INFRASTRUCTURE PARTNERSHIPS AUSTRALIA

DRIVING CHANGE: AUSTRALIA'S CITIES NEED A MEASURED RESPONSE

UBER

Infrastructure Partnerships Australia is a national forum, comprising public and private sector CEO Members, advocating the public policy interests of Australia's infrastructure industry.

INFRASTRUCTURE PARTNERSHIPS AUSTRALIA

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ABOUT IPA

Infrastructure Partnerships Australia is the nation's peak infrastructure body – formed in 2005 as a genuine and enduring policy partnership between Australia's governments and industry.

IPA's formation recognises that through innovation and reform, Australia can extract more from the infrastructure it's got, and invest more in the infrastructure we need.

Through our research and deep engagement with policymakers and industry, IPA seeks to capture best practice and advance complex reform options to drive up national economic prosperity and competitiveness.

Infrastructure is about more than balance sheets and building sites. Infrastructure is the key to how Australia does business, how we meet the needs of a prosperous economy and growing population and how we sustain a cohesive and inclusive society.

Infrastructure Partnerships Australia draws together the public and private sectors in a genuine partnership to debate the policy reforms and priority projects that will build Australia for the challenges ahead.

CONTENTS

EXECUTIVE SUMMARY

Australian governments invest tens of billions in transport infrastructure and undertake a range of policy initiatives every year seeking to improve the functionality of our cities and wider transport systems.

Historically, transport policy has focused on measuring inputs, like the amount of money invested in new road and rail projects, or the Benefit Cost Ratio estimated for these projects.

But the rapid development of technologies across the transport network is generating a wealth of raw data; offering a largely-as-yet-unrealised opportunity to gain a much more sophisticated understanding of how Australia's transport systems are performing.

Indeed, turning 'big data' into 'useful information' would allow transport planners, governments and users to better understand how transport is performing – and importantly, to measure how successful we are in addressing transport challenges, as our cities grow.

Currently, even major states use individual paper surveys, to try and understand complex commuter behaviours – or use a range of physical measurement tools, to try and understand user demand. But already, we are measuring much more sophisticated data that describes how, when and where people travel – the challenge is turning this huge quantity of data, into reliable information, that is useful and transparent.

Infrastructure Partnerships Australia and Uber have partnered together to produce Australia's first regular measurement of road network performance – the IPA Transport Metric – spanning:

1. Sydney;
2. Melbourne;
3. Brisbane; and
4. Perth.

The IPA Transport Metric, released for the first time in this paper, measures travel times across the day – providing new information about how the road network performs in the morning and afternoon peak periods, as well as shoulder and non-peak periods, across three zones:

- CBD zone;
- the inner metro zone; and
- outer metro zone.

Uber's experience running ridesharing services across Australia has the potential to inform and improve urban planning. The IPA Transport Metric leverages data collected from Uber's ridesharing network to do just that.

The IPA Transport Metric captures data from Uber trips, through which a network of data is collected. Each trip is a mobile collection point for key traffic metrics such as travel times. This use of on-vehicle measurement systems will provide a wider, more detailed and granular picture of how the use of our cities' transport systems evolves over time.

In this way, the IPA Transport Metric is a good example of the type of highly valuable information that is already available, at a very low monetary cost – that can be used to improve cities and transport.

IPA and Uber have partnered on this project to provide governments and the community with a new tool, which would allow wide visibility of the transport networks performance – its output – rather than only measuring dollars spent, or estimating potential benefits from individual projects.

Used well, Uber's underlying data and that of other transport operators, allows us new opportunities to better target infrastructure investment, assess the actual benefits of individual projects – and to understand how Australia is tracking in developing smarter, better cities and solving its mobility issues.

PART 1:
DATA FORMS THE BASIS OF GOOD DECISION MAKING

Australia invests many tens of billions of dollars each year in transport infrastructure, seeking to maintain the mobility and functionality of key urban centres; to ensure that regions are effectively and safely connected to economic activities and social opportunities; and importantly, to ensure economic and employment growth.

Until now, effectively measuring the performance of the transport network has been both difficult to do and often inconsistently done.

Modern technology provides powerful new opportunities to better plan, maintain, invest and interact with transport infrastructure – by giving us a much deeper understanding of the capacity and condition of infrastructure, and the demands of the people and businesses who use it.

In transport, technologies are now capturing countless data points each day – across private companies like transport providers and government agencies.

Properly harnessed, this ‘big data’ could be used to provide a much clearer understanding of when, where and how the community travels; allowing planning, infrastructure and regulation to all be better aligned with what the community needs and wants.

The right data could also allow a much clearer diagnosis of where current and future problems with the transport network will occur – ensuring a more effective process to plan and manage the network – and deliver new infrastructure – before problems become acute.

Further, such an approach also allows a new way to assess the effectiveness of different policies and projects, with their impacts more clearly observable and measurable in the real world.

TECHNOLOGY: WE LARGELY HAVE THE DATA, BUT IS IT INFORMATION?

The rapid and accelerating adoption of new technologies across the transport network means that most of the raw data needed to better understand transport already exists; but in large part this 'big data' remains segmented across modes, agencies, jurisdictions and companies, rather than being used to generate clearer information.

Further, there is a notion that simply having data or collecting more data will help solve the problem. This notion needs to be challenged, it is not a matter of more data but rather, a matter of using the right data to understand transport challenges.

Better use of transport data could provide a powerful range of new tools and capabilities. For example, sensors embedded in transport infrastructure assets could monitor and report maintenance needs; on-vehicle and other systems could allow for active management of traffic flows; and real world data about actual user behaviours and demand could allow new approaches to manage and optimise transport, for customers.

The challenge for transport policymakers is to convert raw data into useful information to be able to guide transport investment and maintenance and optimise use of the network.

There is already some degree of political and policy focus on these opportunities – such as the Federal Government's Smart Cities Plan launched earlier this year which contemplates the benefit of better using data and technologies in urban infrastructure[1].

The Smart Cities Plan details three pillars:

» smart investment: using better data and information to prioritise the right infrastructure projects;
» smart policy: using national government incentives to drive consistent state and local government reforms and policies; and
» smart technology: harnessing new technologies to maximise and optimise infrastructure networks.

While this and similar 'smart' policies at a state government and industry level outline admirable objectives and broad aspirations, there is a need to refine these toward more clearly defined objectives and pragmatic outcomes.

While 'exciting' technologies, like the prospect of autonomous vehicle fleets, easily fires the public imagination, there are many more immediate benefits from smarter infrastructure and smarter cities.

There is a good argument to be made for the Commonwealth's 'Smart Cities' policies to refocus more on pragmatic and immediate wins – like better measurement of the systems that together comprise a city.

1. Department of Prime Minister and Cabinet, 2016

HOW CAN NEW TECHNOLOGIES IMPROVE DATA COLLECTION?

In the past, technology was the main limiting factor on gaining a clear understanding of the way users interact with transport. Capturing data about driver activity beyond using pneumatic tube counters on roads, or measuring ridership beyond turnstile counts on public transport, was cost-prohibitive or practically difficult. The use of surveys, while useful to gain deeper insights into user behaviour, can only realistically target a very small number of drivers.

The simple mobile phone provides an example of where technology can have huge impact on data collection – where nearly every human can serve as a measurement node on the transit network – with limitations based on privacy considerations and data accessibility, rather than technology or cost barriers.

According to the World Bank, "as of late 2013, rates of mobile phone penetration stood at 96% globally (128% in developed countries)"[2]. The World Bank discussed the superiority of mobile phone based data over previous methods, noting:

- the speed of collection and transmission;
- high levels of accuracy;
- ubiquity, familiarity and convenience;
- unobtrusive nature of collection;
- low power requirements;
- ability to combine with other data; and
- low cost.

While a growing number of industries are beginning to make greater use of mass data, we have not yet tapped into this resource in a meaningful way in the transport space.

CASE STUDY 1: VICTORIA'S SMART ELECTRICITY METERS SWITCH ON CONSUMERS

Victoria's smart electricity meters record electricity consumption on a periodic basis and communicate this information back to the utility and the customer (Figure 1 shows a typical smart meter).

While the roll out of the smart meters was imperfectly executed, they do provide customers and utilities with new opportunities to make choices about how households consume electricity – and provides operators with much more detailed utilisation data across the day.

With smart meters, Victorian consumers have new options to use flexible pricing plans for their electricity and to make smarter choices about when they consume electricity, and when they do not (see figure 2).

Like transport, electricity networks have a finite capacity at any given time. In the past, consumers have had to swallow the cost of electricity grids built to withstand very short periods of exceptionally high demand – for example, from air conditioning on the few hottest days each year.

The smart meters give consumers choice – but also make the costs of those choices explicit through higher prices in peak periods and lower prices in low demand periods of the day.

As with other sectors, this ability to price signal in periods of very high, or very low demand means that the network can be optimised and the costs of new infrastructure delayed or avoided – keeping prices lower overall.

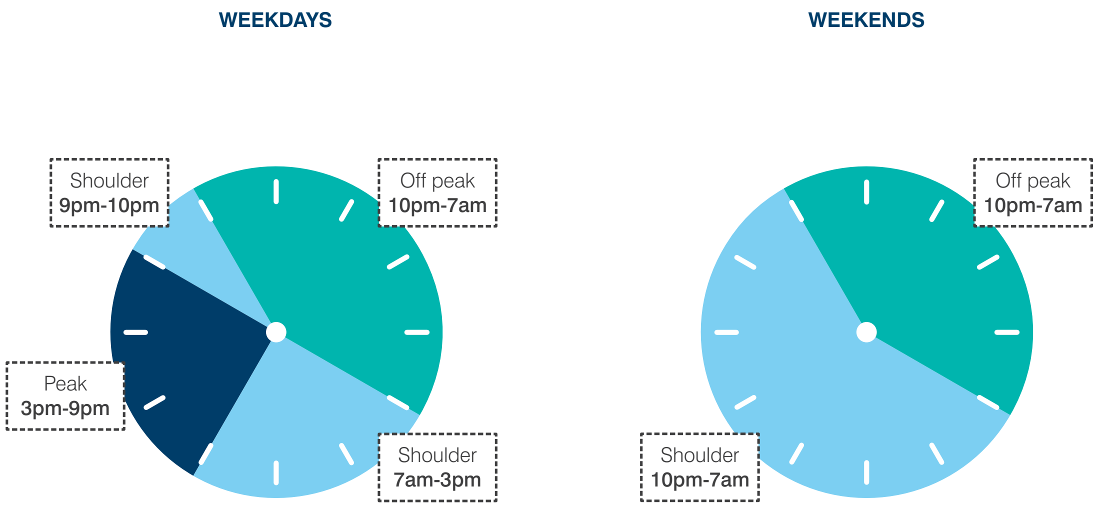
While the Victorian smart meters roll out suffered from implementation issues and came at a cost to the consumer (largely due to the installation costs), the principles of better choice, greater transparency and optimisation of the network were sound.

2. The World Bank, 2014

CASE STUDY 1: VICTORIA'S SMART ELECTRICITY METERS SWITCH ON CONSUMERS (CONTINUED)

Figure 1: Smart Meter

Figure 2: Flexible Pricing Plans



Peak: The price of electricity is higher during the 'peak', typically on weekday afternoons and evenings, when the demand for electricity is the highest.

Shoulder: The price of electricity is lower than the peak rate and higher than the off-peak rate, when there is a reduced demand for electricity.

Off-peak: The price of electricity is lowest, when the demand for electricity is the lowest.

Source: Department of Economic Development, Jobs, Transport and Resources

PART 2:
IS IT TIME FOR MEASURED IMPROVEMENT?

While transport is a dinner table conversation and transport congestion a 'BBQ stopper' in Australia's major cities, we actually collect limited data about where and when we use the road network.

This section uses a number of case studies to illustrate how governments currently measure different aspects of the transport task – and considers the benefits and limitations of these methods.

This is not a criticism of transport agencies, Australia's governments or any one of these methodologies. Indeed, some of these offer valuable insights into particular aspects of the transport network. Rather, this section seeks to show how the rapid adoption of new technologies can provide a deeper, wider picture of the transport system – complementing traditional data sources and approaches.

New enabling technologies offer opportunities to collect data and information about network performance that is consistent, cost effective and allow modern management approaches; in turn, improving understanding of key problems – and facilitating the best solutions.

CASE STUDY 2: NSW RMS ROADS REPORT – POWERFUL, BUT RIGID

The NSW Government recently overhauled its monitoring and evaluation programme under the NSW 2021 Premier's Priorities initiative. As part of this initiative, the NSW Roads and Maritime Services (RMS) has made significant improvements to the way it records, measures and reports traffic information on 124 key routes across the state.

The Roads Report released by the RMS now provides a useful study of traffic patterns on these major roadways, measuring traffic volumes and average travel speeds. Figure 3 below shows a sample report on Parramatta Road, west of Sydney's CBD.

The Roads Report provides data across different date ranges and time periods of the day and week, offering a useful study of traffic patterns and meaningful analysis of how traffic volumes and speeds are changing over time.

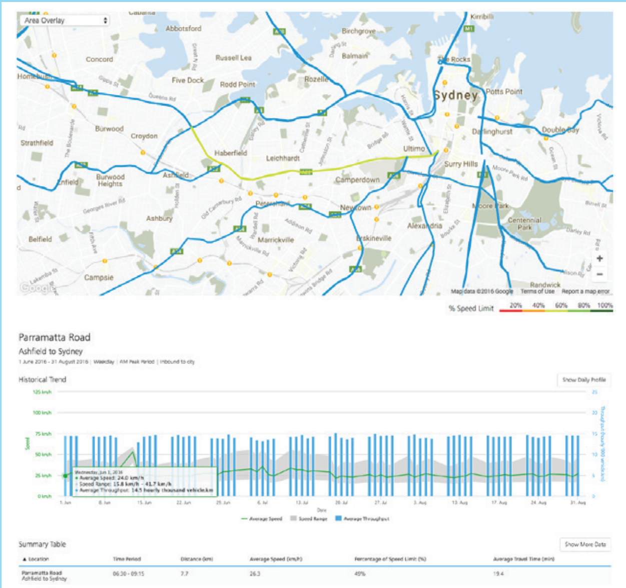
The data is collected via approximately 600 permanent roadside device stations which continuously gather traffic information 365 days per year. There are also numerous sample roadside collection device stations, which collect information on a short term basis, usually over a two week period.

The earliest available data is September 2013, meaning approximately three years of data is available and providing the basis for some historical analysis.

While the Roads Report marks a significant improvement on many traditional monitoring frameworks, there are some limitations due to the nature of the collection methodology, in particular:

- the route-specific nature of data – coverage is limited to specific routes and does not provide a comprehensive picture of the overall network. This means changes in traffic flows on roads and intersections surrounding the 124 major highways are not measured.
- the inflexibility of collection – once routes are selected and the physical infrastructure installed to collect data, altering the routes where data is gathered becomes more difficult, due to the costs and time associated with installation. Additionally, the cost of maintenance on the collection devices and their potential exposure to tampering can hinder the data collection process.

Figure 3: RMS Roads Report – Parramatta Road June – Aug 2016



Source: NSW Roads and Maritime Services

CASE STUDY 3: HOUSEHOLD TRAVEL SURVEY DATA

In recognising the limitations of point to point traffic measurements, Transport for NSW conducts a Household Travel Survey every year, aimed at understanding travel demand and driver behaviours.

The Household Travel Survey targets around 3,000 to 3,500 randomly selected households across Sydney's Greater Metropolitan Area, which includes the Sydney Greater Capital City Statistical Area, and the Illawarra and Lower Hunter regions[3].

Data is collected via face-to-face interviews – with staff questioning each householder on the details of trips made in a 24-hour period. Socio-demographic information is also collected.

The Household Travel Survey overcomes many of the shortcomings of point to point measurement, by providing information based on real journeys and travel choices. For example participants are questioned on the number of journeys they make over a period, the length of these journeys, and the time taken to complete the journeys. They are also questioned on the purpose of their travel and mode of travel, incorporating elements of public transport journeys.

The data is available on Transport for NSW's website. Figure 4 shows some of key transport indicators for the latest set of data from the Household Travel Survey.

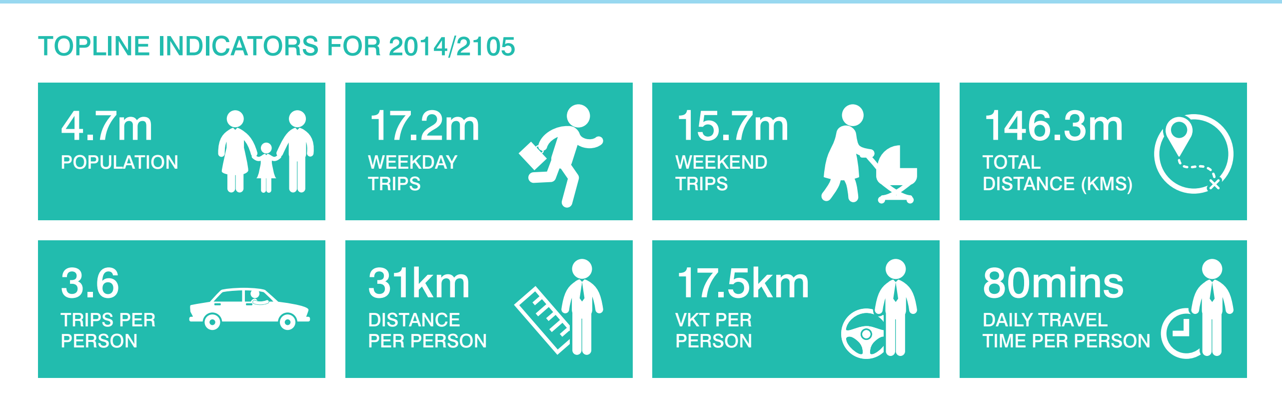
While the information presented is agglomerated across the study area, it is also possible to break the information into more specific regions or demographic groups, allowing analysis of particular trends.

The Household Travel Survey offers transport planners and network managers a clearer picture of the transport demand profile that would be difficult to ascertain by other methods, in particular understanding people's travel choices and the way in which they go about making these choices.

However, being survey based, there are some limitations to the collection process and data series, namely:

» coverage – with only 3,000 households interviewed each year, the coverage of the Household Travel Survey is very limited. While the data is statistically valid and can be used to draw general trends, it is, by nature based on extrapolation. It is also difficult to delve deeper into particular locations or demographics as this would reduce the sample size and validity of the data.
» time delay in analysis – given the volume of data collected, analysis and publication of results can often be delayed.
» time and cost of collection – surveys are costly and time consuming to undertake, requiring significant interaction with the surveyor and effort by the participant.

Figure 4: Key Transport Indicators



Source: Transport for NSW

3. Transport for NSW 2016

CASE STUDY 4: BUREAU OF INFRASTRUCTURE, TRANSPORT AND REGIONAL ECONOMICS (BITRE) COST OF CONGESTION

BITRE provides data on the economic cost of congestion across Australian cities. The data is used in identifying long-term trends in urban traffic growth and estimating the consequent impacts of that traffic growth on the road network.

BITRE's data is a significant step forward from the previous similar measures as it provides a quantification of the economic and social costs arising from congestion and delay – it is the first consideration of how to represent these costs in monetary terms, providing an indication of the fiscal impact of congestion.

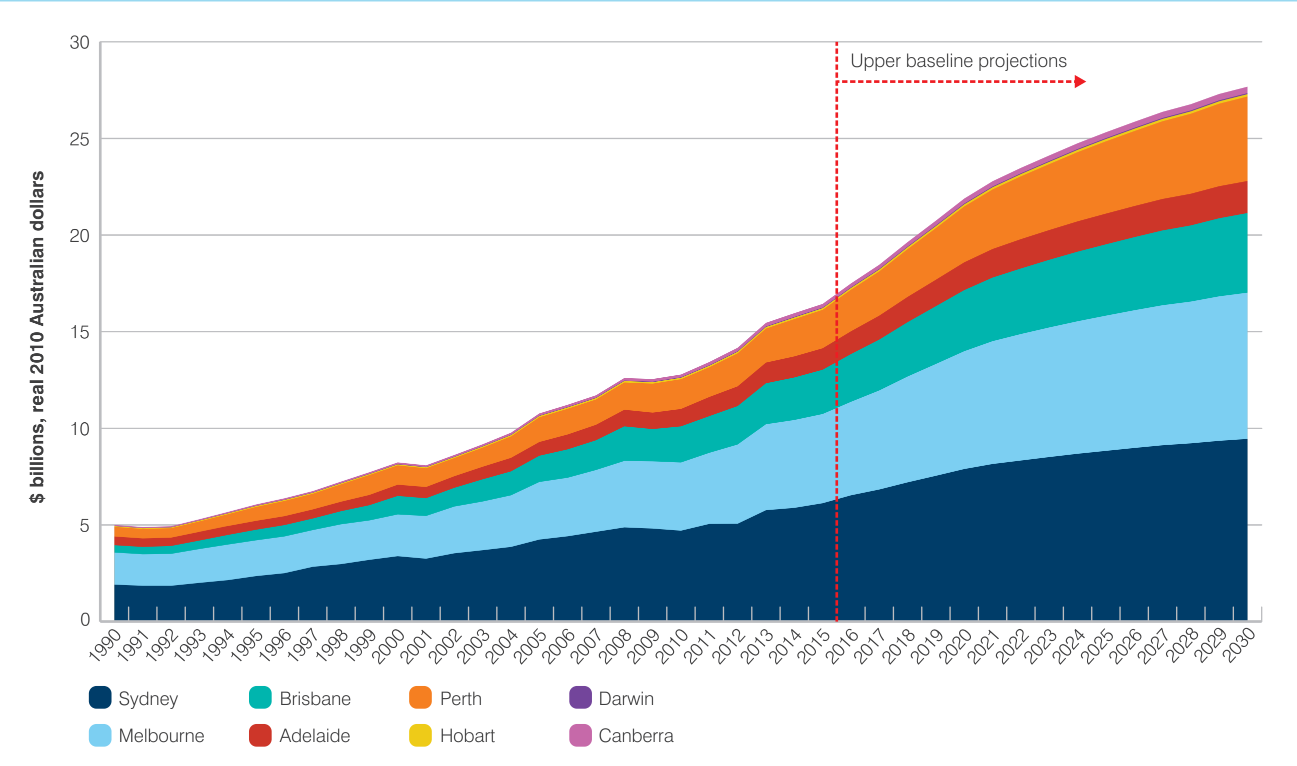
It remains the 'stock standard' measure when talking about the cost of congestion and is a regular feature in headlines across the country.

Figure 5 shows a summary of congestion costs from the latest BITRE update.

In addition to the cost of congestion, other information provided by BITRE's data sets include:

» total vehicle kilometres travelled, current and projected;
» vehicle kilometres travelled by vehicle type, current and projected; and
» vehicle delay costs, by time of day and vehicle type.

Figure 5: Projections of avoidable social costs of congestion, by city



Source: Bureau of Infrastructure, Transport and Regional Economics

CASE STUDY 4: BITRE COST OF CONGESTION (CONTINUED)

BITRE's data offers a useful tool for determining the total cost and impact of traffic flows on a city's transport network and highlights the cost of "do-nothing" scenarios as the network changes into the future.

However, there are some short-comings of this information, including:

- measurement is not regular – while updated periodically (2007 and 2015), there is no regularity to this measurement, highlighting the lack of routine performance measuring across this key economic determinant.
- agglomeration of data – the data is available only for each city as a whole and does not point to specific areas within that city where infrastructure is required or where congestion is worse, limiting its usage for investment decision making.
- esoteric nature of information – while useful for economists and bureaucrats, an economic cost of congestion is not a measure that is easily relatable for the lay person, diminishing its value in demonstration of the problem.
- assumptions required – a significant number of assumptions are required to undertake the calculation, particularly around the forecasting of travel patterns into the future – that is, the travel that is used in the calculations is not representative of 'actual' travel, but a collection of assumptions and extrapolations.

How does this affect our understanding of the network?

The above case studies show that while current measures of the transport network each have a role in examining travel patterns and driver demand, they are not without limitations and drawbacks – including the reliance on physical instruments, the limited coverage of the network and the inconsistent and intermittent nature of collection.

These limitations and drawbacks impact on our understanding of the transport network on the whole, and affects our ability to plan and implement progressive policies.

Compounding this is the ever-evolving nature of Australia's transport network. With the delivery of significant transport infrastructure projects such as Melbourne Metro, WestConnex and the Level Crossing Removals Project underway, the nature of travel in Australia's cities is set to continue to change.

New technologies provide an opportunity to capture this change and enhance our understanding of the network overall. They offer the chance to supplement the data currently collected and the information produced from this data. This improved understanding supports better decisions around future investment, network management and project

3. Transport for NSW 2016

PART 3:
THE IPA TRANSPORT METRIC

Infrastructure Partnerships Australia and Uber have formed a partnership, which will provide Australia's governments, transport policy makers and the community itself with a new tool, measuring mobility indicators in our four largest cities: Sydney, Melbourne, Brisbane and Perth.

Called the IPA Transport Metric, this new measurement will provide the nation's first detailed picture of how well the road network is performing in different zones, across each city over time.

In this way, the IPA Transport Metric will use standardised measures and deliver a time-series, measuring our success in improving transport mobility as each of these cities grow and change.

Importantly, the IPA Transport Metric will include a Travel Time Index – which uses standardised measures to benchmark the performance of each city's network – allowing cross-jurisdictional comparisons to be made.

HOW IS THE DATA COLLECTED?

The IPA Transport Metric captures data from Uber trips, through which a network of data is collected. Each Uber trip is a mobile collection point for key traffic metrics such as travel times. This use of on-vehicle measurement systems will provide a wider, more detailed and granular picture of how the use of our cities' transport systems evolves over time.

Uber has 42,000 active driver partners, across Australia, showing the width and scope of data that informs the IPA Transport Metric.

Number of current driver partners

14,000	14,000	5,000	5,000
SYDNEY	MELBOURNE	BRISBANE	PERTH

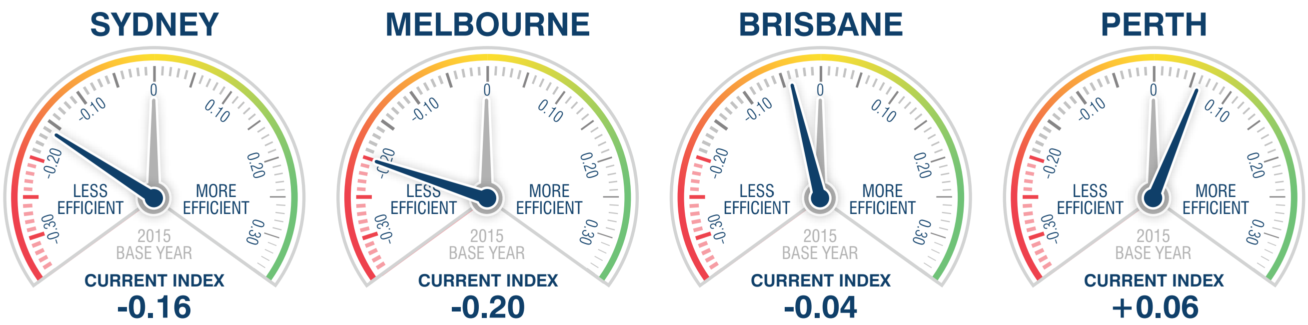
Note: Uber also operates in Adelaide, Canberra, Geelong, Gold Coast and on the Sunshine Coast but these cities are currently beyond the scope of the IPA Transport Metric.

PRESENTING THE TRAVEL TIME INDEX AND MELBOURNE'S DASHBOARD

Travel Time Index

The Travel Time Index uses Uber journey times data to measure whether a city's transport network is becoming more or less efficient.

Travel Time Index 2016 Q2

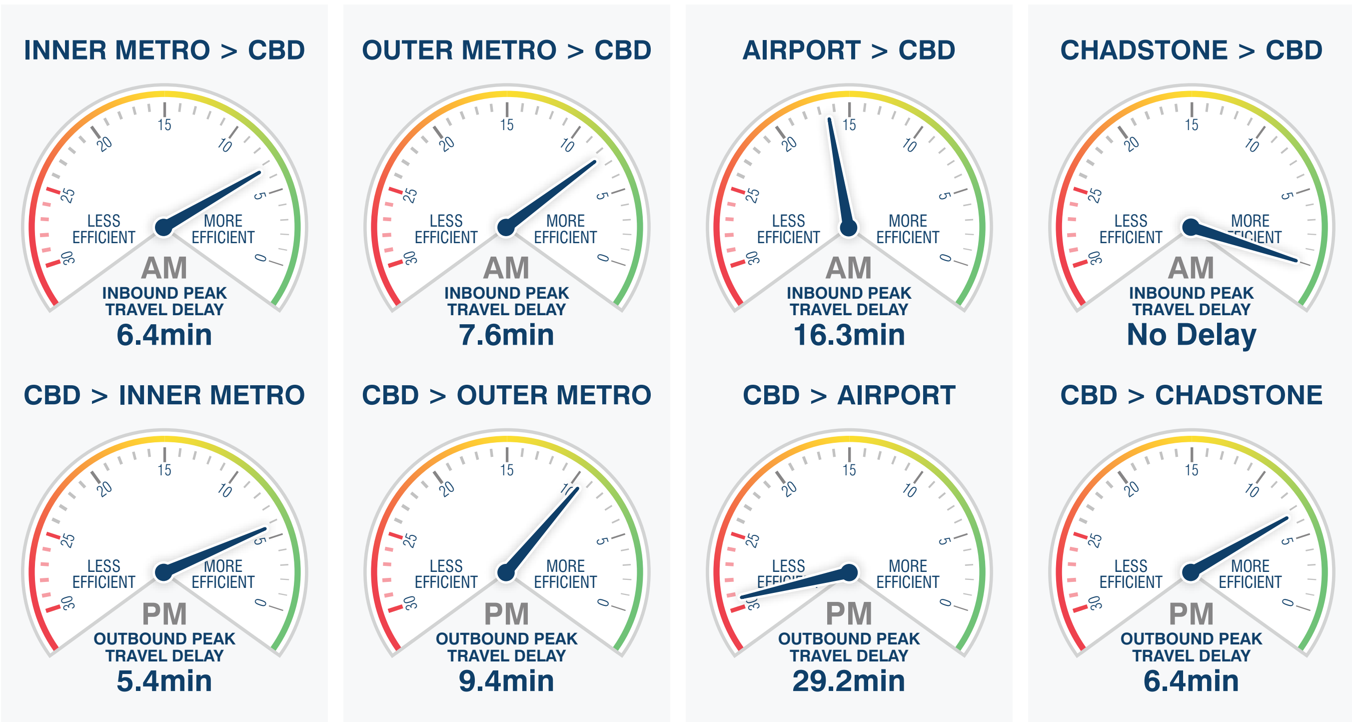


some Brisbane and Perth data have been based on annual averages.

MELBOURNE'S DASHBOARD

Melbourne's dashboard shows the travel delay on a number of key routes in the city, measuring the differences in travel times between peak time and off peak journeys.

Melbourne's Dashboard 2016 Q2



What is being measured?

As shown in the results above, the IPA Transport Metric includes measures of:

- travel times into and out of each CBD;
- travel times between key points on the network e.g. CBD to airport;
- travel times between the CBD and select urban commercial centres;
- the variation in travel times over time; and
- the difference in travel times between peak and off-peak periods.

The IPA Transport Metric presents these measures for each city individually, but through the Travel Time Index – it also allows comparisons to be made between cities, and over time.

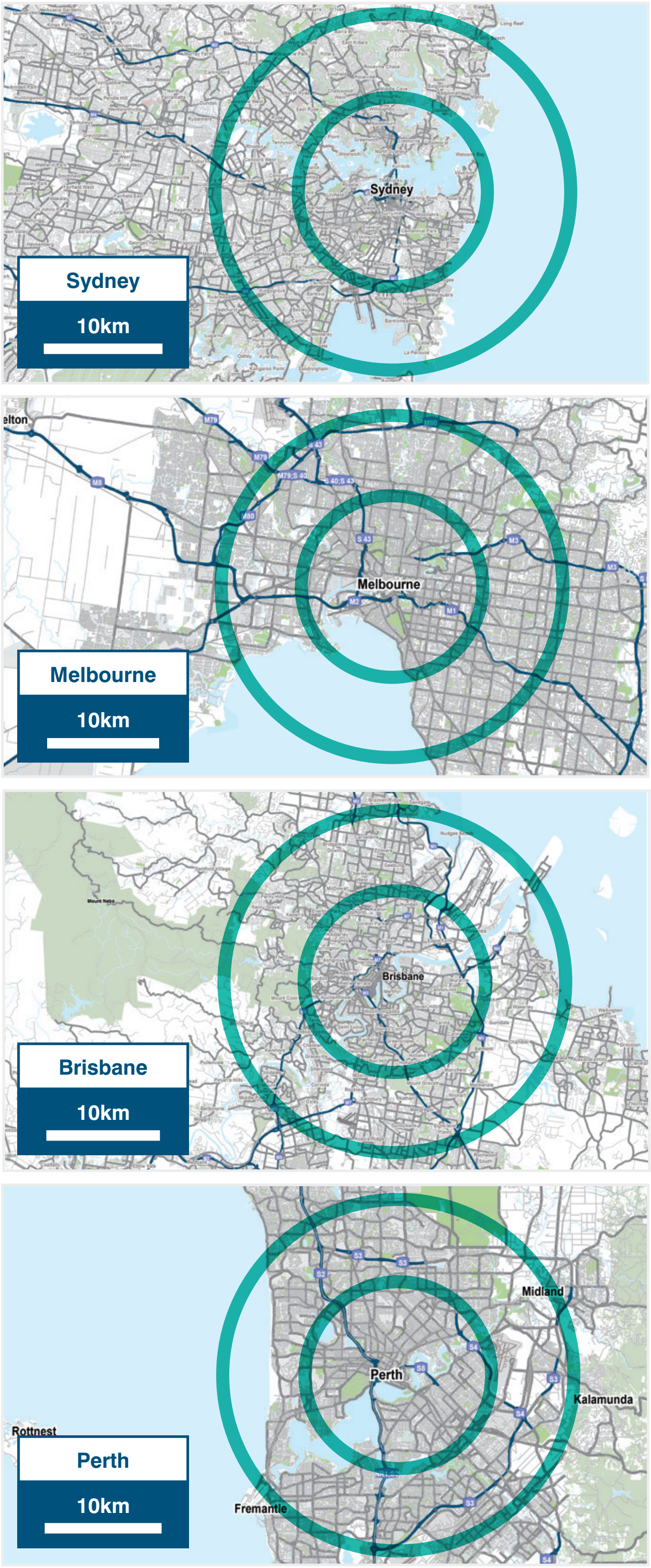
THE TRAVEL TIME INDEX

The IPA Transport Metric is headlined by a new "Travel Time Index" – a standardised figure and indicator of the city's overall level of mobility, indexed against the 2015 base year. The index is an aggregate figure representing the degree of variance in journey times on the city's transport network; that is, comparing journey times experienced during peak periods to what would be expected under free flowing conditions. The closer journey times experienced by motorists are to journey times under free flowing conditions, the better the city will score in this measure.

As a time series, the Travel Time Index will track how each city measures up over time, with an increase representing improving conditions and vice versa.

Being a standardised measure, the Travel Time Index also allows cross jurisdictional comparisons to be made, showing how travel characteristics are changing in each state.

Figure 6: IPA Transport Metric: Travel Zones

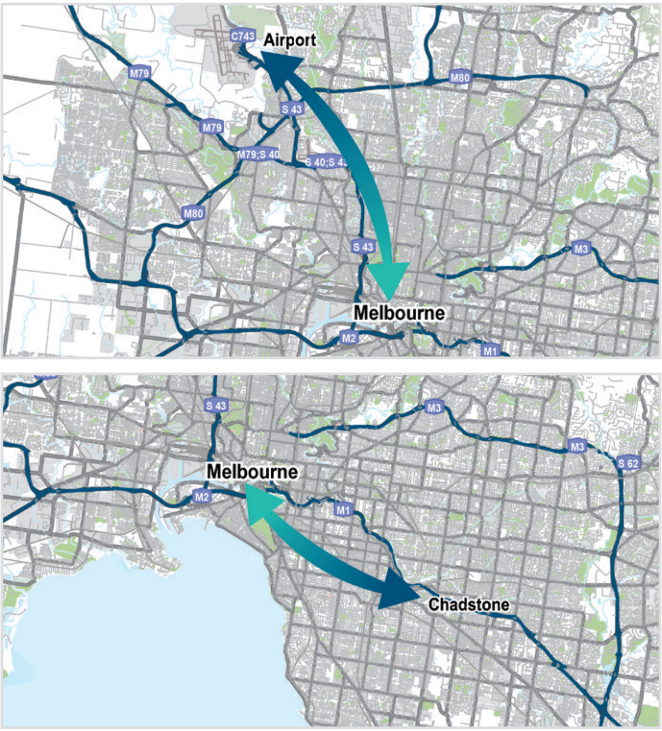


POINT TO POINT MEASURES

Another major advantage to Uber's data series is the ability to measure travel times and delays between any two points on the network.

The IPA Transport Metric will highlight and present such measures for a number of key corridors and journeys in each city, for example CBD to airport and CBD to commercial centres (such as Parramatta and Chadstone). As a time series, the metric will be able to track how travel times and delays on these key routes change over time.

Figure 7: IPA Transport Metric: Point to Point Corridors



Why is the IPA Transport Metric different?

The IPA Transport Metric is different to existing tools because it measures real journeys, using on-vehicle technology, rather than fixed collection points on particular roads. This provides a much more detailed picture of actual use and actual choice, across the whole suburban road system – not just a few key motorways.

For example, traditional approaches to understand use on a motorway would be limited to capturing traffic data between two points on that motorway. The IPA Transport Metric instead uses data from across thousands of vehicle journeys, across the entire road network.

The IPA Transport Metric will also be more relatable to the community, because it is expressed in the decline or improvement in journey times – rather than in less easily understood measures of lost economic and social productivity.

"Your journey to work will be x minutes longer" is much more personal to a commuter than arguing that "congestion cost Melbourne y billion dollars last year".

Of course, the IPA Transport Metric is also different because it applies consistent methods across different jurisdictions – making relative progress by each jurisdiction visible.

For policymakers, the IPA Transport Metric also has appealingly low costs to establish, or operate. Because it uses data that is already collected, albeit for another purpose, the only cost has been locating the data source – and reaching agreement about its utilisation for another purpose – in this case, the IPA Transport Metric.

Because the IPA Transport Metric is a time series, it will also provide a powerful historical data set – allowing transport policymakers and others to see shifts over time – an important indicator of how capacity and regulation have each impacted driver behaviour and network performance.

For example if in 2025, VicRoads wished to examine travel times and delays for journeys between the Melbourne CBD and Melbourne Airport over the last five years, the relevant data could be drawn from Uber's database, and analysed, aggregated and used, as required.

What does the new IPA Transport Metric tell us?

The IPA Transport Metric marks Australia's first comprehensive, regular measurement of how the road system is performing, over time. It complements existing survey and point to point measurement by transport agencies and others – because it provides a long-term and detailed picture of overall system-wide performance.

By using Uber's existing information (discussed earlier in this section), the IPA Transport Metric provides a performance dashboard city by city, but

also uses a standardised methodology across each jurisdiction – allowing transparent, 'apples to apples' comparison between cities, and over time, through the Travel Time Index.

In this way, the IPA Transport Metric is unique – and demonstrates the powerful new tools that are available through existing technology and data that is already collected.

For motorists and network users, the Metric will show them how much additional time they save or spend in traffic – and how that has changed over time.

We hope that this will make the problems and opportunities more explicit, relatable and personal to the community, compared to economic measures of economy-wide costs.

Meanwhile, the Travel Time Index within the Metric will show relative performance of each city, benchmarked against the others.

Ideally, this will create a stronger incentive for transport policy to focus on important and meaningful policy reforms and good project investments, over the long term.

The data underpinning the IPA Transport Metric could scenario test new projects and policies – and measure their real-world impacts post implementation.

While the IPA Transport Metric can provide valuable insights about changing travel conditions over time, the data which underlies the IPA Transport Metric has the potential to be applied toward a broad range of planning and policy purposes.

The real-world journey and performance information gives detailed information about where problems exist in the network. Well harnessed, this could allow the range of policy and project options to be scenario-tested using a real-world model.

The data would improve transport decision making by:

» identifying problematic areas on the network;
» highlighting trends in commuter period travel conditions ; and
» allowing the use of well-defined historical data to understand future demand based on precedent trends and/or events.

Importantly, the data also allows for a more transparent assessment of how well they have been achieved, post execution – and at a relatively low cost compared to existing approaches.

For example, the Victorian Government could use Uber's underlying data to assess whether the Western Distributor motorway meets the expected travel time savings and other benefits, after it is built. Currently, this type of 'ex post' analysis is rarely done, and limited by existing methodologies, which cannot measure flow-on impacts on the network, such as the effect on feeder roads, parallel routes, major on-ramps and intersections.

Taking Melbourne's proposed Western Distributor example, data can be used to assess the project's impact on travel times of journeys that:

» pass through the entire route (between West Gate Freeway and West Melbourne);
» pass through sections of the route (between West Gate Freeway and Swanson Dock); or
» intersect the route (between Newport and Yarraville)

As these measures are based on real journeys, they provide a comprehensive assessment of how the new road affects entire trips and the broader network, as opposed to only measuring the "travel time savings" along the upgraded Freeway itself.

THE LAST MILE AND HOW DATA CAN AIDE POLICY DEVELOPMENT

The Transport Metric and Uber's underlying data capabilities can help expand the evidence base needed to support new policy reforms to help improve existing networks as well as plan ahead for the future.

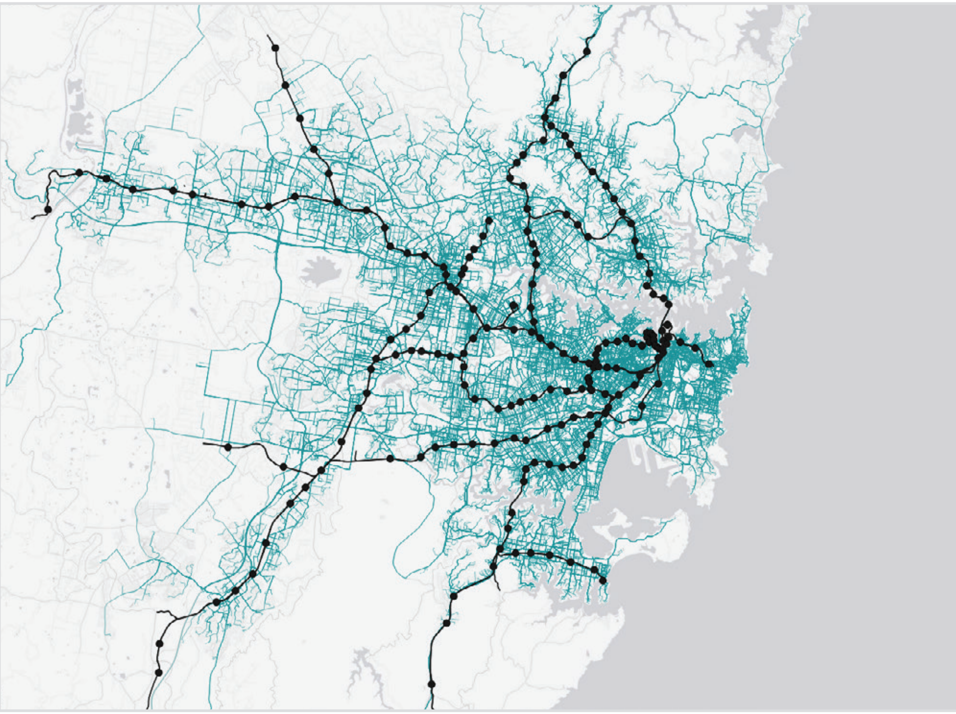
The practical applications of detailed and fine-grained travel time information extend to policies and initiatives that impact public, private, as well as active modes of transportation.

In this context, Governments can have a standardised and extensive data resource to look to when developing policies that help facilitate the more effective use of both public and private transport infrastructure (both roads, public transports and vehicles). For example, road travel times can help determine the effect of enabling infrastructure, such as new bike lanes, walkways and expansion in public transport options.

Figure 8 - Western Distributor Route

Source: Transurban

Figure 9: Uber Trips across Sydney



UBER EXTENDS EXISTING PUBLIC TRANSPORTATION IN SYDNEY

Lines represent Uber trips that began or ended near rail stations

- **Rail station**
- **Uber trips**

Data from the city of Sydney between August 1 and August 7 2016. Completed trips only.

Source: Uber

A recent study by the New York City Department of Transportation – Green Light for Midtown Evaluation Report[4], highlights the travel time improvements experienced through the expansion of pedestrian amenities in a dense metropolitan area in midtown New York. Considering the improvements made to the Sydney CBD area with additional pedestrian amenities coupled with the introduction of light rail, the underlying data presented in this paper could help determine improvements and changes in travel time in the Sydney CBD once these works are completed.

Cities around the world are also adopting Complete Streets and similar policies to work toward the design, operation, and maintenance of streets that are not only safe and convenient for a wide range of users, but also environmentally friendly. Up-to-date travel speed data can aid cities in identifying priority streets and measuring the impacts of Complete Streets, traffic calming, and similar policies.

The underlying travel time data presented in this paper can also help inform Governments on travelling behaviour and the impact of mode shifts from road to public transport on travel conditions.

A recent report from American Public Transportation Association – Shared Mobility and the Transformation of Public Transport[5] confirmed that people who routinely use "shared modes" of transportation (e.g. bikesharing, carsharing, and ridesharing) were more likely to use public transport. These individuals were less likely to drive, more likely to walk, and saved more on overall transportation costs.

The report also found that people who use ride-sharing in conjunction with mass transit are more likely to forgo car ownership.

Put simply, ridesharing complements public transport, and can help enhance urban mobility by helping to bridge public transit gaps and expand Australia's public transport systems. In Sydney, Melbourne, Brisbane and Perth, we are already starting to see this happen.

If Governments can better understand the constraints of the road networks at any point in time, proactive policies could be considered to help shift people onto other transport modes (public transport) in a more effective way.

4. New York City Department of Transport 2010
5. American Public Transportation Association

CONCLUSION

Data is key to gaining a good understanding of our transport networks, and forms the basis of achieving the long-stated ambition of evidence-based decision making.

The IPA Transport Metric is our contribution to the national transport policy debate – and shows the powerful information that is available to us, if we know why and where we need to look.

Our Metric is a relatively simple, but very powerful, new transport tool because it measures actual performance across each of our four major cities – and also, because it measures the relative performance between each jurisdiction, over time.

More broadly, we hope that this paper demonstrates the opportunities that already exist – at very low monetary cost – to improve the public understanding of transport problems – and to improve the effectiveness of our responses to these, over time.

REFERENCES

American Public Transportation Association 2016, *Shared Mobility and the Transformation of Public Transport*, retrieved < http://www.apta.com/resources/reportsandpublications/Documents/APTA-Shared-Mobility.pdf>

Bureau of Infrastructure, Transport and Regional Economics 2015, *Traffic and Congestion Cost Trends for Australian Capital Cities – Information Sheet 74*, Department of Infrastructure and Regional Development, retrieved <https://bitre.gov.au/publications/2015/files/is_074.pdf>

Department of Economic Development, Jobs, Transport and Resources, How Flexible Pricing Works, Victorian Government, retrieved < http://www.smartmeters.vic.gov.au/flexible-pricing>

Department of Prime Minister and Cabinet 2016, *Smart Cities Plan*, Dept. of Prime Minister and Cabinet, Canberra

Energy Australia, *Smart Meters FAQs,* retrieved <https://www.energyaustralia.com.au/faqs/residential/smart-meters>

New York City Department of Transport 2010, Green Light for Midtown Evaluation Report, City of New York, retrieved <http://www.nyc.gov/html/dot/downloads/pdf/broadway_report_final2010_web.pdf>

Roads and Maritime Authority, *RMS Roads Report*, NSW Government, retrieved <http://roadsreport.rms.nsw.gov.au/#/chart?location=76&dateStart=2016-06-01&dateEnd=2016-08-31&peak=AM&type=period-plot>

Transport for NSW, *Household Travel Survey*, NSW Government, retrieved <http://www.bts.nsw.gov.au/Statistics/Household-Travel-Survey/default.aspx#top>

M. Trucano, *Using mobile phones in data collection: Opportunities, issues and challenges*, The World Bank, retrieved <http://blogs.worldbank.org/edutech/using-mobile-phones-data-collection-opportunities-issues-and-challenges>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