Smart Cities and Smarter Transport

Future urban mobility and access

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CILTA Webinar

20 May 2015

Outline

- Future cities/ the ‘Smart City’ age. Drivers of change
- Digital strategies: deploying widgets
- Can you manufacture places people want to live in?
- Transport drivers of change
- Clever stuff
- Case study ‘Smart’: Autonomous Vehicles
- Hope for the future/ hoping for a future

Future cities are here now

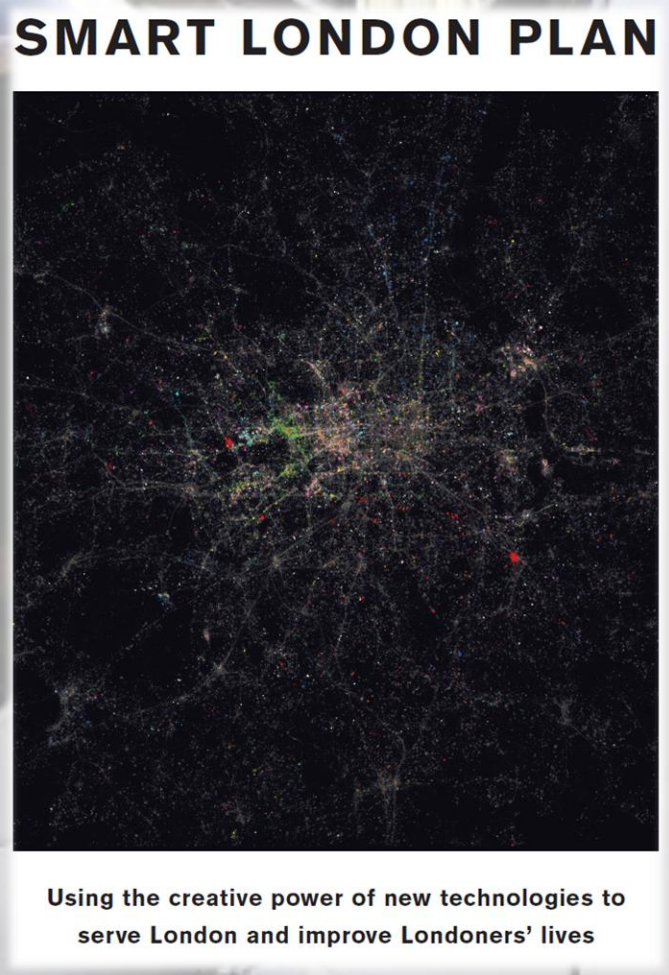
- We are an urban species
- Megacities, Smart Cities, Chic Cities, Arrival Cities

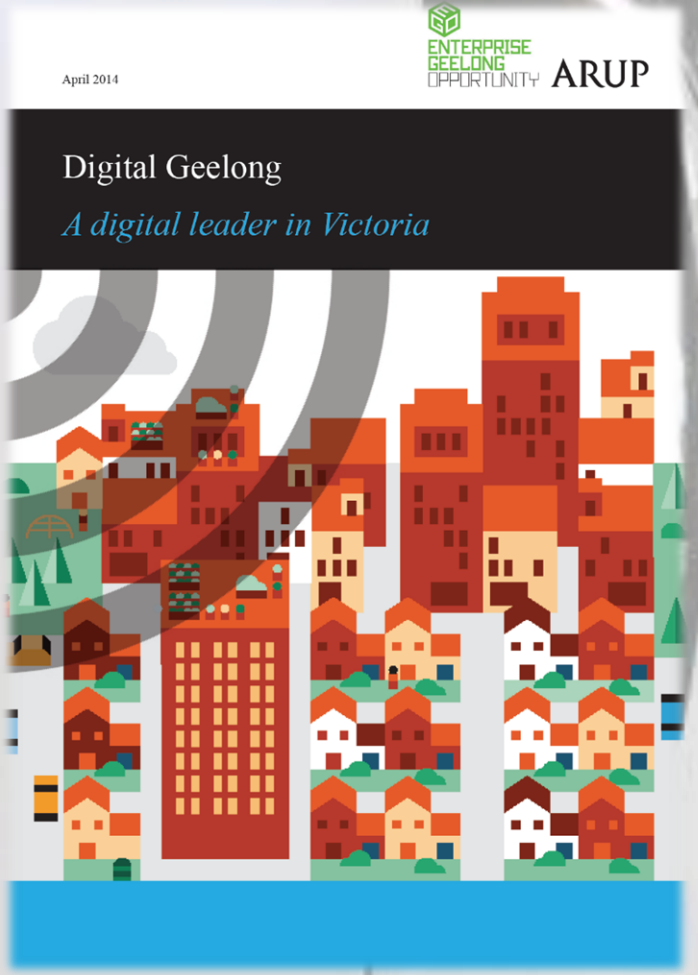
Drivers of Change in Cities

- Population flow
- Arrival city economies
- Competitiveness
- Affordability
- ICT and IoT

Digital Strategies

- Siemens, Cisco, IBM, Ericsson Schneider…sensors, sensing and smarter applications (widgets)
- Reduced friction and increased efficiency: tech fixes
- Competition between cities and countries
- Predict and control?





- Should some things stay the same?
- Do we need urban layers and urban grit?
- Can we manufacture places that people truly want to live in?

Transport Drivers of Change

- Systems efficiency
- Safety
- Resilience
- Technology

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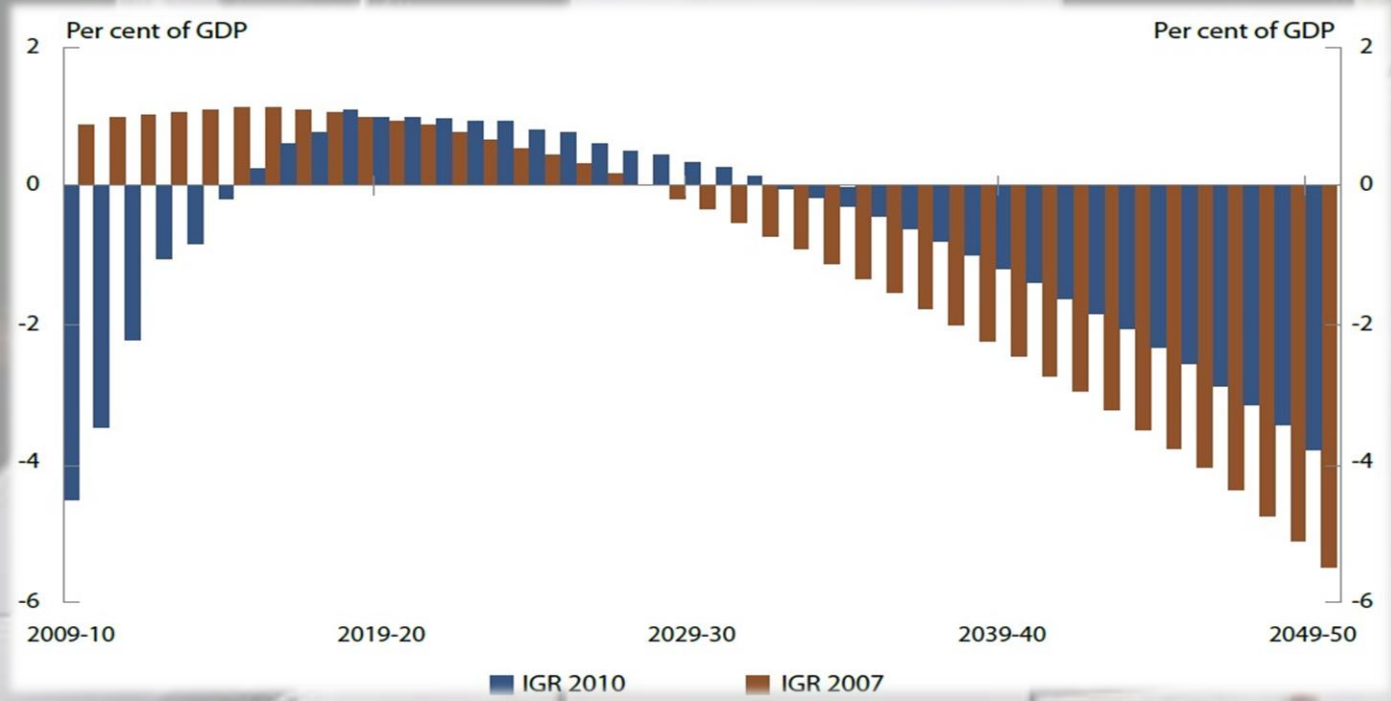
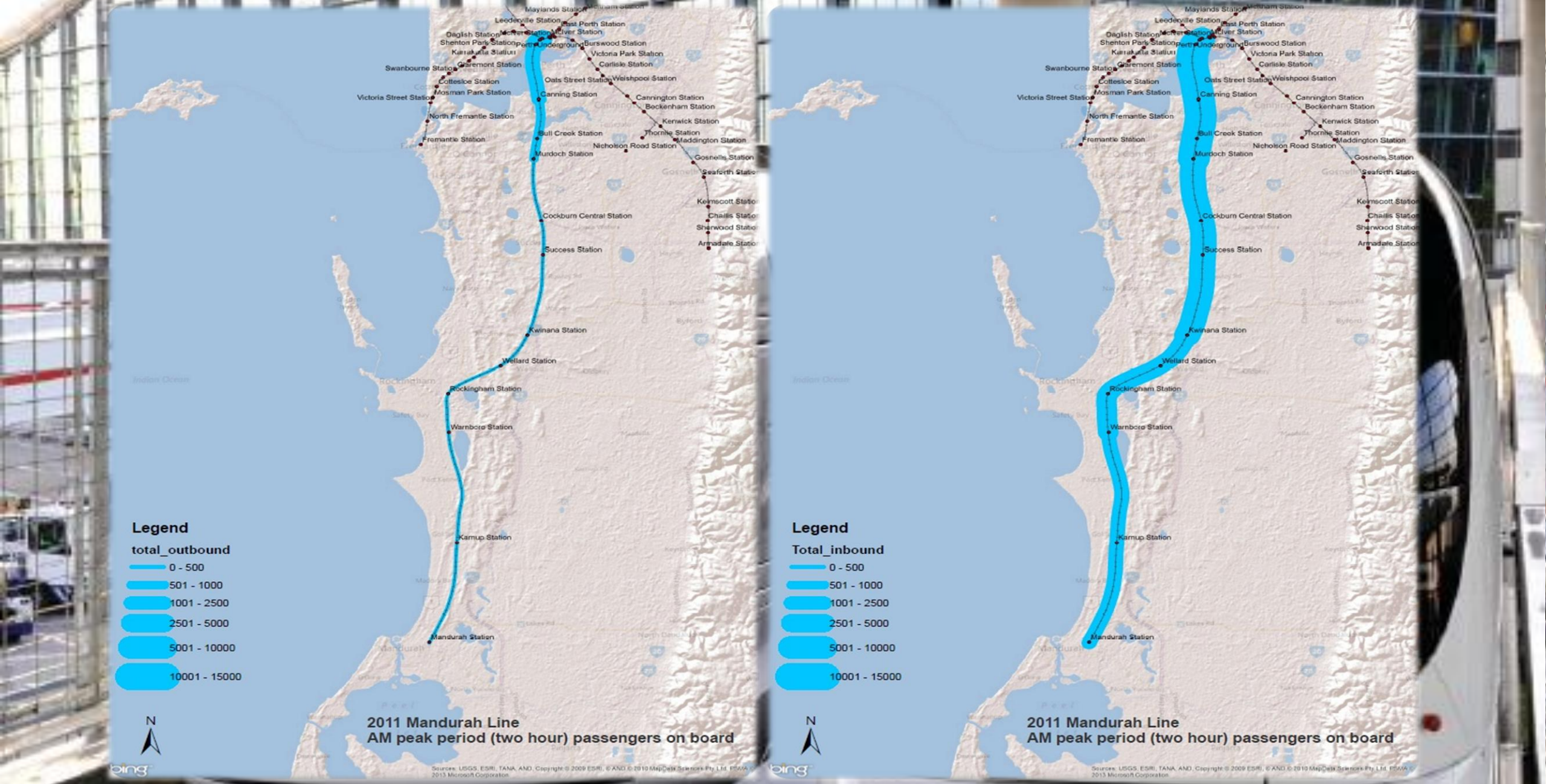
people lost their lives on our roads last year

Source: RAC WA



Source: Moving People 2030 Taskforce, 2013



AM peak inbound vs outbound on Mandurah line, Perth

City	Fare multiplier required for 30 per cent cost recovery	Fare multiplier required for 60 per cent cost recovery	Fare multiplier required for 90 per cent cost recovery
Sydney	1.25	2.5	3.8
Melbourne	0.97	1.9	2.9
Brisbane	0.94	1.9	2.8
Perth	0.79	1.6	2.4
Canberra	1.8	3.6	5.3

Source: Moving People 2030 Taskforce, 2013

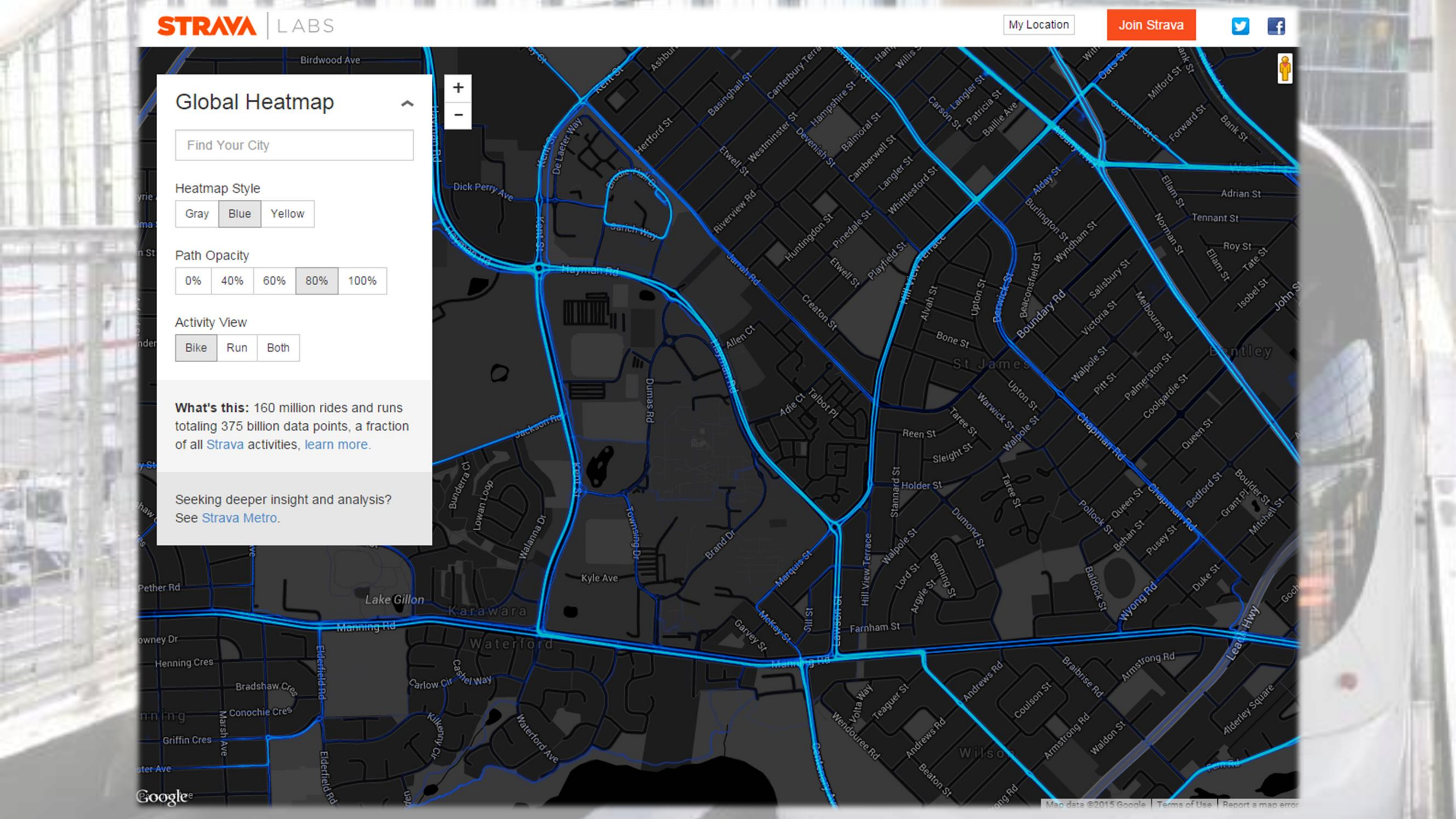
Midway, Colorado (Hayden, 2004: p105)

Portervi11e, Californ ia (Hayden, 2004: p28)

Waves of transport technology

1. Muscle
2. Steam
3. Combustion
4. Flight
5. **Autonomy, cybernetics, connectivity and big data**

https://vimeo.com/18966477


STRAVA | LABS
My Location
Join Strava
Global Heatmap
Find Your City
Heatmap Style
Gray
Blue
Yellow
Path Opacity
0%
40%
60%
80%
100%
Activity View
Bike
Run
Both
What's this: 160 million rides and runs totaling 375 billion data points, a fraction of all Strava activities, learn more.
Seeking deeper insight and analysis? See Strava Metro.
Birdwood Ave
Dick Perry Ave
Hayman Rd
Jackson Rd
Kyle Ave
Lake Gillon
Karawara
Manning Rd
Waterford
St James
Bentley
Wilson
Adrian St
Tennant St
Roy St
Bone St
Reen St
Holder St
Farnham St
Armstrong Rd
Leach Hwy
Pether Rd
Henning Cres
Bradshaw Cres
Conochie Cres
Griffin Cres
Map data ©2015 Google
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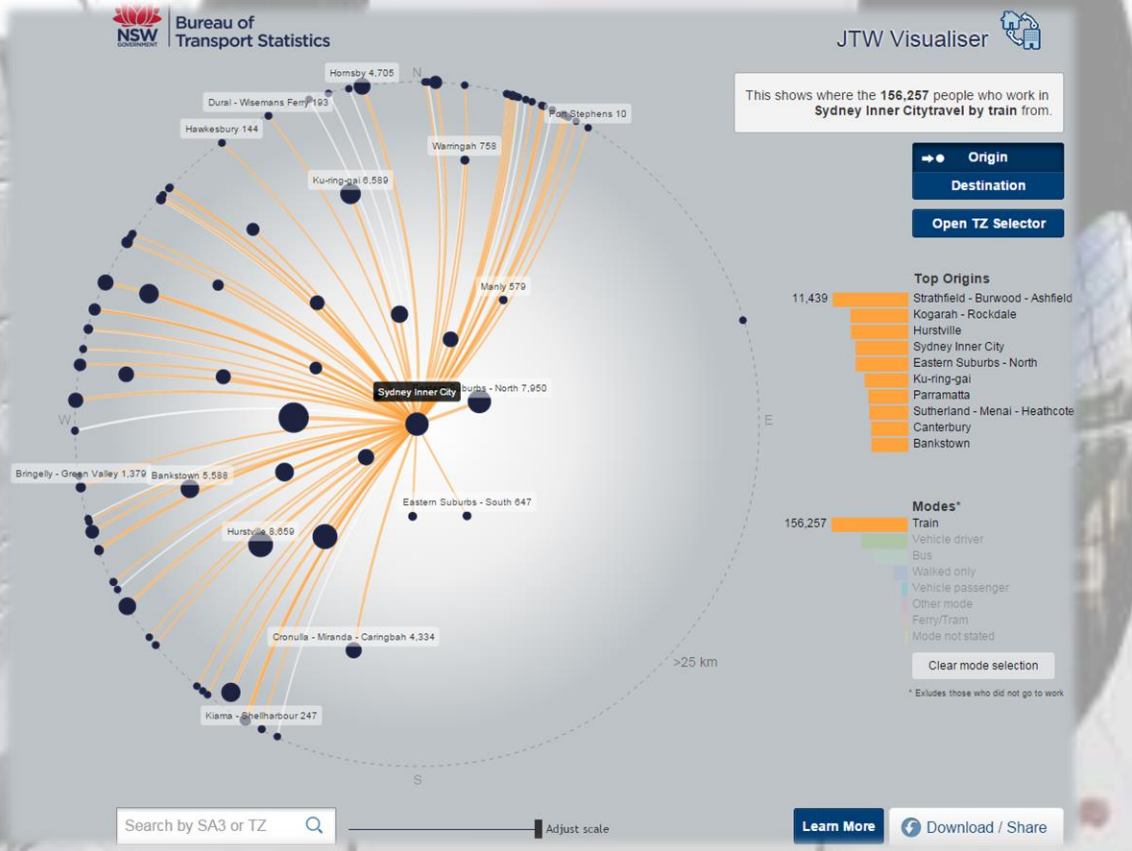
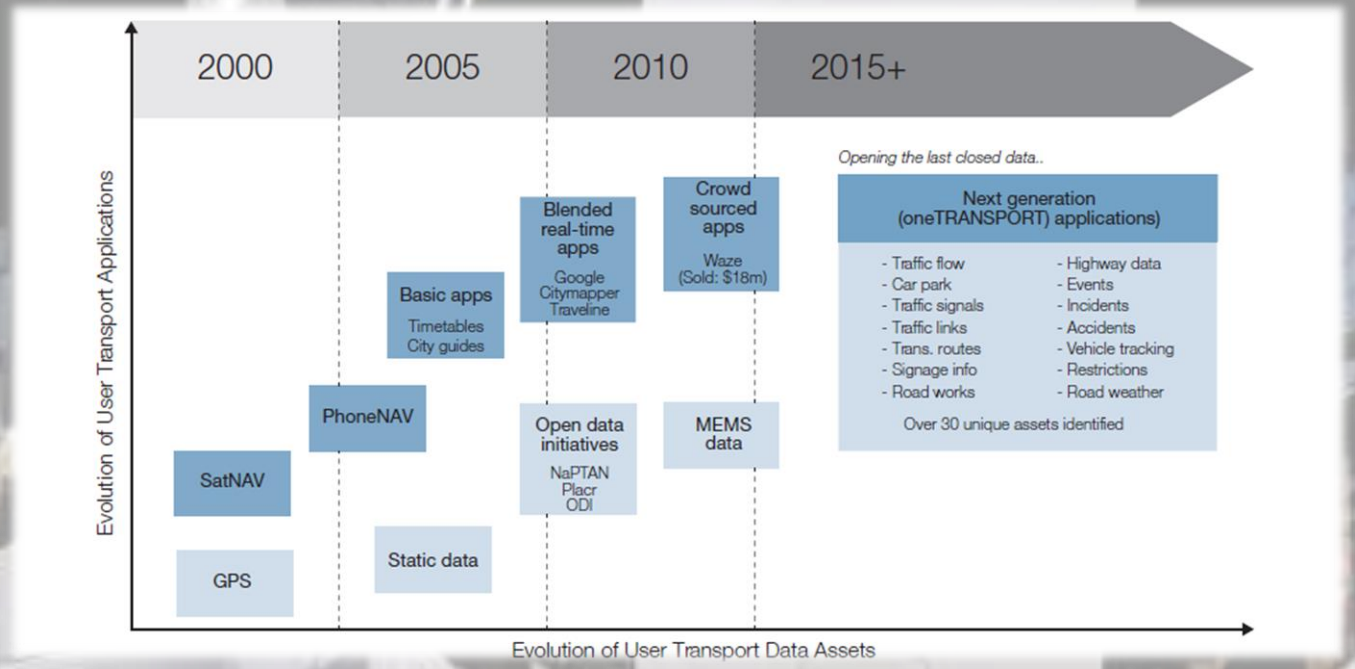
NSW BTS – interactive data platform

- Open data example
- Household Travel Survey
- Census
- Trip forecasting
- Patronage data
- Future scenarios



oneTRANSPORT (UK)

- Transport information marketplace
- Leverage of ‘Machine2Machine’ communication
- Publishing by data owners and applications by the market
- Requires opening up ‘closed data’
- Private-sector innovation, inter-geographical benchmarking, tailored transport, user satisfaction



Smart Drive, New York City

- NYDOT programme
- Application of in-vehicle telematics, mobile data and Cloud computing technology
- Provision of customised data to drivers to assist transport decision-making and improve driving habits
- Spin-offs for systems efficiency

DriveSMART

Save money, save time, and drive more safely.


CYCLE HIRE
Hammersmith
Greyhound Road
← Margravine Road
Hammersmith Cemetery
WEST KENSINGTON
The Queen's Club


zipcar
CAR CLUB ONLY

Autonomous Vehicles

- Safety + efficiency
- Freight and passenger applications
- Huge investment proposition

Automation and Connectivity

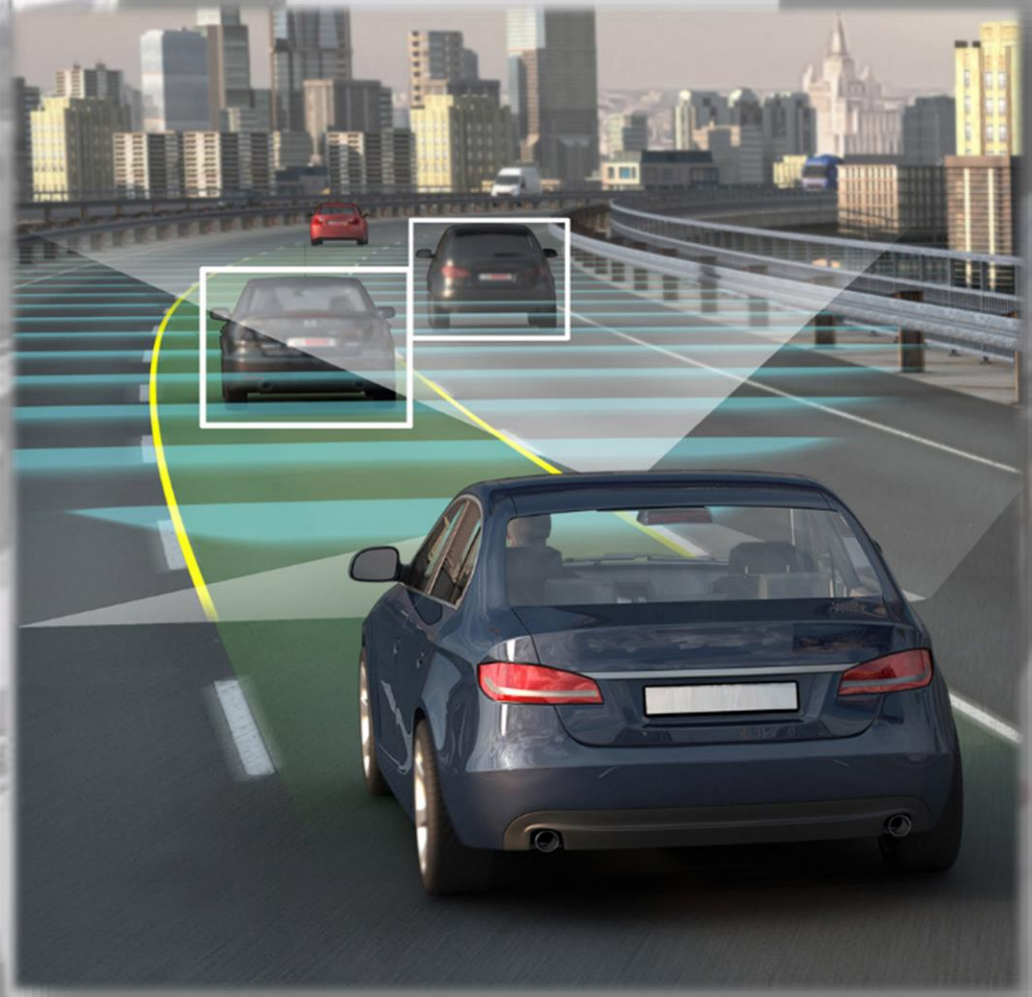
- Automated systems are not new
- Connected systems are related
- Current products are Level 2
- Product tests are Level 3
- Some commentators see significant market penetration of ‘AVs’ by 2020

Level	Function	Driver involvement
1	Specific and limited, such as cruise control and automated parallel parking	Driver generally retains control
2	Combined automated functionality, such as adaptive cruise control with lane centring	Driver can relinquish control in some limited situations but is expected to retain situational awareness
3	Limited automation	Driver can relinquish control and situational awareness in typical situations. The vehicle will alert driver to circumstances requiring human intervention
4	Full automation	Vehicle can respond to all conceivable conditions, enabling carriage of passengers who are not able to drive

Source: based on NHSTA, 2013

Traffic Safety

- >90% traffic accidents product of human error
- Many others are consequences of human reaction time
- Eliminate human factors = dramatic reduction in incidence?

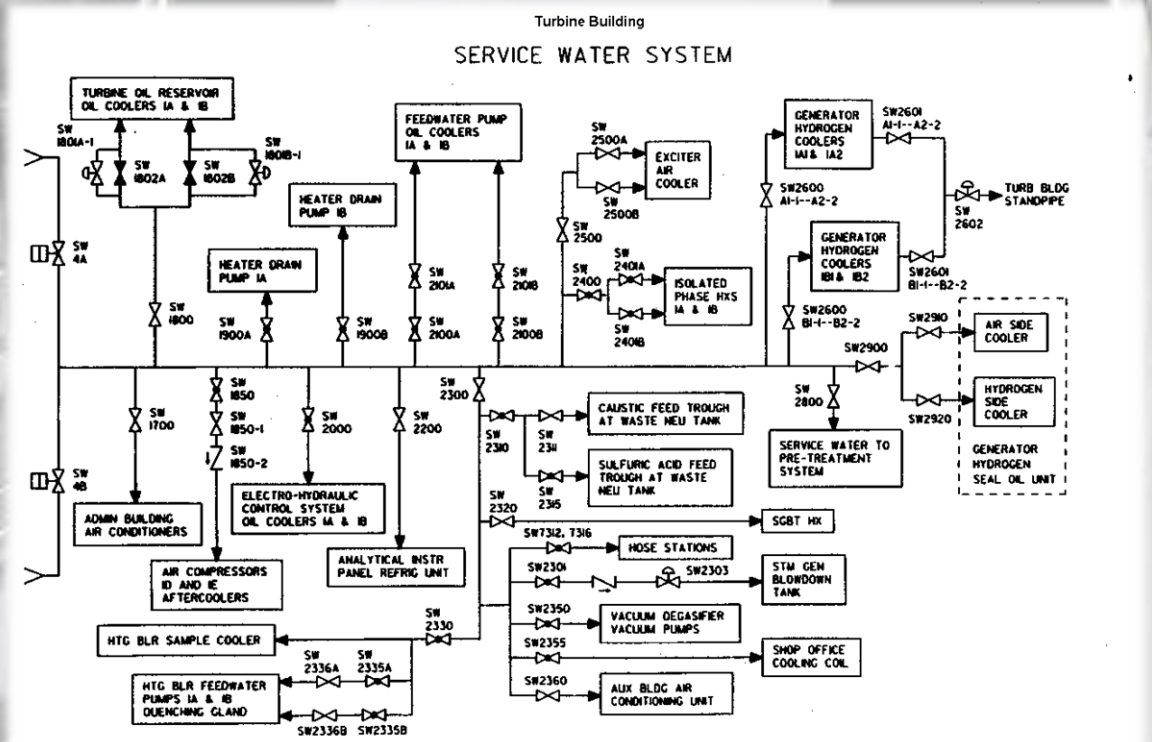


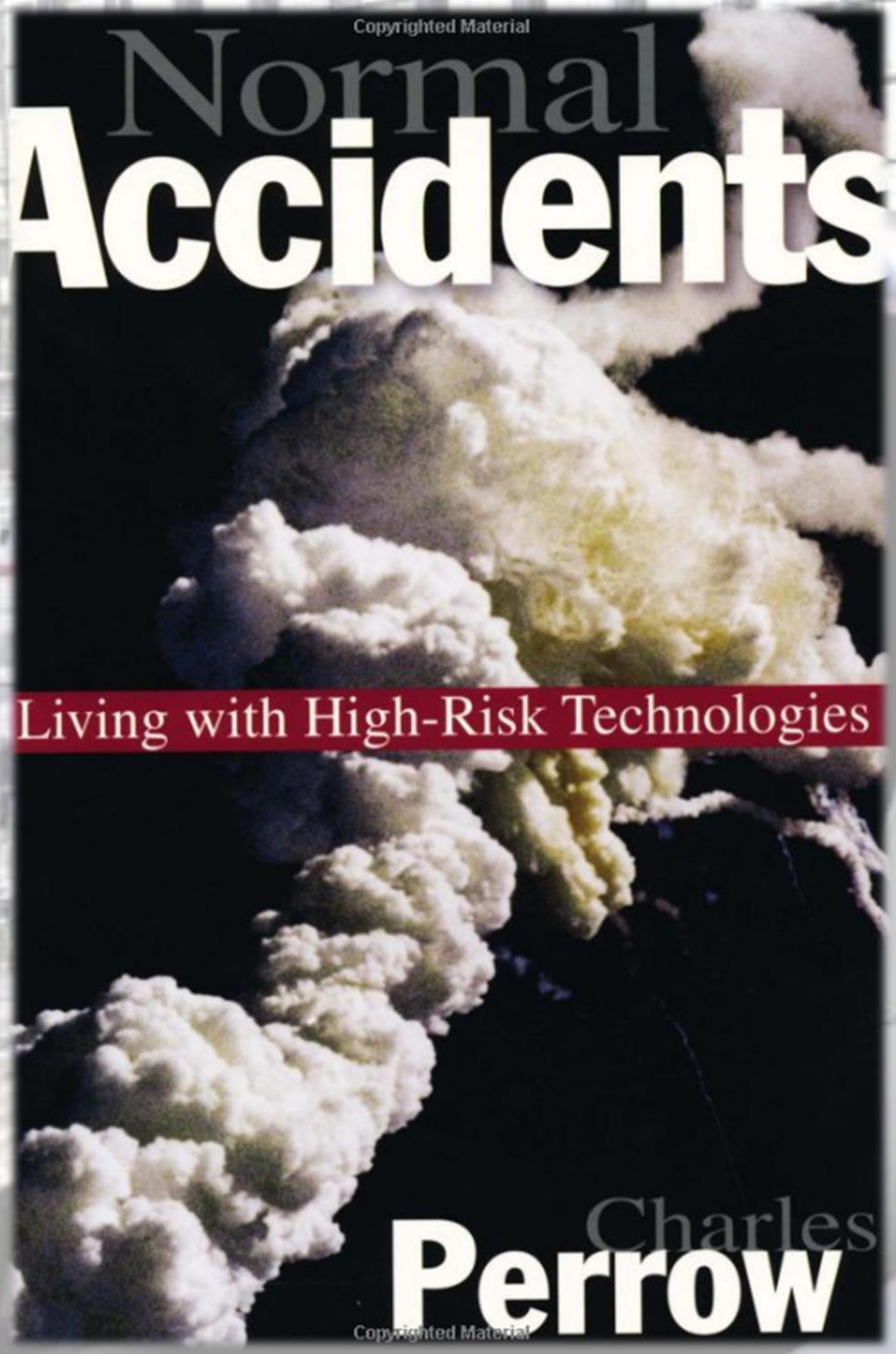
Efficiency

- ICT has potential to double or triple road capacity (Mulligan, 2014)
- Faster reactions and complex decision-making = increasingly complex vehicle interaction = more efficient use of road-space
- Significantly reduced delay at intersection, the primary bottlenecks on the network

The Challenges

- Fleet transition problems: mixed traffic; heuristics
- Systems failure and ‘hack’
- Liability/ legislative system
- Might exacerbate mobility problems
- (In)equality





**Probability	Risk level ❶ = Low through to ❻ = Extreme *Severity of consequence						
	Property damage	First-aid injury	Casualty injury	Acute injury	Critical injury	Single fatality	Multiple fatality (Bus)
	Fatality equivalent 0.004	Fatality equivalent 0.009	Fatality equivalent 0.024	Fatality equivalent 0.072	Fatality equivalent 0.251	Fatality equivalent 1.000	Fatality equivalent 4.667
Almost Certain	❸ 0.400	❸ 0.900	❹ 2.400	❺ 7.200	❺ 25.100	❻ 100.000	❻ 466.700
Expected	❷ 0.180	❸ 0.405	❹ 1.080	❹ 3.24	❺ 11.295	❺ 45.000	❻ 210.015
Probable	❷ 0.080	❷ 0.180	❸ 0.480	❹ 1.440	❺ 5.020	❺ 20.000	❺ 93.340
Likely	❶ 0.040	❷ 0.090	❸ 0.240	❸ 0.720	❹ 2.510	❺ 10.000	❺ 46.670
Possible	❶ 0.018	❶ 0.041	❷ 0.108	❸ 0.324	❹ 1.130	❺ 4.500	❺ 21.002
Rare	❶ 0.008	❶ 0.018	❶ 0.048	❷ 0.144	❸ 0.502	❹ 2.000	❺ 9.334

Fatality equivalent values are based on Rural Generic Costs per Accident (Economic Analysis Manual, Appendix B, Table 12, 2003. 14 injuries are equivalent to 1 fatality).

** Severity of consequence is a log relationship y=0.0006e1.838x based on fatality-equivalent intercepts at Property Damage = 0.004, Acute = 0.072, Fatality = 1.*

*** Part of a power series (1.10)2n*

Source: New South Wales Road and Maritime Services Road Safety Audit risk evaluation matrix

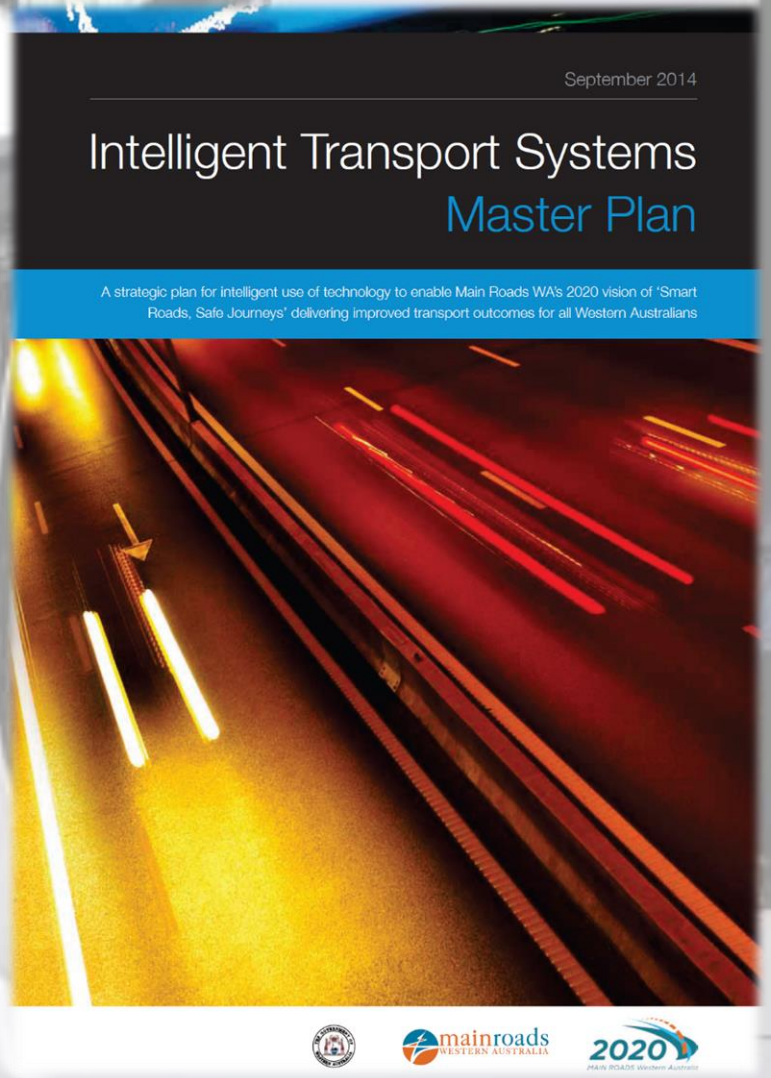
GATEWAY (Greenwich Automated Transport Environment Project

£8 million project funded by industry and Innovate UK, and led by Transport Research Laboratory (TRL). Aims:

- Demonstrate automated transport systems in a range of environments
- Explore legal and technical issues
- Analyse interactions between pedestrians, drivers and other road users

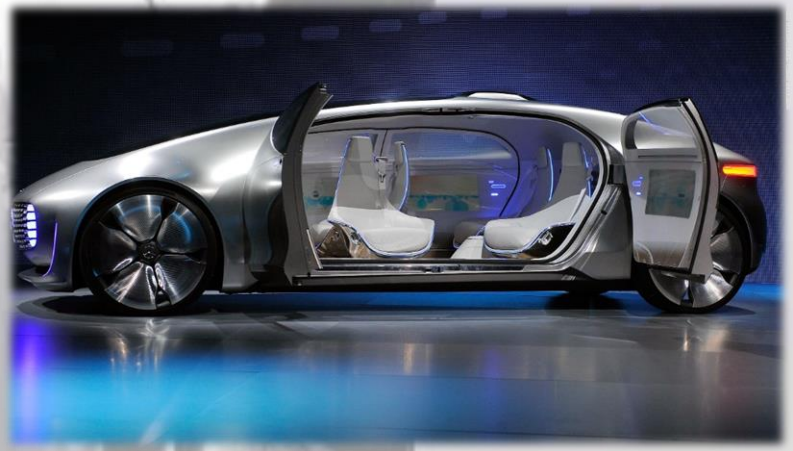
Source: http://www.digitalgreenwich.com/first-trials-of-driverless-vehicles-get-underway-in-royal-borough-of-greenwich/

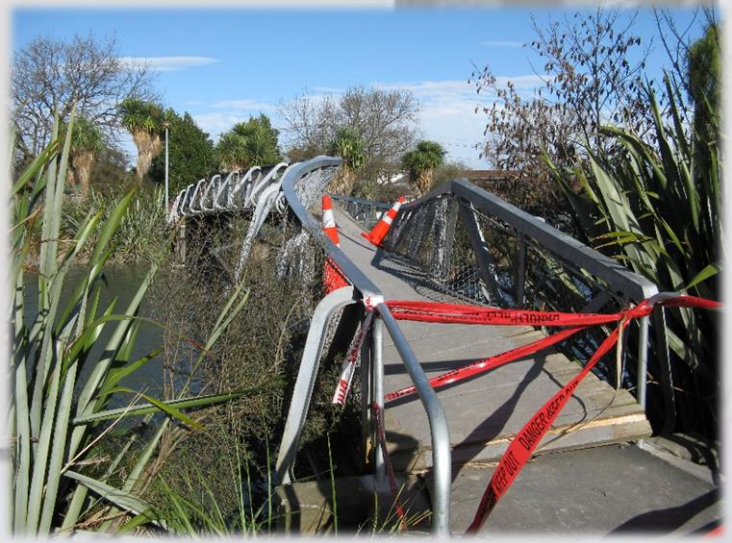
AV Research and ITS

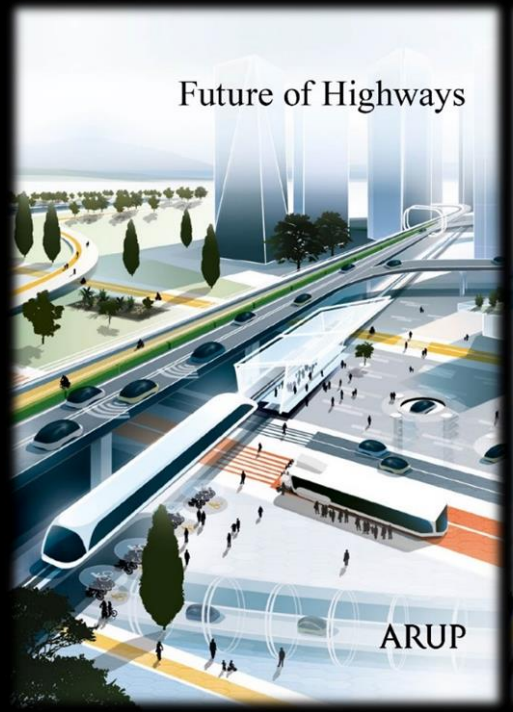


Conclusions – Hoping for a Future

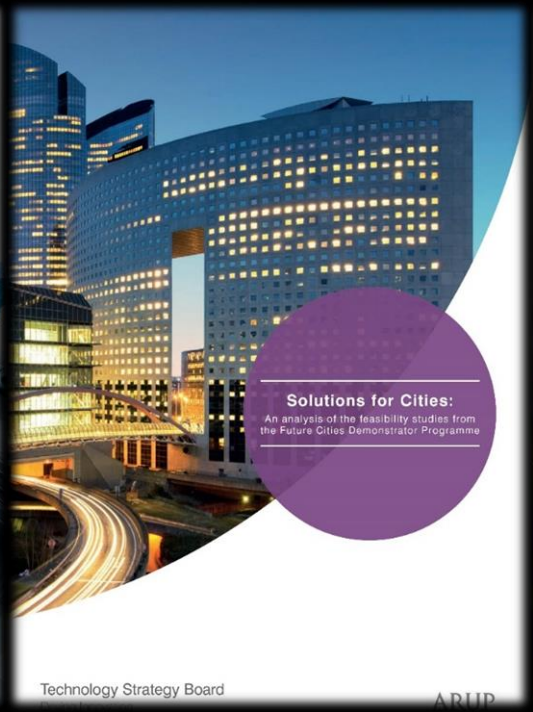
- Managing the needs of our urban population is complex
- We are in the midst of a new wave of regional competitiveness
- Urban quality of life is one of the issues of the 21st Century
- Government is hamstrung by cost
- Technology may be salvation. Its also Pandora's Box
- New transport technology is with us and inevitable
- The extent to which its deployed equitably and smartly will define our generations

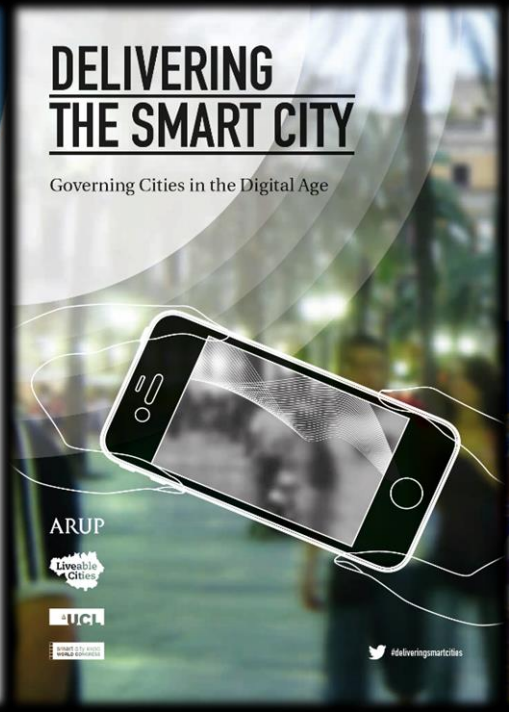





Future of Highways
ARUP


foresight
Future of Rail 2050
ARUP


Solutions for Cities:
An analysis of the feasibility studies from the Future Cities Demonstrator Programme
Technology Strategy Board
ARUP


DELIVERING THE SMART CITY
Governing Cities in the Digital Age
ARUP
Liveable Cities
UCL
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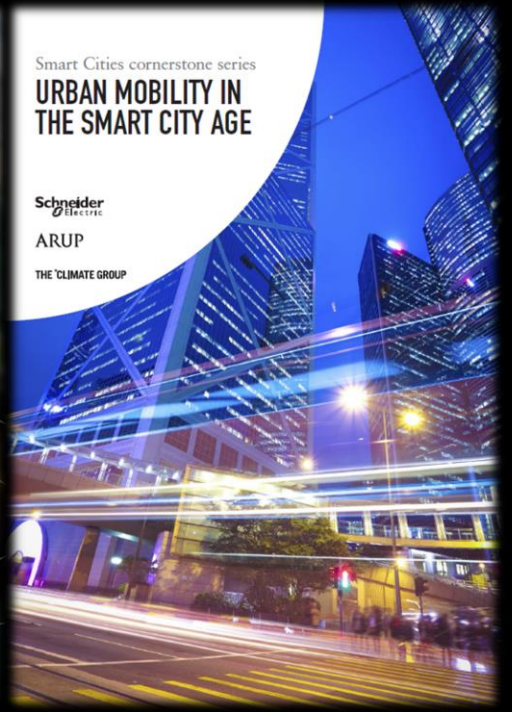
Smart Cities cornerstone series
URBAN MOBILITY IN THE SMART CITY AGE
Schneider Electric
ARUP
THE CLIMATE GROUP

https://www.youtube.com/watch?v=KcUR65bju78