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BETTER TRANSPORT • BETTER PLACES • BETTER CHOICES

SUSTAINABLE TRANSPORT:
REALITY OR PIPE DREAM?

Evolving Transport Future
(trend is *definitely* not destiny)

What program / policies changes are needed?

What are the challenges / opportunities?

Gerard Reardon

SUSTAINABLE ENGINEERING SOCIETY ENGINEERS AUSTRALIA

The Sustainable Engineering Society

...engineering in harmony with ecology

DISCUSSION SUMMARY

- **Set the scene:**
  - Defining the outcome… and why?
  - Global trends
  - Demographic and Behavioural change
  - Mega trends in transport

- **Policy and Program changes**
  - Redefine expectations
  - Policy changes
  - Change approach to transport planning
  - New business models

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DEFINING THE OUTCOME

1987 United Nations (UN) World Commission on Environment and Development, also known as the Brundtland Commission:

> *sustainability is development that meets the needs of the present without compromising the ability of future generations to meet their own need*

Sustainable transport requires changing:

- People's behaviour and the way that they live
- Technology
- Pricing

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ATTRIBUTES OF A SUSTAINABLE TRANSPORTATION SYSTEM:

Centre for Sustainable Transport in Canada:

- Allows the basic access needs of **individuals and societies to be met safely** and in a manner consistent with human and ecosystem health, and with equity within and between generations.
- Is **affordable, operates efficiently, offers choices of transport mode**, and supports a vibrant economy.
- **Limits emissions** and waste within the planet's ability to absorb them, minimizes consumption of non-renewable resources
- **Limits consumption of renewable resources** to the sustainable yield level, reuses and recycles its components, and
- **Minimizes the use of land** and the production of noise.

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ATTRIBUTES OF A SUSTAINABLE TRANSPORTATION SYSTEM:

American Public Transportation Association (APTA) has defined sustainability for the public transportation industry as:

- **Employing practices in design and capital construction**, such as using sustainable building materials, recycled materials, and solar or other renewable energy sources to make facilities as “green” as possible.

- **Employing practices in operations and maintenance** such as reducing hazardous waste, increasing fuel efficiency, creating more efficient lighting, and using energy-efficient propulsion systems.

- **Employing community-based strategies** to encourage land use and transit oriented development designed to increase public transit ridership.

AGAIN, *WHY?*

- **Globally, transport sector**
  - 1/7 greenhouse gases
  - 2/3 passenger travel / 1/3 freight
- **In Australia, transport sector:**
  - ¼ energy consumption
  - 1/6 greenhouse gases
- **Health**
  - Physical Inactivity - Obesity
  - Mental health (WHO)
- **Congestion cost**

  Recurrent & Non recurrent congestion (US ~57% of highway congestion cost)

  Value of travel time / diversity in workplace
- **Changing Retail model**
  - Home deliveries
  - 24/7 trading
  - Internet purchase
- **Economic Productivity**

  Reduced transaction costs (i.e. travel time)

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CULTURAL CHANGE REQUIRED

"Except for walking, travelling by **car is the most democratic and socially equitable form of transport ever seen in history** as it allows more than 90 per cent of adults to go where and whenever they want to travel.

In particular, because the car allows chained or multi-purpose trips to work, schools, shopping and friends, **it has been a potent force in the struggle for gender equality**.

The car has allowed women the freedom to do what they want to do in todays society and is the reason why surveys have found that women are more pro-car than men nowadays."

John Cox (2003), Australian transport economist

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GLOBAL TRENDS IMPACTING CITIES
(AND HENCE TRANSPORT NEEDS AND BEHAVIOUR)

- Energy Storage
- Climate change
- Making cities in less than 20 years
- Increase life expectancy
  - 1985- 75yrs; 2017- 83 yrs, 2045- 90 years
- Pandemic of physical inactivity
- Rise of Healthcare expenditure
  - 25% all govt taxes on health care; 2040 - ~40% (CSIRO)
- Digital immersion- rapid technological change

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DEMOGRAPHIC AND BEHAVIOURAL CHANGE

Young people:

- **Paradigm shift (5th generational cohorts – 'Gen Z': 1995- 2007)**
  - **Staying at home longer**
  - **Staying in education longer**
  - **Combining study with work**
  - **Most technologically literate**
  - **Preference for social entrepreneurship**
  - **Innovation and sustainability**
  - **(Australians under 25) less likely to have a license or own a car**
    77% in 2001 66% in 2015
  - **More likely to use public transport, walk or cycle**

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DEMOGRAPHIC AND BEHAVIOURAL CHANGE

Young people choosing to use public transport, cycle or walk

Why?

Travel time reliability: **Avoid recurrent and non-recurrent congestion**

Time conscious: **Commuting < 10 hrs / week. Live on campuses / close by**

Sustainability: **Willing to pay more for sustainable offerings**

Infrastructure and services: **Quality infrastructure, fleet and high frequency**

Technology focused:

Dr Rod Tolley (Walk 21) –

'Young told not to use technology while driving. We did not expect them to give up the car'

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DEMOGRAPHIC AND BEHAVIOURAL CHANGE

Young people choosing to use public transport, cycle or walk

Why?

Questioning the 'freedom' of car ownership –

Car usage:	*~ 4% of the time ; parked ~ 96% of time (30% looking for car park)*
Fuel cost:	*Production costs will continue to increase supply cost*
Additional costs:	*Parking / insurance / depreciating asset*

Health focus: **Students are more health conscious**

'Millennium baiting' – shaping the design of new cities / walking communities

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MEGA TRENDS IN TRANSPORT

Car occupancy decreasing

- 1970 av ~1.5 p /car **2010 av ~1.09 p /car**
- Future demand (still) based on historical growth

Fuel cost continue to Rise

- 1970 ~$0.50 /l ; 2015 ~$ 1.40 / l
- cost will increase
- **~80% Australian supply imported (risk)**

Going electric: Banning diesel and petrol

- 2019 Vovlo – only electric / hybrid
- 2025 Norway
- 2040 France and Britain – and now China.

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MEGA TRENDS IN TRANSPORT

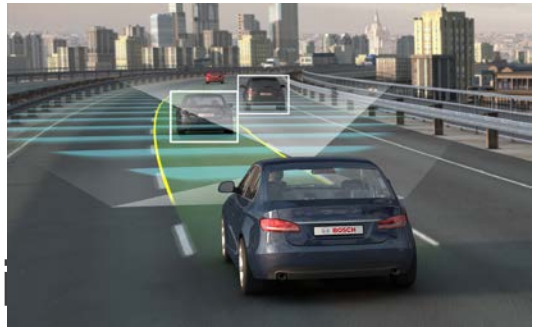
Development of sharing economy

•Ride-sharing (e.g. Uber) Car-sharing (e.g. Goget)

Development of autonomous vehicles

•Collective / personal on-demand

•Supplement mass transit systems



Development of mobility as a servi

•E.g. Whim (Finland and West Midlands U.K.)

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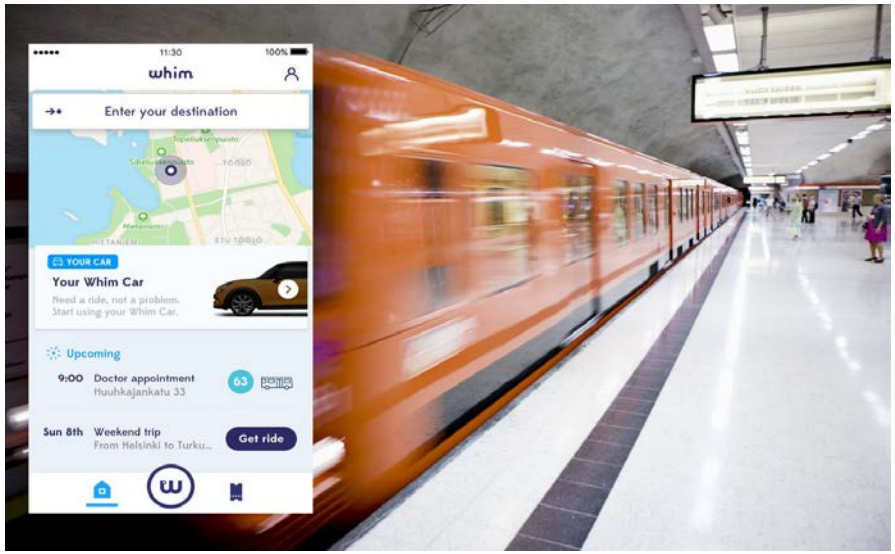
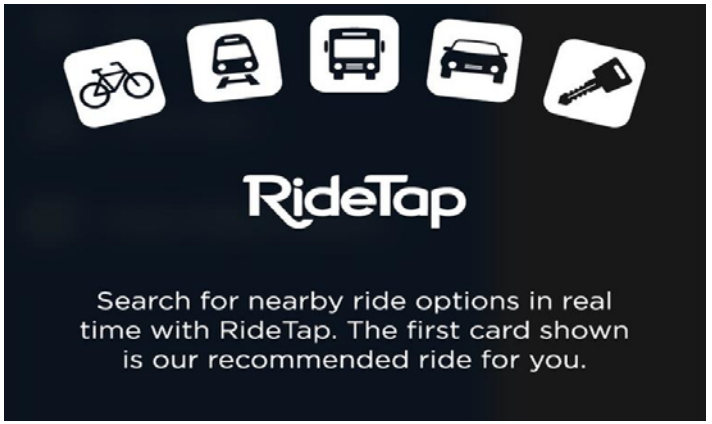
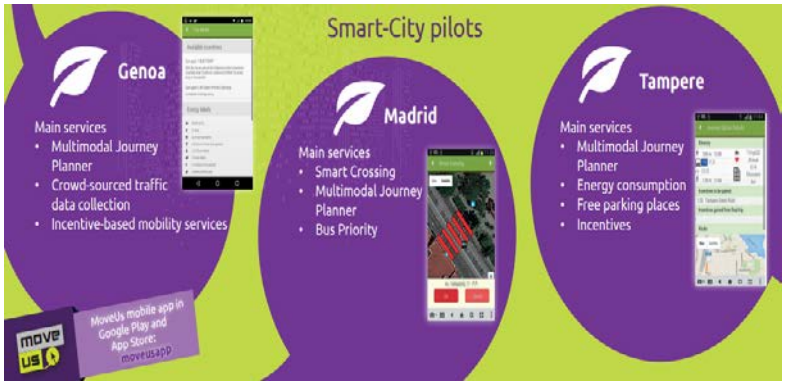
MEGATRENDS –TECHNOLOGIES

Integrated apps & services







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MEGATRENDS - BIG DATA

Extend beyond traditional company boundaries.

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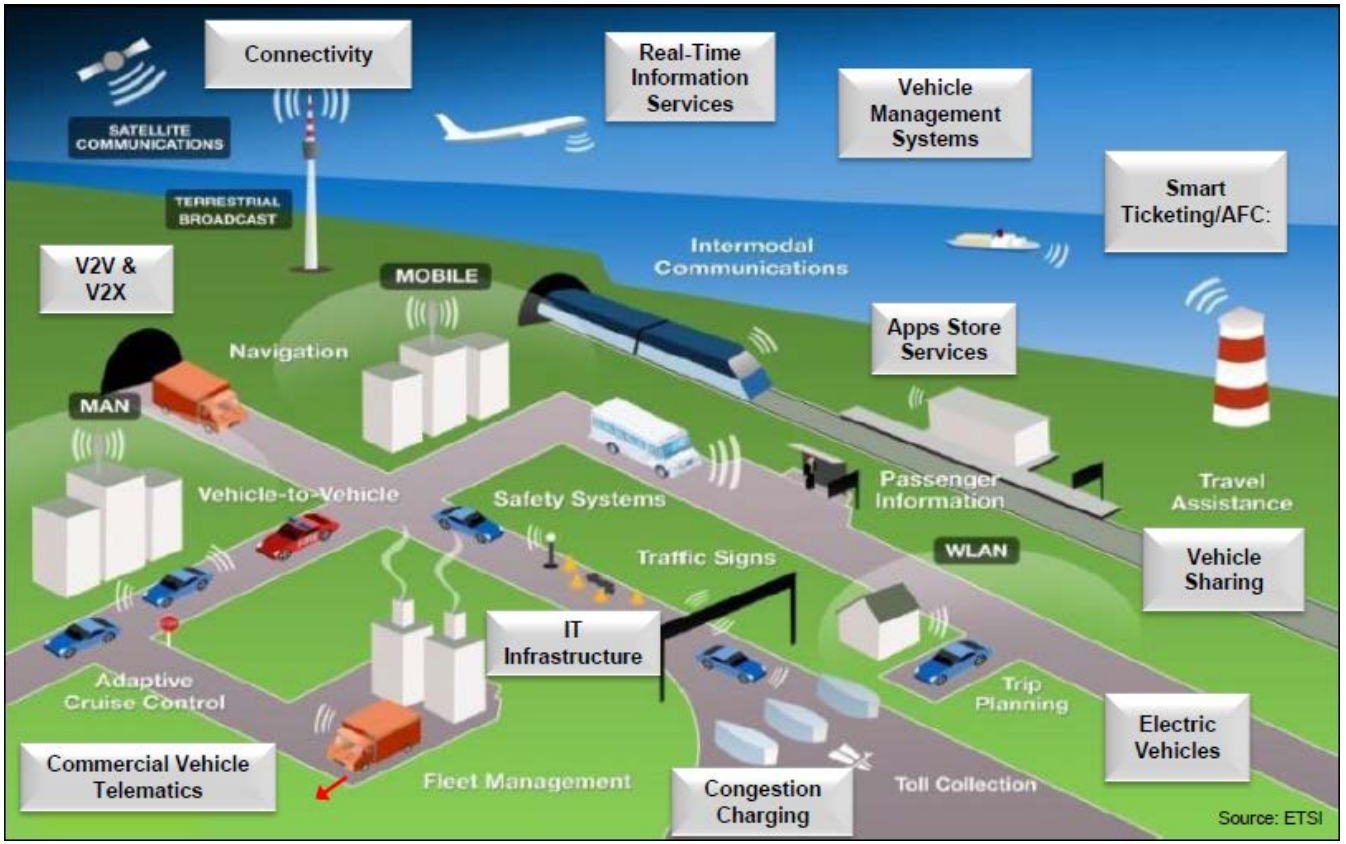
MEGATRENDS – CONNECTIVITY

The ‘internet of things’ – connected fleet, infrastructure, services, places, and people



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MEGATRENDS – NEW SERVICE DELIVERY MODELS

- Sharing Economy - blurring sector boundaries
- Great focus on access over ownership of resources
- Open Payment systems
  - – even iris recognition for transit payments.

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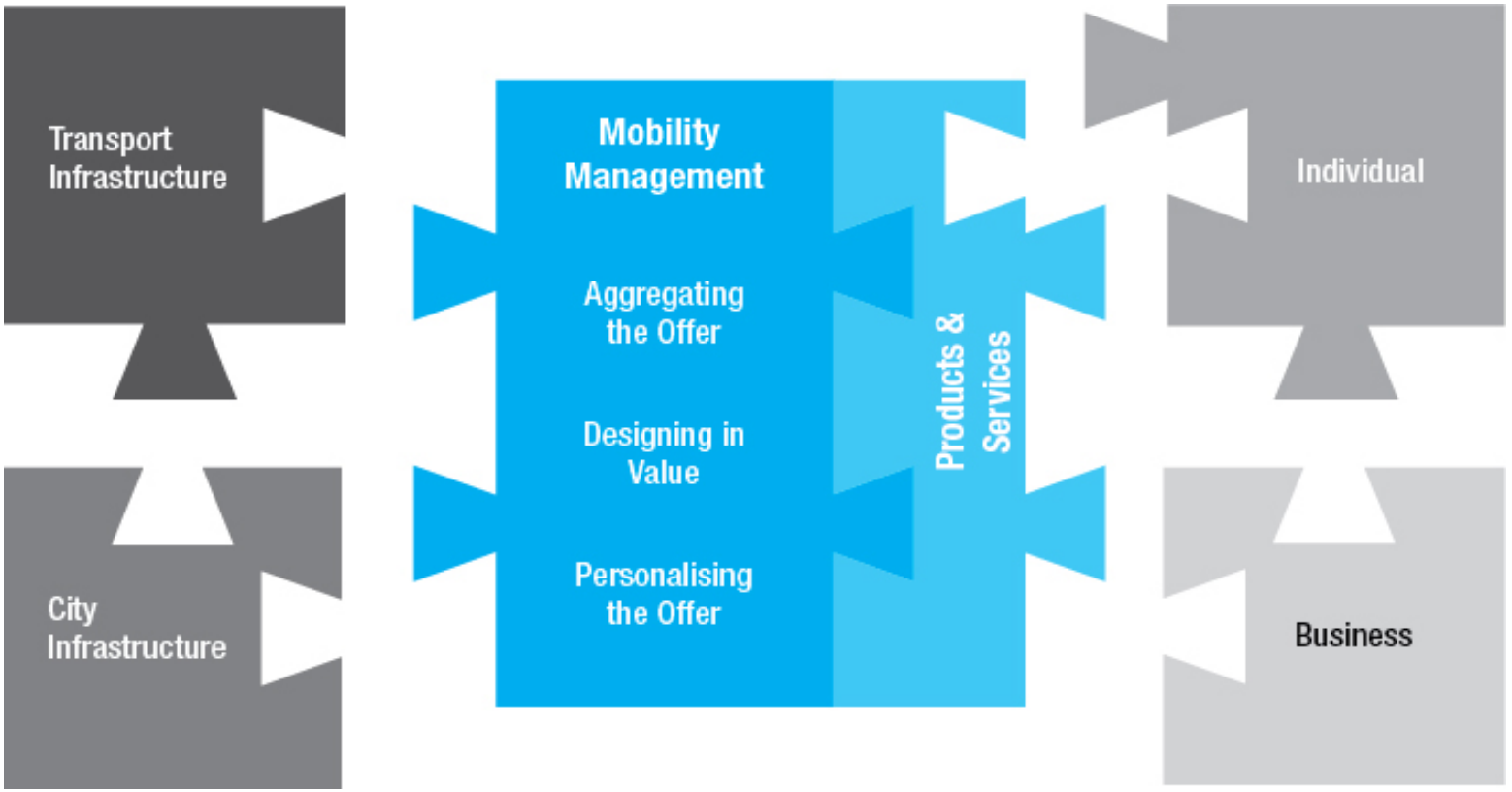
THE FUTURE FOR CITIES

Mobility as a service (MAAS)



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MOBILITY-AS-A-SERVICE

Mobility-as-a-Service (MaaS), describes a shift away from personally owned modes of transportation and towards mobility solutions that are consumed as a service.

This is enabled by combining transportation services from public and private transportation providers through a unified gateway that creates and manages the trip, which users can pay for with a single account. Users can pay per trip or a monthly fee for a limited distance.

The key concept behind MaaS is to offer both the travelers and goods mobility solutions based on the travel needs. MaaS is not limited to individual mobility; the approach can be applied to movement of goods, as well – particularly in urban areas.

This shift is fueled by a myriad of innovative new mobility service providers such as ride-sharing and e-hailing services, bike-sharing programs, and car-sharing services as well as on-demand "pop-up" bus services.

On the other hand, the trend is motivated by the anticipation of self-driving cars, which put in question the economic benefit of owning a personal car over using on-demand car services, which are widely expected to become significantly more affordable **when** cars can drive autonomously.

This shift is further enabled by improvements in the integration of multiple modes of transport into seamless trip chains, with bookings and payments managed collectively for all legs of the trip.

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REDEFINE EXPECTATIONS

(CHANBE BEHAVIOUR AND WHERE THEY LIVE)

Current:

- **Congestion reduction / busting will happen – false**
- **Congestion addressed with additional road capacity – false**
- **Governments can sustain road expenditure funding levels – false**
- **Road taxes full fund road infrastructure costs – false**
- **Parking a subsided cost exclusive of trip cost – uncompetitive**
- **Urban sprawl is sustainable – false**

Move to :

- **Congestion is a demand management tool**
- **Road network is a utility. Differential usage pricing appropriate**
- **Parking is a cost of total trip – and should be recognised.**
- **Wider housing choice – increase density**

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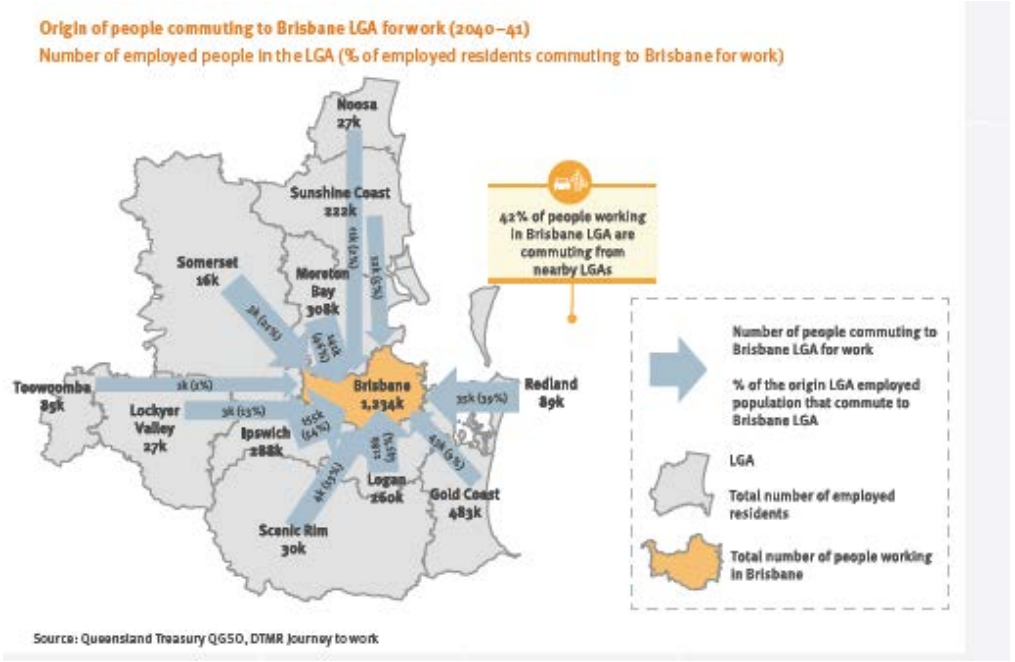
CHANGE LAND USE POLICIES

World class at urban sprawl

- **A key challenge**
  - Outside Brisbane city mode splits ~ 85/90% car for commuter trips (employment location)
  - Recurrent congestion – motorways
  - ~ 80-90% commuting by car
- **Parking supply and pricing - a key facilitator of change**



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CHANGE TRANSPORT POLICIES

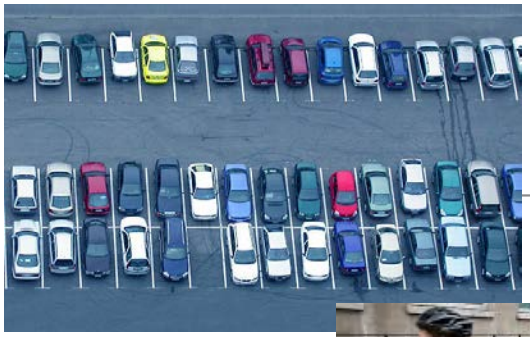
- Travel demand initiatives (parking supply)
- Pricing (State and local)
  - Differential parking
  - Levies- stop socialising costs
  - On-street share car zones
- Active Transport
  - Federal funding program
- Redraft BCA framework
  - Health impacts
  - Climate change impacts

PART B - ASSESSABLE DEVELOPMENT BENCHMARKS

Table 9.4.13-2: Transport code – for assessable development

Performance outcomes	Acceptable outcomes
Car parking	
PO1 Development provides off-street car parking to accommodate the parking demand. **OR** Where located in the Centre zone or the Southport Priority Development Area at rates that: (a) reduce congestion and car dependency; (b) maximise the efficiency of car parking provided; and (c) encourage alternative transport options such as walking, cycling and the use of public transport.	**AO1** Off- street car parking spaces are provided in accordance with the identified relevant table as follows:

Location	Off-street car parking rate
All zones except: (a) Centre zone; (b) High density residential zone (where located in the Transport hub area in **Figure 9.4.13-1**); or (c) Special purposes zone – Special development area precinct – Southport Priority Development Area	**Table 9.4.13-3**
Centre zone and High density residential zone where nominated in the Transport hub area in **Figure 9.4.13-1**	**Table 9.4.13-4**
Centre zone not nominated in the Transport hub area in **Figure 9.4.13-1**	**Table 9.4.13-5**
Special purposes zone – Special development area precinct – Southport Priority Development Area	**Table 9.4.13-6**
Note: Where off-street car parking cannot be reasonably provided, Council may consider improvements to active and public transport to offset the shortfall in car parking spaces.	



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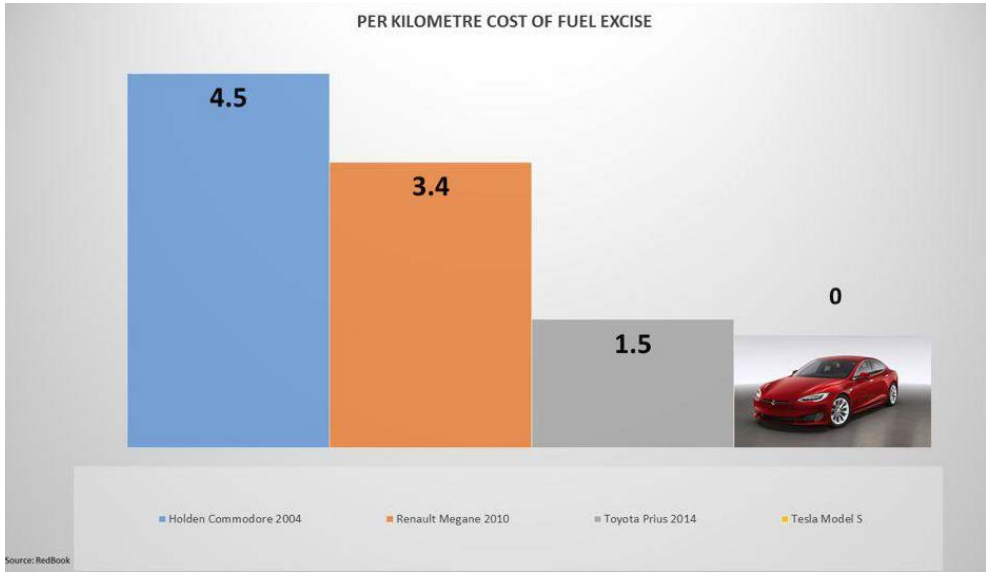
APPLY REALITY RULER, ADOPT NEW FUNDING MODEL

Prioritise autonomous vehicle needs

- C-ITS and Level 3

New funding model – Road User Charging

- Av Annual Road Bill
  - 46% fuel excise
- Equitable?
- Issue with electric cars
- National Road Map



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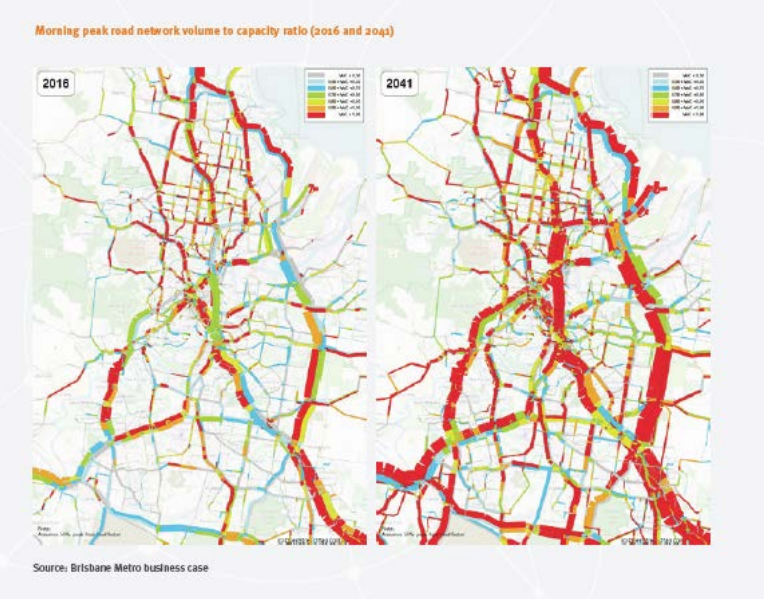
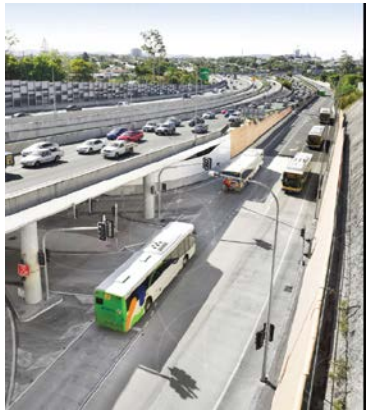
TRADITIONAL TRANSPORT PLANNING: PREDICT AND PROVIDE

Project current transport demands into future to determine future infrastructure needs

But the world *has* changed.





"You're out of luck and the reason you had to care, the traffic is stuck and you're not moving anywhere."

Bono, U2 (2000),*Beautiful Day*

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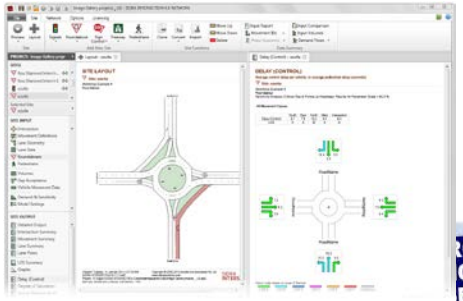
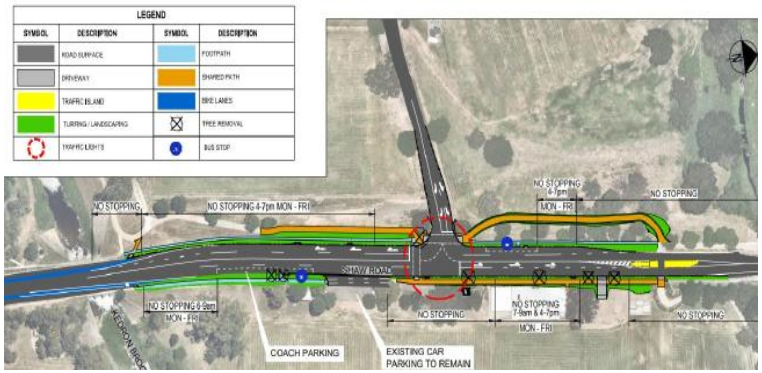
TRADITIONAL TRANSPORT PLANNING: PREDICT AND PROVIDE

Land uses → traffic demands & transport infrastructure →

parking demands, queue lengths, intersection types, etc.

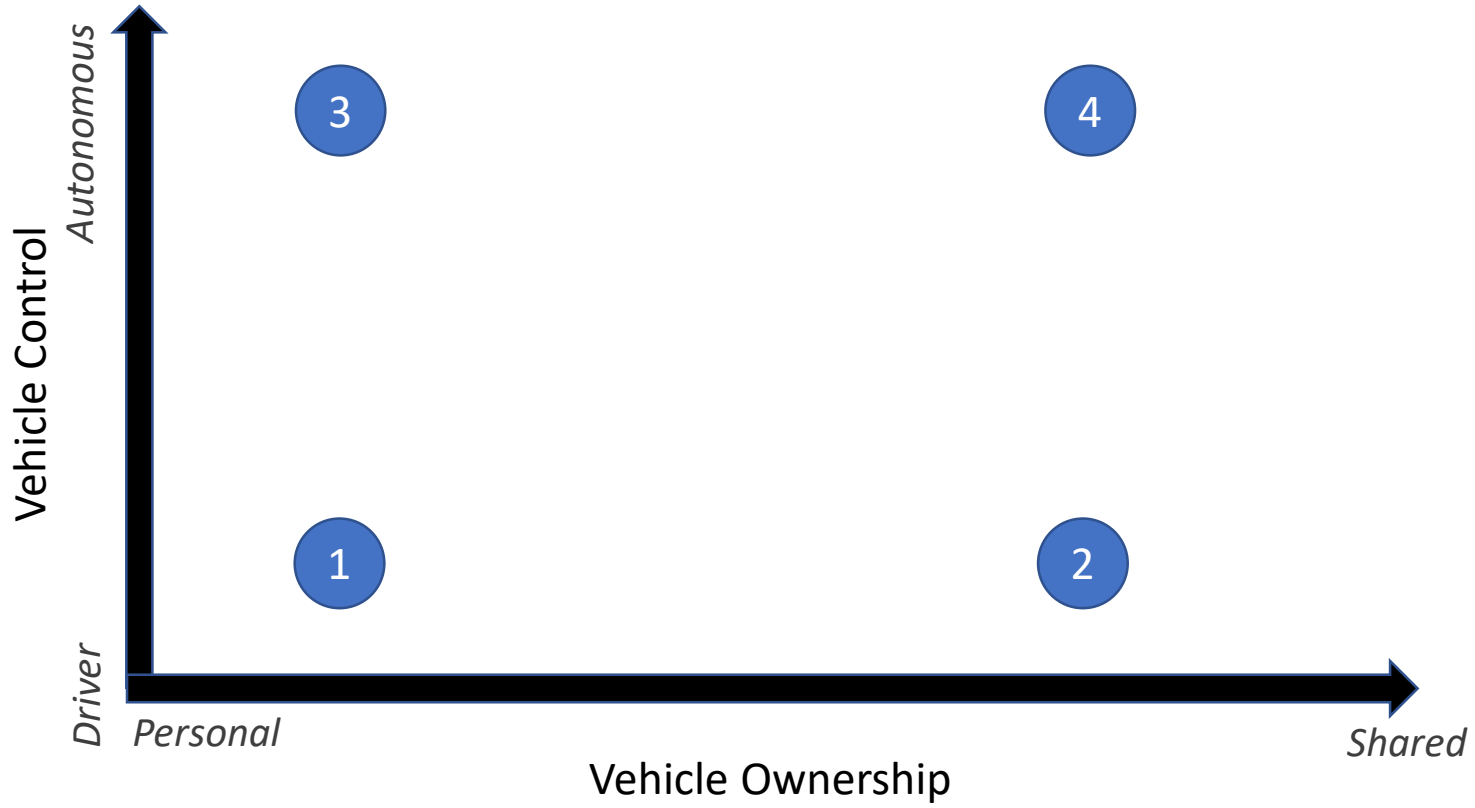




Road Safety over congestion levels – during road peak periods: should this be adopted?

CHANGE TRANSPORT PLANNING APPROACH

Scenario planning rather than ‘predict and provide’ modelling



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CHANGE IS THE ONLY CONSTANT…

“Business As Usual” model is not an option.

NEW APPROACH FOR SERVICE PROVIDERS

- More than just a service provider – a manager of mobility / aggregator

An aggregated transport solution.

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NEW APPROACH TO TRANSPORT

New business model

- Aggregate and personalise product/service offerings
- Transport access as a loss leader, revenue through aggregation
- Embrace the sharing economy
- Partnerships / aggregation / direct or indirect engagement with MAAS
- New revenue streams (potential loss of parking revenue)

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NEW APPROACH TO TRANSPORT INFRASTRUCTURE

New technologies

- Capitalise on automation and connective technologies
- Use Big Data (open sourced) and Real Time information - communications and response
- Incorporate dynamic pricing

New operations / layout

- Changing access modes mean different design / infrastructure
  - e.g. shared spaces, charging stations, reduced parking supply
- Build capacity of staff - new skill sets required

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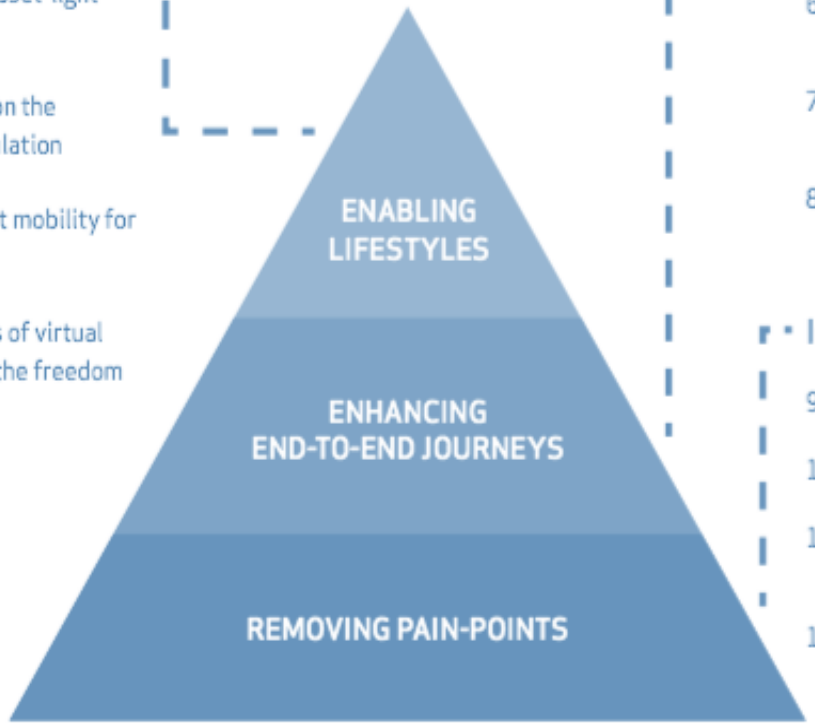
BENEFITS FOR TRAVELLERS

Improving 'Mobility Fit'

1. Help the urban population reduce their transport footstep and enable digital, asset-light lifestyles
2. Reduce the burden on the car-dependent population
3. Provide independent mobility for car passengers
4. Push the boundaries of virtual mobility to provide the freedom not to travel



Improving 'Mobility Choice'

5. Aim for transport systems to offer the flexibility and convenience of the private car
6. Actively engage the traveller in journey planning and modal considerations
7. Enable faster journeys and increase confidence in arrival times
8. Create relevant, personalised and context-aware information

Improving 'Mobility Experience'

9. Solve the parking challenge
10. Enable smoother drives
11. Increase user experience and perceived value of public transport
12. Improve and enable multi-modal journeys – reducing complexity, enhancing conectivity and improving speed and reliability

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