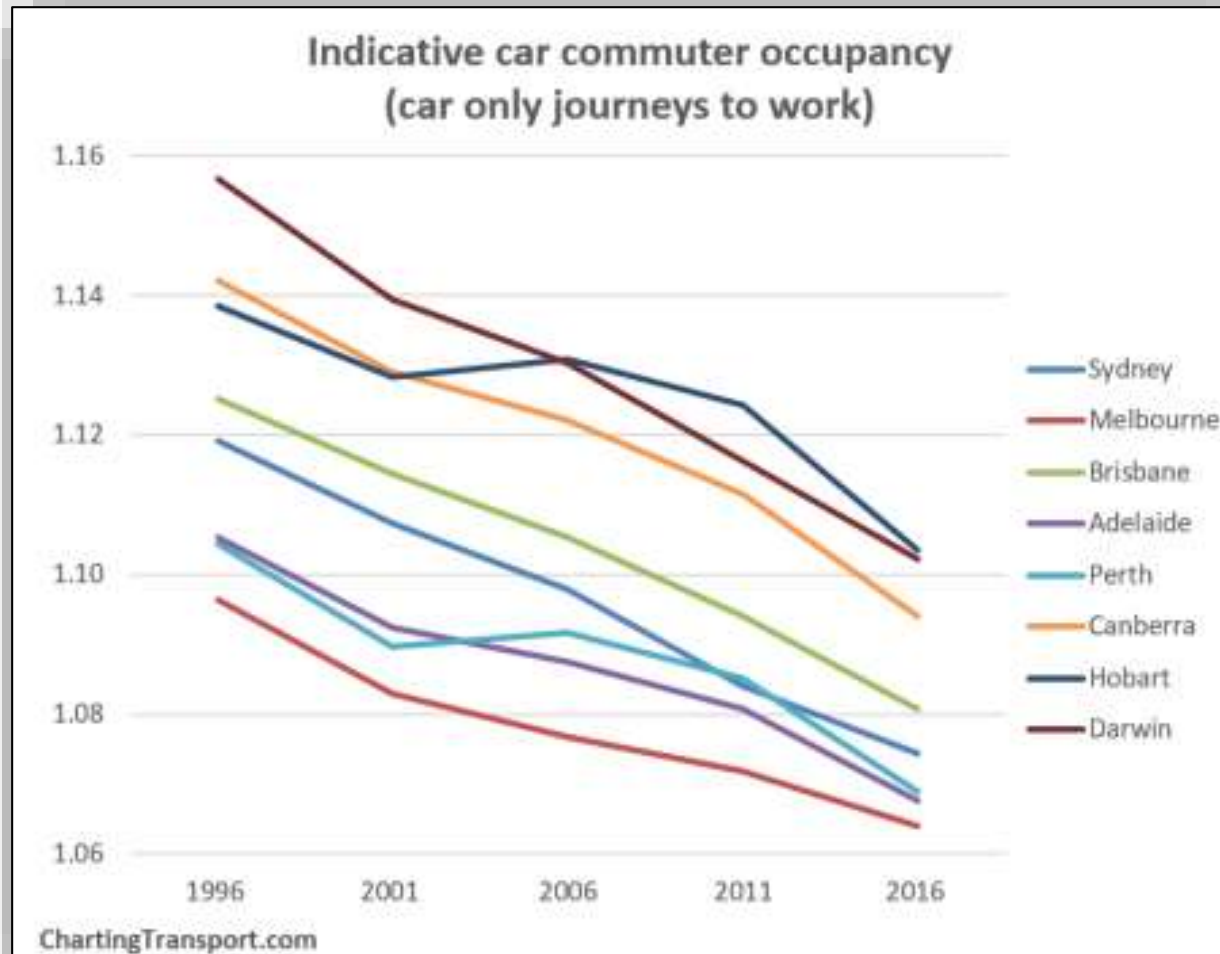


Source: Charting Transport (2017)

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



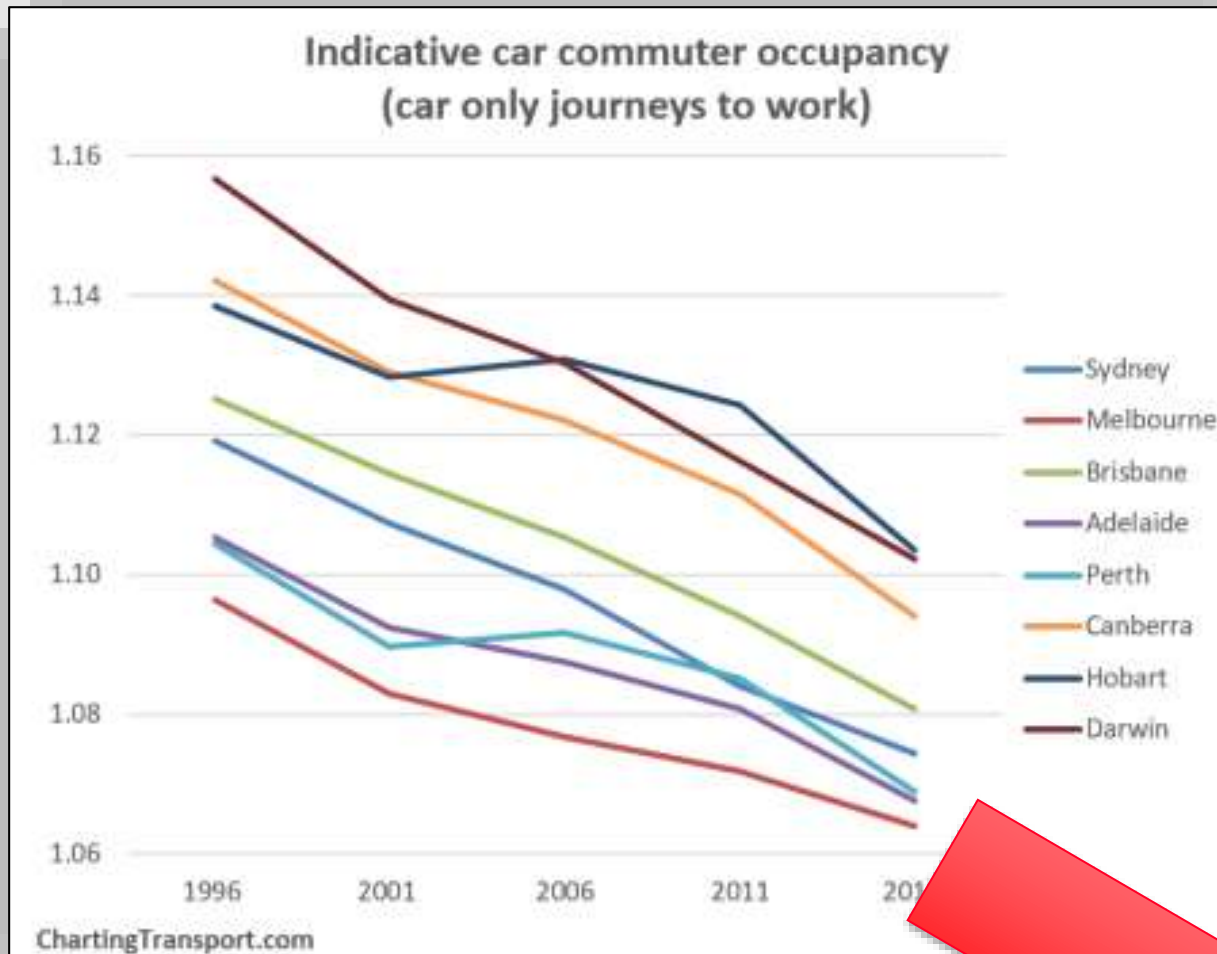
Source: Charting Transport (2017)

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



**MONASH**  
University

**Introduction**

**The Hype**

**Five Lies**

**The Future**

**Transit Fightback**







MONASH  
University

# 2007



**PUBLIC TRANSPORT  
RESEARCH GROUP**



GROUP  
OF EIGHT  
AUSTRALIA

MONASH  
INSTITUTE OF  
TRANSPORT  
STUDIES





MONASH  
University

# 2030



**PUBLIC TRANSPORT  
RESEARCH GROUP**



GROUP  
OF EIGHT  
AUSTRALIA

MONASH  
INSTITUTE OF  
TRANSPORT  
STUDIES



# Cities; humanities future







**MONASH**  
University

**Introduction**

**The Hype**

**Five Lies**

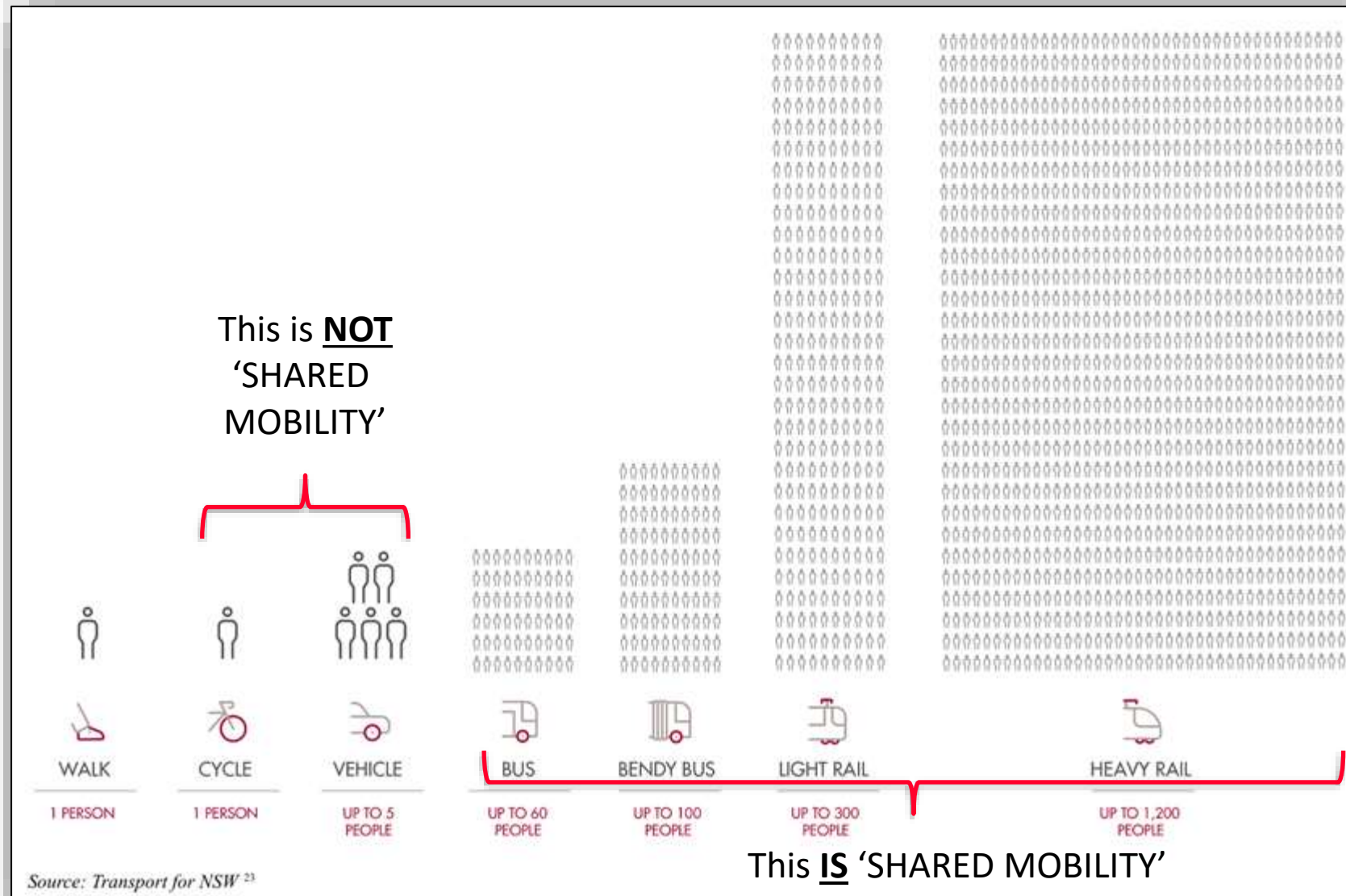
**The Future**

**Transit Fightback**





# Public Transport is the most efficient form of SHARED MOBILITY



# Cities need modes with shared occupancy that are SPACE EFFICIENT...

To carry 50,000 people per hour per direction, you need:

a 175m wide road used only by car



a 35m wide road used only by buses



a 9m wide railway track bed for metro



# ...and ENVIRONMENTALLY EFFICIENT

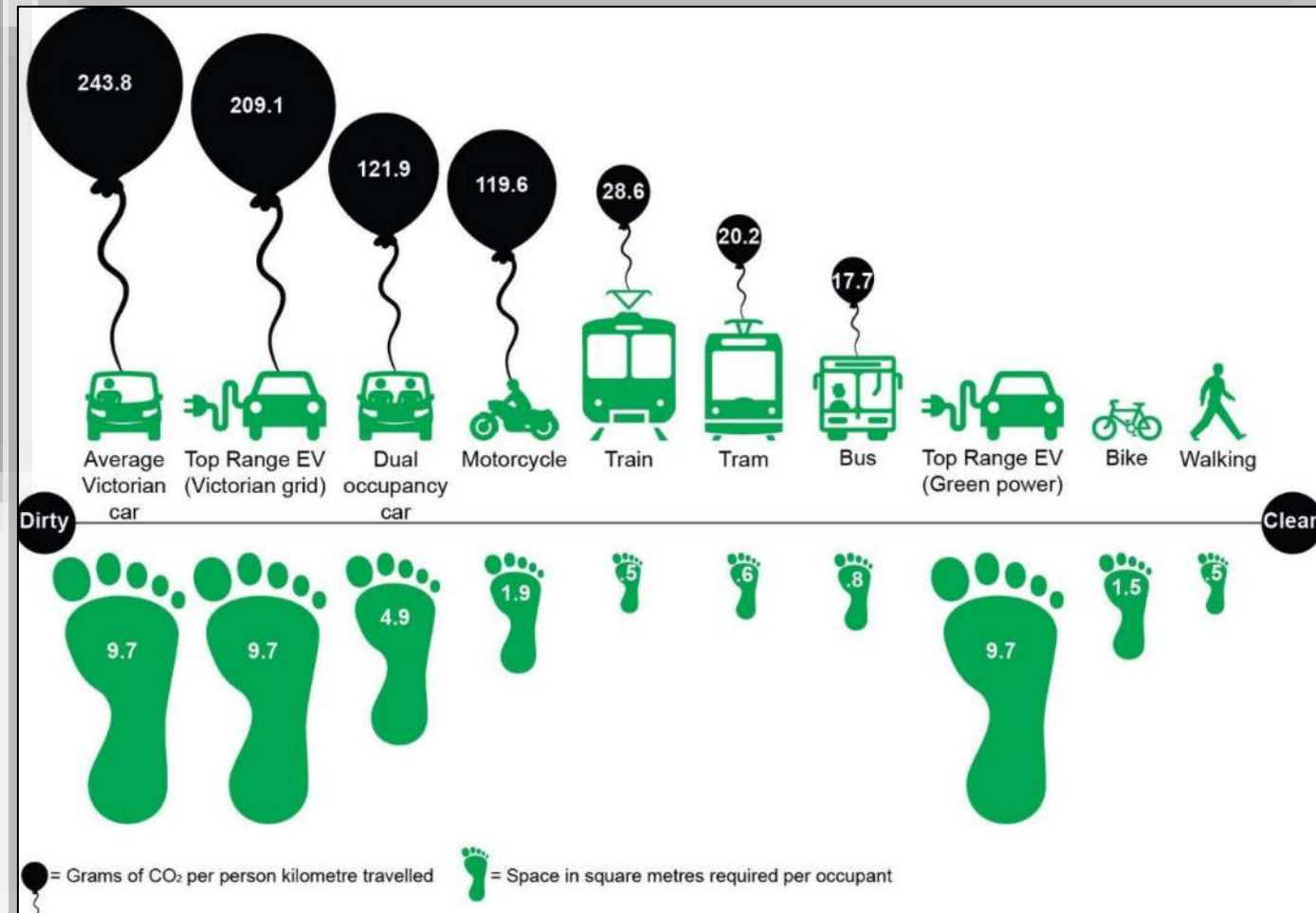
To carry 50,000 people per hour per direction, you need:



a 35m wide road used only by buses



a 9m wide railway track bed for metro



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



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



Transit runs the Car Share Scheme



First-Last Mile Tech to Transit Nodes

UBER+ **DART**

**Go further.  
GoPass.™**

Simplify your commute with the **FREE GoPass app.**

  *let's go.*  
Available in English & Español. [DART.org](http://DART.org)



# 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





# The 'Trackless Tram' is a new innovation in Transit Fusion with very positive potential for growth of transit in future cities



## The Evidence

- Much less cost than Light Rail
  - No tracks, no removal of below ground utilities
  - No overheads (batteries)
- Lighter than buses of same size
- LRT ride quality, performance & capacity
- 15km range on a 10 min terminus recharge
- \$2-3M per vehicle (LRV=\$6-9M)
- Deliver a new transit system in **3 months**

Source: Prof Peter Newman – October 2018

# 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

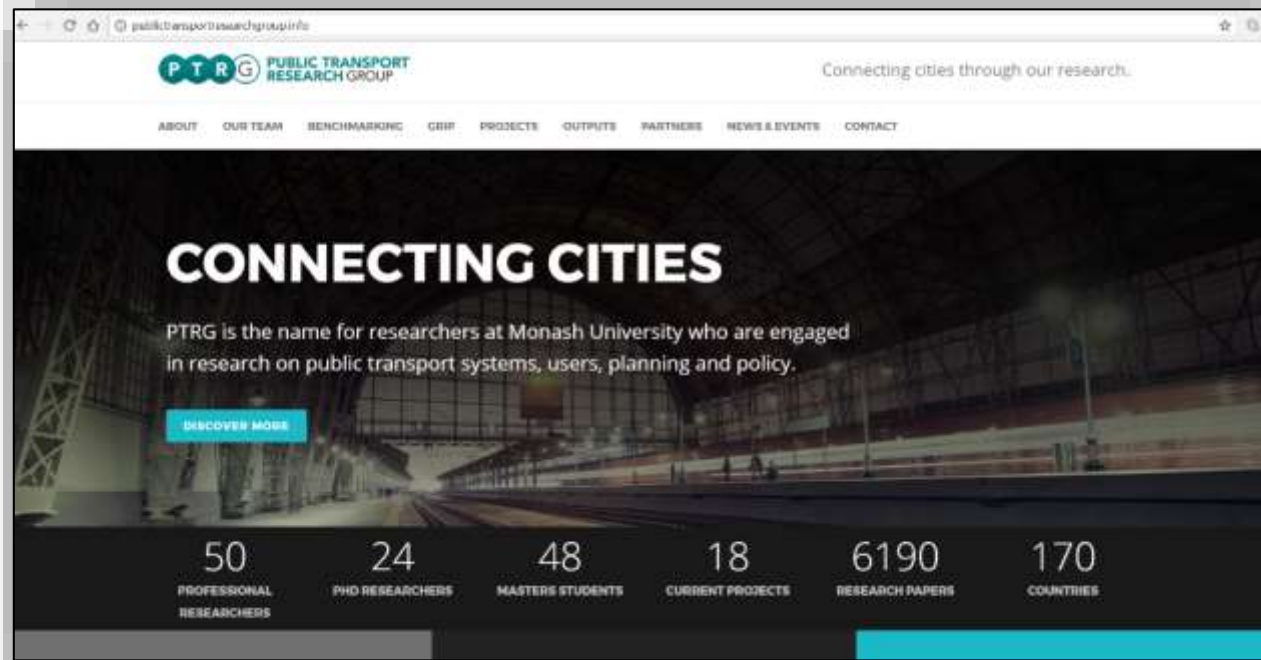
# Contact us via our website PTRG.INFO, LinkedIn or Twitter

**Professor Graham Currie**  
FTSE  
Director, SEPT-GRIP, PTRG



Connect with us on  
**LinkedIn** 

The  
**‘Researching Transit’**  
Podcast Series



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



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



Showcase  
Winner

**FREE!**