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The 19th COTA International Conference of Transportation Professionals
Keynote Session – 10:00-12:05 Saturday 6th July 2019
Zijin Hall, Nanjing Junling Conference Centre, Nanjing China

Transit Fightback – Pushback on Technology Hype for Stronger City Futures

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Monash University, Australia

PTRG PUBLIC TRANSPORT RESEARCH GROUP
GROUP OF EIGHT AUSTRALIA MONASH INSTITUTE OF TRANSPORT STUDIES

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This paper is part of a very successful special session held at the 2019 US Transportation Research Board…

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

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

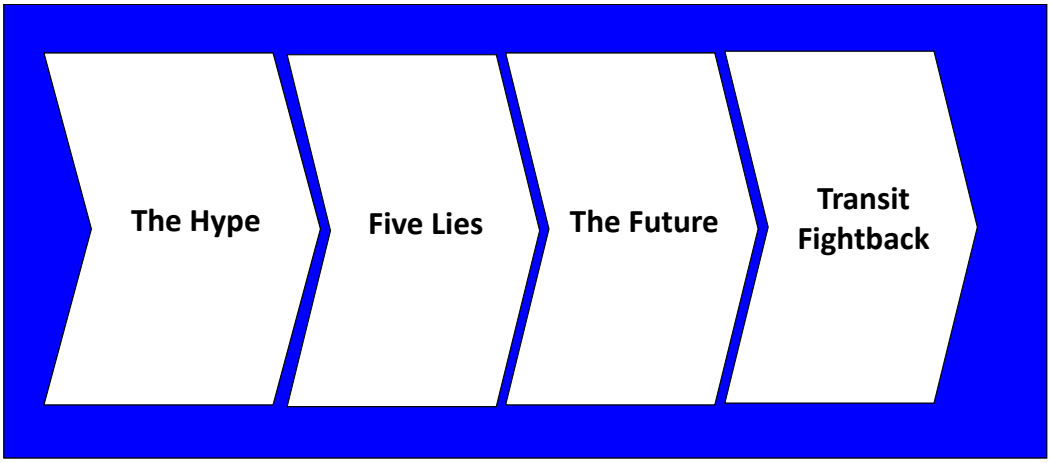
- It aims to :
  - consider how "new mobility", "autonomous vehicles", "shared mobility" and "ride sharing" is going to impact cities in the future transit
  - Explore the future case for Urban Public Transport systems
  - Look at some new and interesting developments in the field
- It is going to debunk 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 based on a research paper aimed to provoke new thinking on the topic...

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

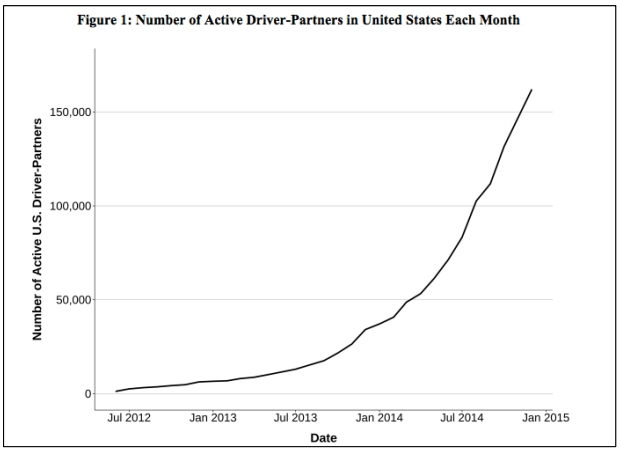
Transit Fightback

That amazing future we dreamed of…

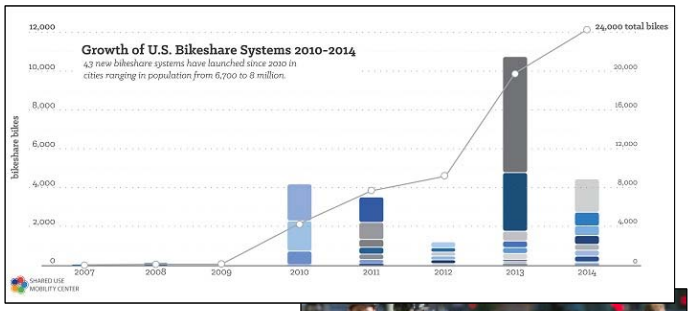
..they say its going to happen with driverless cars.

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



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

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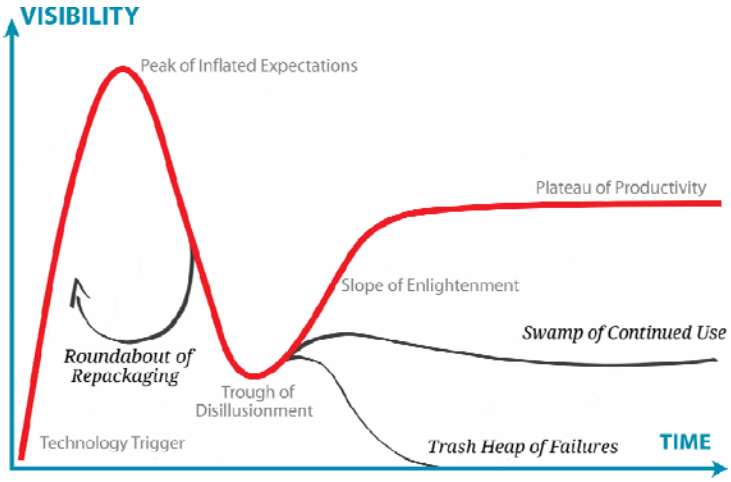
Technology development in practice always follows the HYPE CURVE

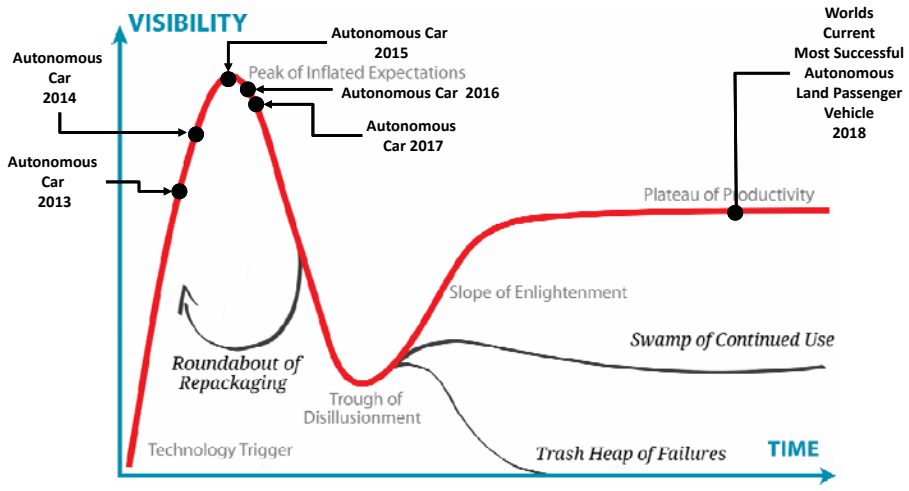


Source: Gartner; https://www.gartner.com/newsroom/id/3784363

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

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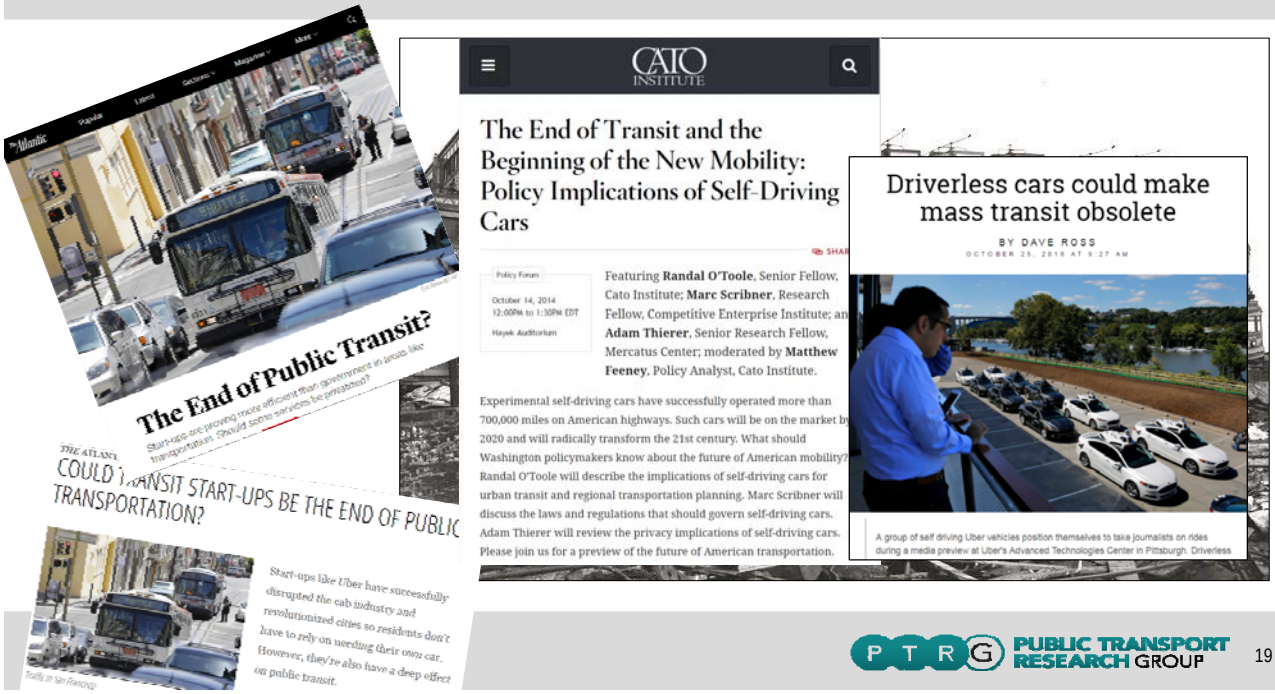

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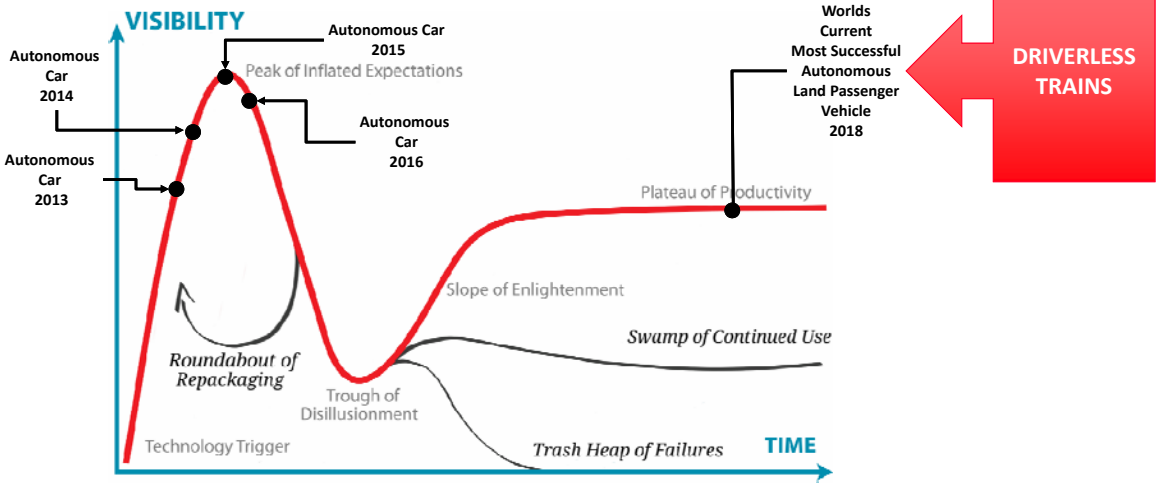

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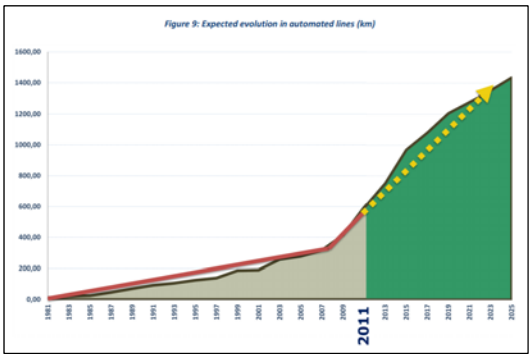
Lie 1 – Autonomous Cars are the END of Transit – <u>Truth 1</u> - Most travel by AV's is on Driverless Trains which is booming – Transit dominates Autonomous Vehicle travel



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 <u>all</u> 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 – <u>Truth 2</u> – 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

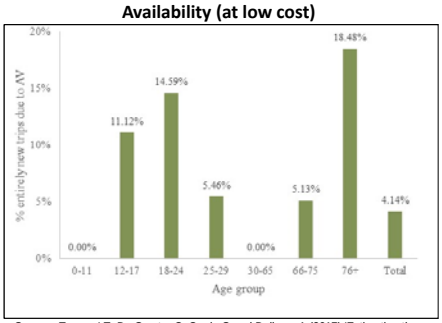
ILLUSTRATION: DOUG CHAYKA

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

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

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



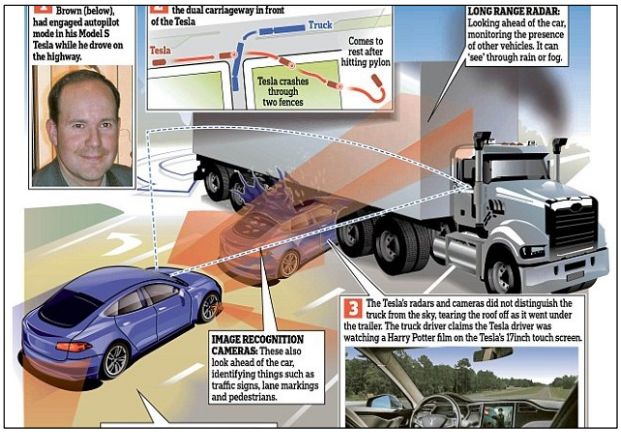
Source: Truong LT, De Gruyter C, Currie G and Delbosc A (2017) 'Estimating the Trip Generation Impacts of Autonomous Vehicles on Car Travel in Victoria, Australia' TRANSPORTATION November 2017, Volume 44, Issue 6, pp 1279-1292.

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):
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  - In the US human driven cars have road deaths of 1/100M miles
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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

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- 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

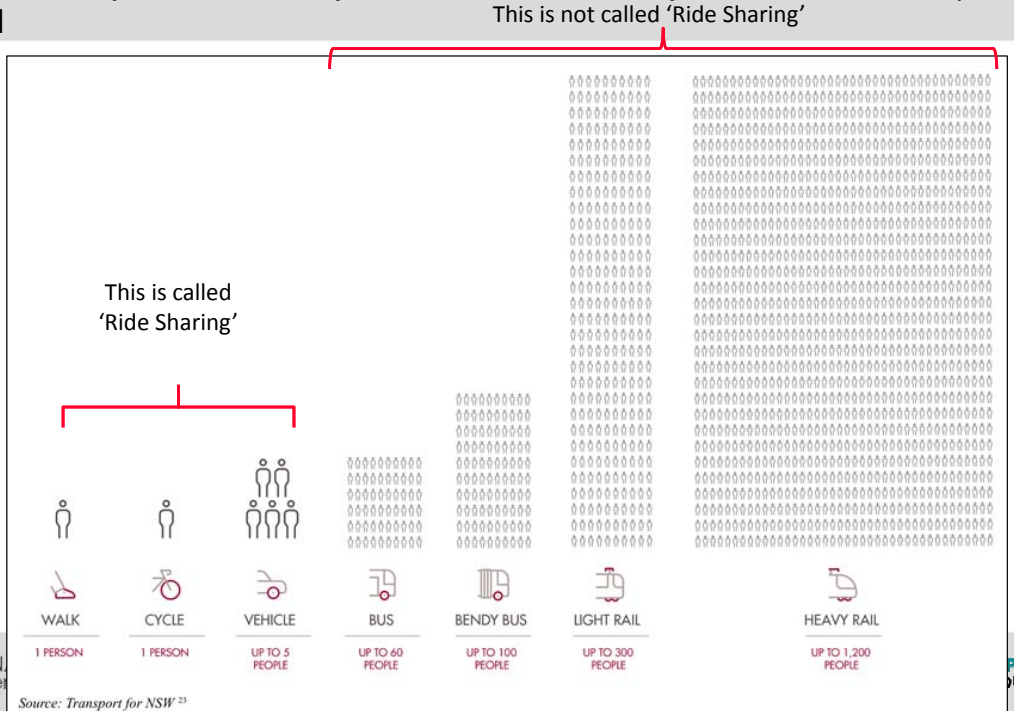
- Sharing:

  "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



Lie 5 – Shared Mobility is Increasing Improving Cities

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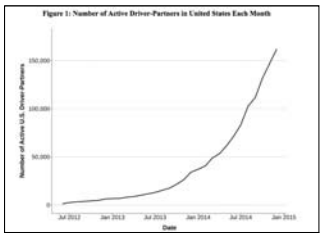
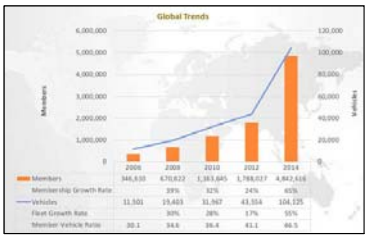
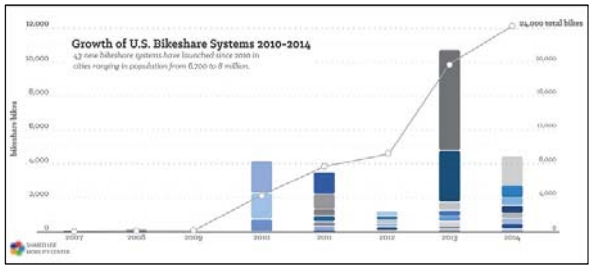
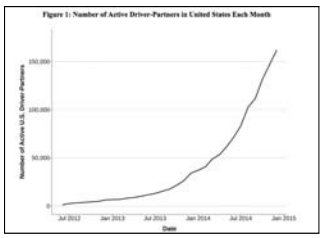
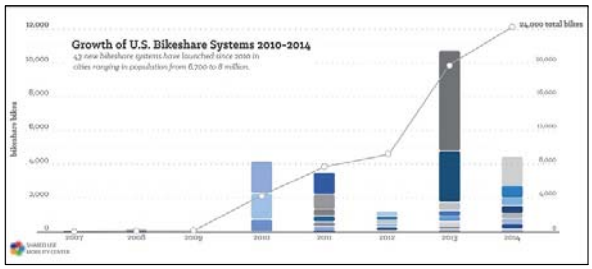






Lie 5 – Shared Mobility is Increasing Improving Cities – Truth 6 – Urban shared vehicle occupancy is in significant DECLINE making cities worse not better

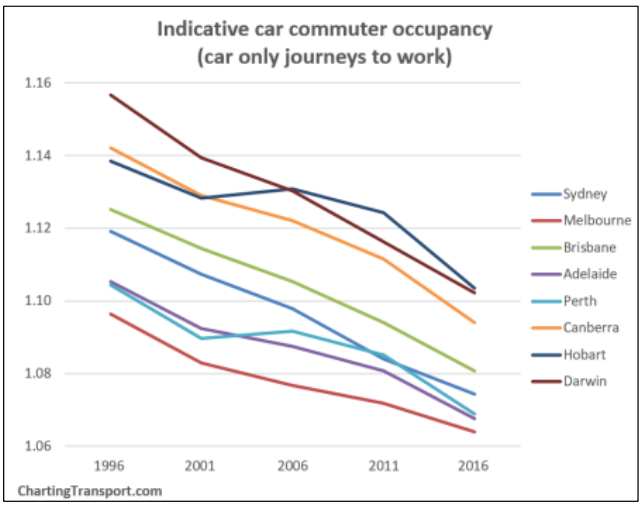




The Evidence – Shared Mobility modes represent very small amounts of travel – the private car DOMINATES

- 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:
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  - Travel by private car represents **74%**

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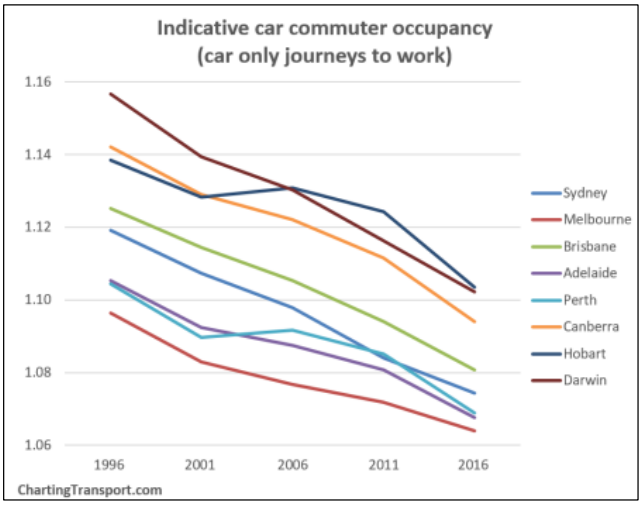
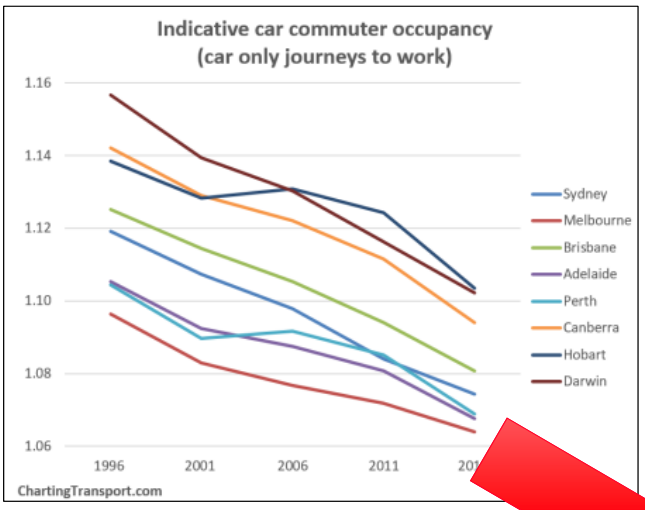


Source: Charting Transport (2017)

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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Cities; humanities future

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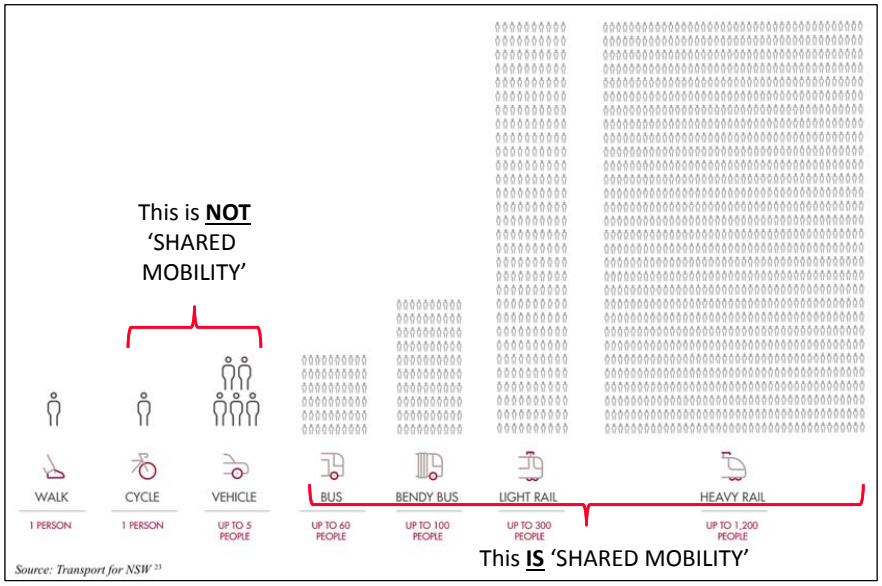
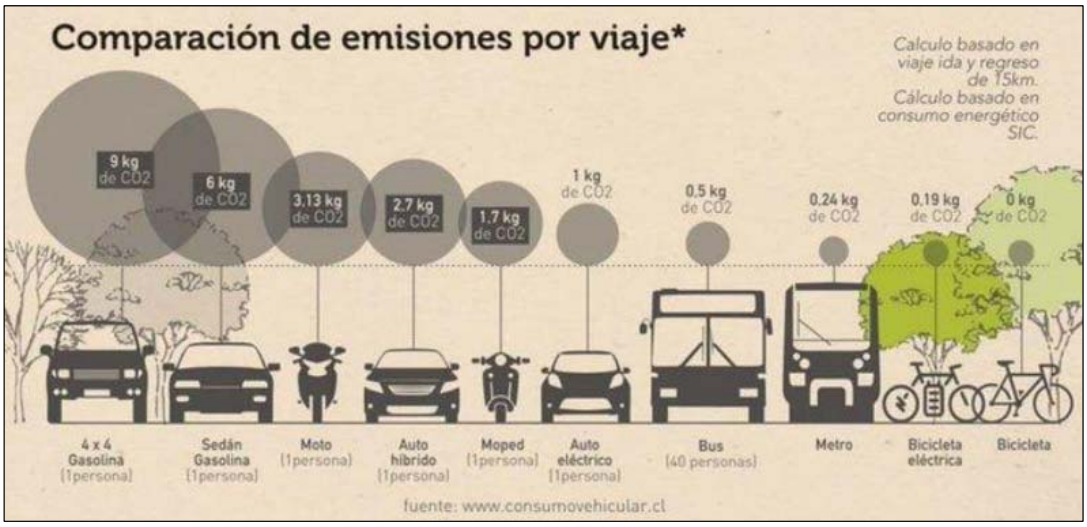
Public Transport is the most efficient form of SHARED MOBILITY



Cities need modes with shared occupancy that are SPACE EFFICIENT…

...and ENVIRONMENTALLY EFFICIENT



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

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 that 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

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Director, SEPT-GRIP, PTRG

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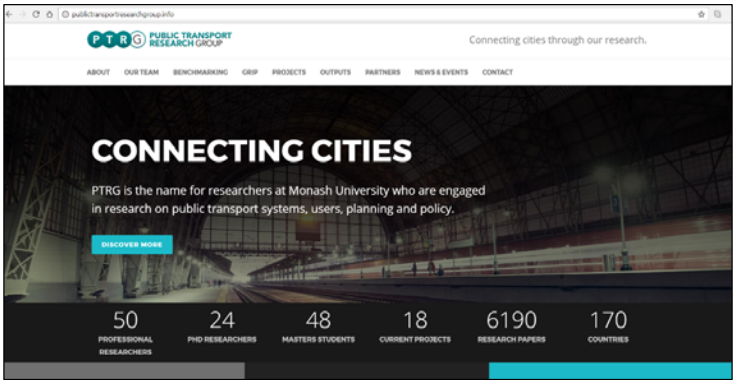

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