



THE UNIVERSITY OF
SYDNEY

John Grill Centre
for Project
Leadership

Shifting Australia's Infrastructure Mindset to the long game

Policy Outlook Paper No. 2

Authored by Garry Bowditch
in collaboration with Gordon Noble
and Glenn Maguire

**Better
Infrastructure
Initiative**

Leadership
Partner



Contents

Executive summary	2
Recommendations	4
Chapter 1	
Movers and shifters in infrastructure	7
- Megatrend 1: The inflation of expectations	11
- Megatrend 2: Blurring boundaries	12
- Megatrend 3: Risking innovation	14
Chapter 2	
Infrastructure governance practices: a customer's friend or foe?	16
Chapter 3	
Shifting the mindset: play for the long game	28
Final remarks	40
Appendices	42
End notes	44
Authors	45

Acknowledgements

In developing this paper many colleagues and stakeholders have made thoughtful observations and comments that have greatly benefited the final product. I wish to thank all those that have contributed in this way, and in particular colleagues at the John Grill Centre.

I would like to thank Les Hosking, John Gardiner and Dr Tom Parry for their review of earlier drafts along with Leanne Gordon and Jack McAuley.

Of course, the responsibility for views expressed and the accuracy of the content of this paper remains with the authors.

Garry Bowditch

Welcome

It is a pleasure to present the second policy outlook paper from the Better Infrastructure Initiative, at the John Grill Centre for Project Leadership.



Garry Bowditch

Executive Director,
Better Infrastructure Initiative

This policy outlook paper series is part of the Leadership Partner Program with the National Australia Bank. The partnership aims to challenge the nation and infrastructure stakeholders towards a new reform agenda centred on customer led infrastructure.

Australia has much to gain from critical thinking and questioning the status quo in respect of its infrastructure. Shifting the mindset that infrastructure is predominantly about delivering services to customers and community has the potential to be a defining moment for Australia.

Enhanced productivity and liveability are the expected dividends of infrastructure spending, but these will continue to be elusive until fundamental reforms are acted upon.

This is the core purpose of the Better Infrastructure Initiative. I welcome comments on this paper and suggestions for new themes and issues for our thought leadership.

The Better Infrastructure Initiative is guided by 10 key propositions:

1. Better infrastructure requires better long-term planning.
2. All infrastructure interventions should be scaled, targeted and feasible.
3. The biggest impediment to better infrastructure is lack of transparency.
4. Infrastructure businesses are better than infrastructure projects.
5. Land-use planning and infrastructure planning are the same thing.
6. Good project selection is paramount; financing is secondary.
7. Infrastructure is primarily about service outcomes to people and business.
8. Risk is a catalyst for more innovation.
9. Better infrastructure relies on strong institutional memory.
10. Leadership matters.

Executive summary

Infrastructure is an essential and consistent ingredient in the alchemy of growth, prosperity and social progress across human history.

The sector has always had to deal with the short-term politics of the day, and the long-term welfare of the community the infrastructure will serve. Resolving these inevitable tensions transparently and holistically is a true litmus test of what separates good governance of society from the rest.

An enduring trend in infrastructure since ancient Greece through to the modern age consists of a cocktail of three important and inter-related themes. First, it is clear that private ingenuity from individuals, community and more recently corporations are key drivers of progress. Second, enthusiastic political interests are persistently in close proximity. Thirdly, transparency and accountability are critical companions to help illuminate and protect against poor decision-making.

Apart from the obvious impact of ‘pork barrelling’ where political expediency can result in sponsoring the wrong projects, at the wrong time and place, there is also a deeper and more systemic factor at play concerning the choices a society can make about its possible futures. Building big and solid infrastructure may have its place, but flexibility of function and being fit for purpose over its long economic life is fundamental to its continued relevance and value to society.

Yet governments and their institutions that are entrusted with the custodianship of planning and managing infrastructure are less often associated with championing agility and flexibility. The willingness to acknowledge and deal with high uncertainty and its consequences in the future is an area of focus in this report.

This Policy Outlook Paper No. 2, *Shifting Australia's Infrastructure Mindset to the long game* builds on the importance of customer-led infrastructure as a catalyst for purposeful and disciplined investment in new assets and networks, along with enhancement of the existing ones. These issues were examined in the

Better Infrastructure Initiative paper, *Re-establishing Australia's Global Infrastructure Leadership*.

Chapter 1 sets out the case that Australia has good foundations on which to make further reforms that can prepare the nation for the considerable challenges and uncertainties before it. Population growth and demographic changes alone are major reasons why Australia must extract more for every infrastructure dollar expended. It argues that reform can be more purposeful when there is a strong institutional memory of past successes and failures to inform future policy design and project management. The chapter concludes with three megatrends that are expected to fundamentally shape Australia's infrastructure future in the coming decades.

Current infrastructure governance practices with a special focus on land transport are critiqued in Chapter 2. Engaging with, and enabling innovation, adaptability and customer-led services through governance and contractual practices forms the core of this discussion. Land transport remains an area in need of urgent reform so it can catch up with other infrastructure sectors that have had the benefit of extensive reform, such as utilities, telecommunications, air and marine ports.

While recognising the considerable attempt to reform the way governments plan and manage infrastructure, Australia could benefit from adopting a fully corporatised model for arterial roads, similar to Highways England. The NSW Roads and Maritime Services (RMS) road stewardship public-private partnership (PPP) is an example of an important local initiative that provides good foundations for the next tranche of reform.

Chapter 2 concludes that when customers are bearing more of the economic cost of the infrastructure provision, innovation and adoption of new technologies to better serve customers and to reduce costs would appear to be more likely.

This is borne out in corporatised and privatised infrastructure businesses, but is less evident in land transport PPPs in Australia. PPP contracts can provide high levels of certainty for government and its private partners but at the same time lack sufficient incentive to invest in future customer service outcomes compared with the more dynamic approach of full privatisation.

Chapter 3 argues that infrastructure governance should not lock in societies to second best infrastructure. This is most likely to occur when competition is limited and governance arrangements set by government are inflexible in the face of what the future may bring. Neglect of customer needs and belatedness in adopting new technology undermines the long-term dynamic efficiency of infrastructure assets, and has significant consequences for the performance of adjoining networks.

Australian policy reform experience suggests that entities set up as businesses with the ability to interact with and adjust customer outcomes are better placed for long-term management of infrastructure than some forms of PPPs. The nation has had some success with privatisation, especially where there is price monitoring and regulation that helps facilitate asset owners to interact with their customers. This has created a more disciplined and forward looking investment environment to deal with the uncertainties and challenges of the future. The success of airport privatisation in Australia, now in its 20th year of operation, is discussed in chapter 3 as a timely reminder to governments of what constitutes good reform measures for infrastructure.

The paper concludes that policymakers at all levels of government in Australia should unshackle themselves from out-dated assumptions and notions that infrastructure is just about physical assets, fiscal stimulus and creating short term construction jobs. There is a compelling need for governments to shift their mindset and define future infrastructure challenges in terms of service outcomes and ensure city, state and national network arrangements can work together coherently to meet the changing needs and expectations of customers and community. Future policy reforms in respect of arterial roads are likely to face additional costs and complexity in all east coast capitals of Australia. This is because some motorway PPPs have contractual obligations signed by previous governments decades ago that make it more difficult to introduce much needed network-wide reform like customer service standards, and adoption of technology to help deliver better service outcomes.

Australia's policymakers must reconcile their rhetorical argument that infrastructure is for the long term, with a commitment to ensure governance arrangements can better accommodate change so assets and services can more rapidly adapt to future needs and uncertainties. This is a precondition to ensuring infrastructure is a catalyst for innovation and productivity and not a drag on it.

A rebalancing of infrastructure governance is needed. That is, from short-term technical efficiencies of building and commissioning infrastructure to addressing institutional rigidities that prevents the prompt take-up of new technology and innovation. Innovation must serve as a force for change, adaptation and renewal of the nation's infrastructure, which are necessary for long-term dynamic efficiency to take hold. These are essential foundations for securing Australia's future standards of living.

The community is in need of a nationwide conversation about how privatisation can serve them well and their expectations of current and prospective owners of these important community assets.

Just as governments have a role to play in building the social licence for ongoing asset privatisation and government balance sheet reform, so too do investors. In fact investors are central to the process of deepening the market of opportunities to improve both productivity and community amenity for which infrastructure is core. By consistently demonstrating long-term responsibility and stewardship are at work in every decision of the asset owner is a critical step towards consolidating trust and showing the values and behaviours of these infrastructure markets are worthy of community acceptance.

Historically, societies have always faced uncertainty and change. Successful societies take on these challenges by being flexible and adapting to whatever the future might throw at them. Australia has very good form in this regard, as a small, dynamic and open economy to international trade. It is critical we do not lose these credentials. A first instalment to retaining them is to embrace innovation and let the customer lead the nation in determining the infrastructure assets and services, both big and small, are fit for purpose and ready for the next wave of change.

That is how Australia must prepare for and play the long game.

Recommendations

1. Shifting the mindset

Policymakers adopt an 'active' approach to planning and managing infrastructure.

This requires governments to shift their mindsets and define future infrastructure challenges in terms of services and service outcomes that meet the changing needs and expectations of customers and community.

2. Infrastructure, a catalyst for innovation

All federal, state and local government infrastructure agencies review how to better structure future infrastructure contracts in favour of innovation, customer needs and requirements over the life of the contract/PPP.

3. Strong memory means strong foundations

There is an urgent need to redress a lack of institutional memory in the major successes and failures of previous project and related infrastructure endeavours.

4. Project leadership

Governments and private sector proponents must invest in people with the capability to be world-class project leaders who can deal with the dynamic risks and uncertainties of managing business and defining projects responsibly, transparently and accountably.

5. Highways England model for Australia

The Australian Government should prioritise the reform of federal and state financial arrangements to allow for a customer-focused, corporatised public road agency for each state and territory. Highways England provides an excellent model to guide this reform.

6. Embracing future change

Governments through contractual and administrative arrangements give greater priority to infrastructure being flexible and able to adapt to the customer.

7. Getting more from PPPs

Governments need to ensure future PPP land transport contracts give sufficient incentive to concession holders to adequately develop and adapt assets and services to the changing requirements of customers and adjoining networks.

8. Patronage risk

Governments cease forthwith with new PPP contracts that assign demand risk to a concession holder that does not have the power or capability to manage it. This occurs where the PPP is part of an adjoining network where it has limited or no control over it.

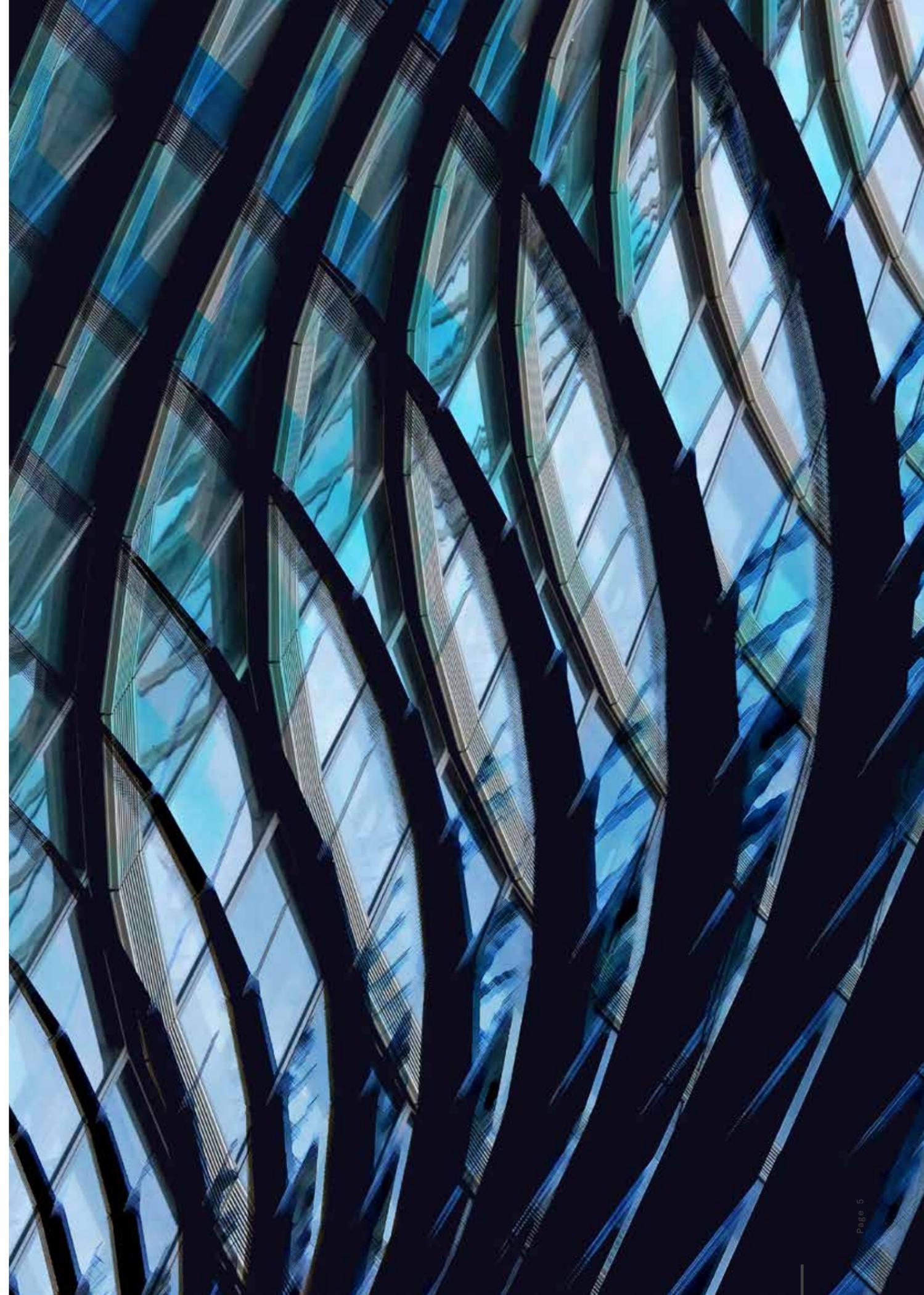
A review of efficient risk allocation practices is required to inform the development of the next generation of PPP contracts.

9. Privatisation, retain as important reform option

Policymakers must understand and propagate the lessons and successes from past privatisation, and in doing so make a more evidence-based case to the community for a stronger role for privatisation of public assets.

10. Investors need to step up

Current and prospective owners of infrastructure assets need to engage the community using their credentials as responsible organisations. For example, they need to be prepared to be proactive through the creation of new standards in transparency and accountability for service standards and customer satisfaction by establishing a voluntary Investor Accountability Protocol.





Chapter 1

Movers and shifters in infrastructure

This chapter presents an overview of some long-term trends in infrastructure. It reviews the big behavioural drivers that may shape infrastructure development in Australia, and interprets what that means for governments to provide infrastructure and the future involvement of private sector capital and expertise.

Introduction

The Australian status quo for infrastructure is similar to the broader Organisation for Economic Co-operation and Development (OECD). It has had the benefit of an enormous legacy of roads, bridges, tunnels, and water energy and gas reticulation systems, along with a rich fabric of social amenities that support the economy.

It is true the bulk of this infrastructure is ageing, and its economic lives are being extended beyond original expectations. But the opportunities to revitalise this infrastructure have never been better, with a globally connected marketplace for design, engineering, technology and construction services. The transfer of technology and human capital between jurisdictions is high and is expected to intensify. Together these forces should assist Australia, and other developed and developing nations, to adapt and repurpose their infrastructure in a timely and purposeful way.

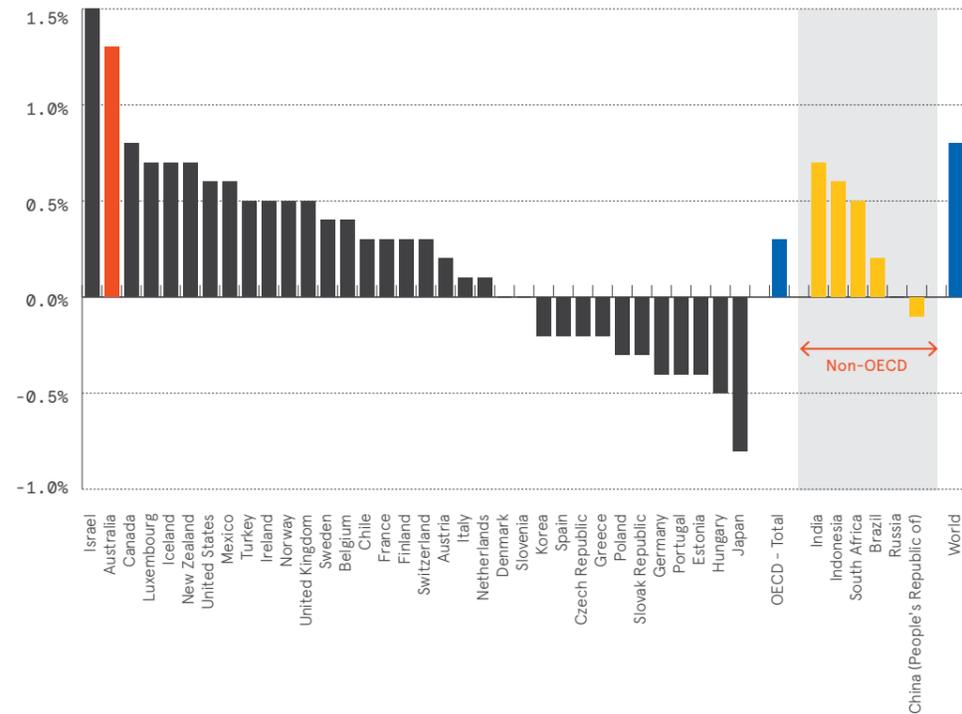
The composition, size and living patterns of societies continue to grow and evolve. Urbanisation is well recognised around the world for the unprecedented impact it is having on the density of settlement and the associated infrastructure needs it is demanding. Australia continues to be one of the most urbanised nations on the planet and the infrastructure agenda for cities needs further enhancements particularly in respect of integrated long term planning of transport and land use, and access to sustainable funding and financing sources.

Australia has a population growth that is more akin to a developing nation, with growth approximately three times that of China (OECD 2016¹). Figures 1 and 2 show that Australia is set to be the second fastest growing OECD nation and that, in absolute terms, Australia is set to increase its population more than any other developed country except the United States, Mexico and Turkey. Coupled with population growth is a dramatic shift in the demographics where aging will see shifts in living patterns and use of infrastructure that will place new and unexpected demands on the system.

A society that is more educated, connected and informed than previous generations is also emerging as an important ingredient to the infrastructure task. Both community and customers that make up the critical mass of stakeholders in infrastructure are more assertive in expressing their expectations of infrastructure. The complexity of planning, delivering and managing infrastructure has become more challenging, and will demand a great deal more of policymakers, project leaders and industry partners.

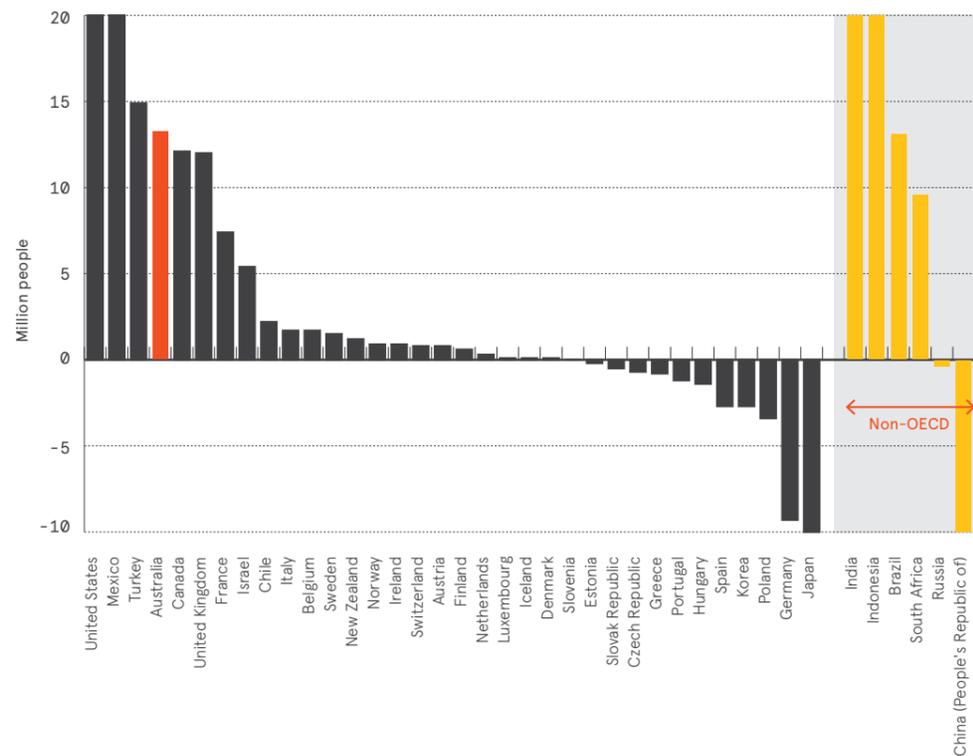
Governments must reassess and see that they too earn their social licence for infrastructure to be developed. Without this, the scope for wastage and risk of discontent is acutely high for all stakeholders.

Figure 1: Projected average annual population growth rate 2016–2050, OECD and selected other countries



Source: Organisation for Economic Co-operation and Development (OECD). 2016. Historical population data and projections (1950–2050)

Figure 2: Projected addition to population by 2050, OECD and selected other countries



Source: Organisation for Economic Co-operation and Development (OECD). 2016. Historical population data and projections (1950–2050)

Sustainability as a word to describe infrastructure is an important and relatively new development in the vernacular of the industry, as is the emergence of resilience. Together they could be attributed to the issues of climate change and other environmental issues, but the community's expectations for more accountability and responsibility for the resultant service outcomes are in play as well. In particular, enhancing productivity through doing more with less, accommodating a society where time and space are scarce and sensitive to disruption and volatility are critical factors in shaping the policy and operating context of the industry. It is also related to the fact that cyber threats are real and significant across every dimension of the infrastructure system.

Australia has a population growth that is more akin to a developing nation, with growth approximately three times that of China

The political economy is also an important and enduring trend maker in the sector. Politics of infrastructure are favouring big and complex, and 'transformative' appears to be a word of choice for politicians in describing infrastructure. This in part reflects the difficulty in getting agreement to build infrastructure, and that bi-partisanship is more likely if the project is big. The preponderance of mega projects to be late and over budget is well documented.² However, less common is the ability for such projects to be responsive to new information and circumstances. This is often inadequate owing to poor project governance standards that could undermine the social licence for both current and future projects.

The next section discusses the importance of retaining a strong institutional memory so that all stakeholders in infrastructure retain a more informed perspective on the size and scope of their current challenges relative to their predecessors. This will be followed by a forward looking assessment of megatrends that are the potential drivers of change expected to shape the infrastructure landscape over the next century.

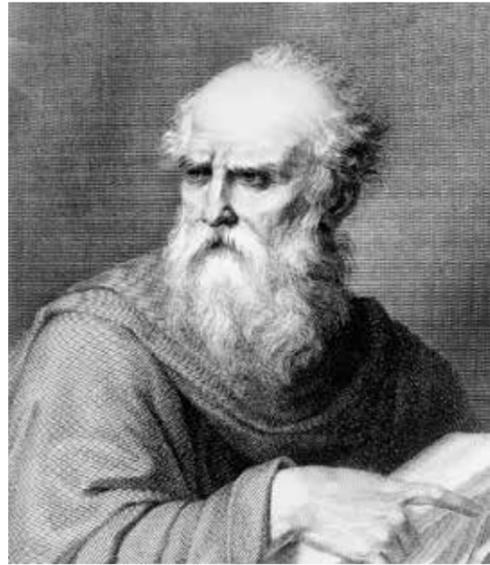
Learning an old lesson again

Infrastructure and human development are synonymous. The waves of innovation that heralded new opportunities for human endeavour and then displaced the old infrastructure are commonplace. But surprisingly, the relationship between economic growth and infrastructure is an area of considerable political and academic debate. Many macroeconomic and microeconomic studies have added to the body of discussion, but have not secured a consensus on its magnitude, causation and timing.³

Infrastructure as a word is relatively new and it continues to attract rich variations in definition. According to Goldsmith⁴, it first appeared in the *Oxford English Dictionary* in 1927, and was more often used in a military context up to about 1960. The *Proceedings of the Institution of Civil Engineers (Great Britain)*, published continuously since 1826, contained the first reference to the term infrastructure in 1933 in connection to ports and public works in India.

While the physical characteristics of an infrastructure asset and its function has been the cornerstone of most descriptions, there have been subtle shifts in describing the services the asset delivers, particularly as private capital is involved and long-term contracts secured. For example, the provision of the actual road is incidental to the fundamental point that the lanes on the road are available, safe and accessible. This has served to be a powerful force for change, when authorities focus on services delivered from the physical asset rather than just building assets.⁵

Despite the technical advancement in infrastructure evident today, much of this has been done in spite of a weak institutional memory. This loss of knowledge from previous infrastructure endeavours, however, is not unique to the modern context. While this is no excuse for permitting a weak institutional memory, it appears that some of the most bold infrastructure endeavours in human history suffered from the same problem.



During the 1st century BC, Marcus **Vitruvius** Pollio, was a Roman author, architect, civil and military engineer. He is commonly known as Vitruvius.

For example, the Roman Empire created a network of roads and townships coupled with communications systems that would stand proud against any modern context. Importantly, the networks were subject to clear asset standards and project governance. These were standardised in the Law of the Twelve Tables in 450 BCE. There was a strong focus on whole-of-life costs, for example roads constructed to a standard to minimise ongoing maintenance costs. The Romans left a well-documented process on the 'how to' of building physical infrastructure.

Vitruvius (70–10 BCE) lamented, however, that the good practices of the past were being forgotten, and that the Romans had completely forgotten the disciplines of the Greeks in controlling the costs of public works. He cited a law in the Greek city of Ephesus that required architects, when entrusted with public works, to lodge a cost estimate with the magistrate. On completion, if the final costs did not exceed the estimate the architect was celebrated with decrees and honours. When the cost exceeded the estimate by no more than a quarter of the original estimate, it was defrayed by the public purse and no punishment inflicted. But when the cost overrun was more than 25 percent, the architect was required to pay the excess out of his own pocket.⁶

A compelling lesson from history is that our societies would be well served by having a strong institutional memory. In the current policy debate in Australia, it is expressed slightly differently as the need for evidence-based policy development and decision-making. However, calls to address this in infrastructure continue to be inadequate and urgent action is required to ensure these principles are applied.⁷

Wrestling with megatrends

A distinguishing characteristic of infrastructure is its relatively long economic life. It therefore has to accommodate the ebb and flow of multiple trends in business and society and their changing needs. In the case of transport such as bridges and tunnels, they can extend well beyond a century, which is also true for water-related assets like dams and reticulation systems. In the case of energy and social infrastructure assets, their economic lives are typically shorter but still last for many decades.

A megatrend, as defined by the Commonwealth Scientific and Industrial Research Organisation (CSIRO), is a major shift in environmental, social and economic conditions that will substantially change the way people live. Megatrends are relevant to contemporary decision making and may prompt a rethink of governance models, business processes and social systems.⁸

It is from this perspective that a study of megatrends can be useful, not for trying to predict the future but for understanding the range of behaviours and forces at work that can shape our economy and society and in turn infrastructure. These megatrends are not intended to be comprehensive nor exhaustive but rather to start a conversation and debate about the drivers of change and their implications.

The ability to fulfil the escalating expectations of infrastructure customers will demand a different approach from policymakers.

Megatrend 1:

The inflation of expectations

The defining characteristics of successful infrastructure in Australia continues to shift because of a combination of factors related to wealth and income levels along with technological advancement and its availability to broader groups of people.

Traditional measures of the quality of a road in early 1900s were dominated by engineering considerations, such as smoothness of the journey, incidence of potholes. This evolved with an expectation of adequate street lighting to ensure safety, and the use of traffic lights at intersections for safety and improved flow by the mid-1950s. Further enhancements continued with design flexibility to enable contra-flows to deal with peak demand and breakdown lanes and breakdown car removal services for clear lanes and regular traffic flow. More recent decades have seen real-time traffic information and measures like HOT (high occupancy transit lanes) on selected roads. Over time the basic road has changed from a piece of bitumen-based infrastructure into a higher level technological, information-based service asset. In doing so, it has graduated into a new class of asset performance that can accommodate time sensitive customers, especially in respect to accessing other transport modes, such as airports, as well as heavily congested areas such as central business districts.

Planning infrastructure for the future will need the design to be flexible enough so it can provide for not only additional capacity, but also the ability to break down traditional concepts of aggregate demand into more refined service outcomes for a variety of customer groups. It will also need to have greater service capacity per unit of physical infrastructure.

Other sectors in the economy are experiencing the complexity of demand, particularly in tourism and retail where the customer is seeking an experience (service) rather than the basic consumption of a product. This is affecting infrastructure in all its different forms, as the following examples show.

- Energy customers are expecting to know the origin of their power supply, and are expressing preferences for access to certain power sources that have attributes of no carbon or less intensive carbon emissions.
- Airports are no longer just concerned with the aeronautical functions of aircraft movement and safety. More contemporary drivers include landside facilities such as parking and shopping, along with airline passengers able to reach the hub conveniently, by positioning gates nearby for ease of interchange between planes.
- Water and waste provision is shifting with expectations of stronger environmental standards in the harvesting and distribution of water. Customers are also expecting responsible use of waste, which has triggered innovations for the production of renewable energy and recycled water. This is still evolving in Australia, but wastewater has the potential to change from a cost to a new revenue source.

The upshot is that community and customer expectations are on the rise, and that the static physical assets of infrastructure will need to evolve into dynamic service centres to cater for a plethora of preferences from the community and customers.

The ability to fulfil the escalating expectations of infrastructure customers will demand a different approach from policymakers. Not only is the traditional presumption that infrastructure is a 'one size fits all' for customers and services rapidly approaching redundancy the process of 'right sizing' will remain challenging. That is, how to fund infrastructure of the right size and the time taken to reach reasonable capacity utilisation will have even more complexity to it.

Implied in this megatrend is how a focus on bigger, more solid assets may not correlate with the ability to meet the finer resolution of services required, and that more of this may be resolved at a micro-scale using technology, customer-to-customer and business-to-customer solutions that are discussed next.

Megatrend 2: Blurring boundaries

Traditionally infrastructure has benefited from a clear definition of the entities that supply infrastructure, and those that use it. The configuration of energy, water, and transport networks and the supporting regulations continue to have a strong mono-directional flow from producer to the user. The interaction with the customer is often minimal and perfunctory at retail level, but this is often changing for larger business customers.

Technology innovations are undermining this relatively simple 'supply-push' model where producers (which often are monopolies) create the assets and services that are pushed through the network according to a schedule of production and service timetable.

This simple 'supply-push' relationship between producer and user is eroding and 'demand-pull' forces are growing in importance. They bring potentially significant implications for the incumbent producers, and invite new suppliers to enter that can shift industry dynamics.

Supplier and customer boundaries are being eroded by technology that has lowered the transaction costs associated with making infrastructure available to a market of buyers and sellers. This is sometimes referred to as the sharing economy.

Examples of this in the infrastructure sector relate to transport and energy, and are causing greater complexity for policymakers to manage these innovations, and assess the implications for forward planning.

Australia has experienced a disruption in transport from new technologies, both from global and home-grown sources, generally known as a transport asset sharing platform. Uber is commonly recognised in this space, with its introduction to Australia in 2012, and then the introduction of UberX in mid-2014.

The blurring of the boundaries that has emerged with Uber and similar sharing platforms in the supply of transport services is yet to be fully understood or appreciated. These systems, however, do seem to have the capability to liberate latent spare capacity in the private vehicle fleet through an on-demand delivery model.

This is enabled when drivers that are registered on these sharing platforms can at their discretion liberate their time and spare capacity of a private vehicle for a financial return. The consequence of this additional supply is that customers can choose their vehicle of choice, and have a logistic solution to their exact point-to-point journey requirements.

The take-up of this technology remains relatively nascent; nonetheless as it matures and competition



intensifies it raises the possibility that the sharing economy could in part meet the escalating freight and passenger logistics task of the nation's cities and regions. Aggregate demand modelling for future public transport projects will need to be cognisant of the potential risks of overstating the need for new projects because of unanticipated shifts in user behaviour and technology that can reveal new supply side capacity.

sharing assets can shift the size and scope of the so-called infrastructure dollar deficit, and reduce new capital investment requirements

A similar argument can also apply to driverless vehicles, where road productivity may be transformed by higher vehicle density, assuming the technology can do so without loss of speed or safety when vehicles are networked together.

Traffic simulation undertaken by FP Think (2014) suggests that with 75 percent of vehicles autonomous, freeway capacity might be increased by 35 percent.⁹ The Bureau of Infrastructure, Transport and Regional Economics (BITRE 2015) estimates that if autonomous vehicles account for 30 percent of the light vehicle fleet by 2030, congestion in Australia will be reduced by around a quarter.¹⁰

Such technology could also accelerate the blurring between the consumption and supply of infrastructure services as ownership models change to exploit the new opportunities of generating third party revenue from latent capacity in the vehicle fleet.

In the case of the energy sector, the interplay between customer and supplier is also emerging as a source of disruption to the traditional model of centralised dispatch of electricity. For example, households with solar panels (and batteries) are increasingly capable of being more self-sufficient

and independent from the electricity grid. As their micro-production of energy becomes more efficient, the excess power can be injected into the grid, making the household both a consumer of electricity from the grid and a source of production to it.

In both cases, replacing the 'push' model of infrastructure production in energy and transport logistics appears to be only a matter of time, as it is resource intensive, and inefficient in matching supply to customer preferences.

The more organic, dynamic and complex set of arrangements where technology is enabling the blurring of production and consumption of infrastructure services has the benefit of liberating latent production capacity, and satisfying a more diverse and range of customer needs and expectations. As this megatrend evolves it may bring with it a number of implications.

- It may challenge infrastructure planners to question and re-evaluate demand forecasts for future infrastructure based on historical trends.
- Higher vehicle productivity may imply a future of fewer cars that travel more and deliver enhanced mobility but with a more cost effective vehicle-sharing ethos.
- It may refocus efforts to ensure legacy infrastructure can remain viable, as necessary, to interface with and accommodate new technology that liberates latent capacity and enhances customer service.
- It may enable a price for service culture to emerge. Instead, sharing assets can shift the size and scope of the so-called infrastructure dollar deficit, and reduce new capital investment requirements.

Finally, the need for new infrastructure to meet the strong population and economic growth of Australia will continue to be a priority for the medium term. However, the dividends to the nation of greater flexibility in reusing and repurposing existing infrastructure with the benefit of new technology needs greater understanding. This is a priority for public transport agencies to adopt new technologies that could delay or potentially substitute costly new projects in favour of more capital-efficient solutions.

An early understanding of the consequences and opportunities of the megatrend blurring boundaries could yield the economy and taxpayer a significant productivity boost, and money saved for the taxpayer from delayed or abandoned projects.

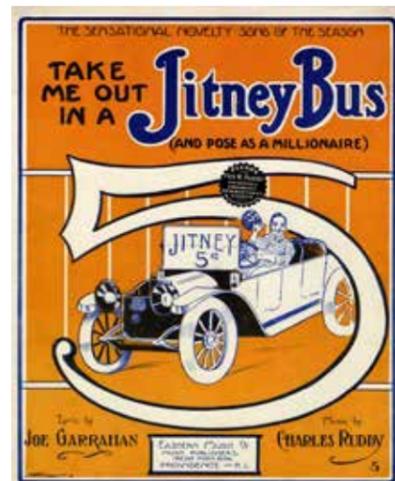
Megatrend 3: Risking innovation

Innovation is fundamental to our wellbeing, and wherever there are challenges and necessities of life to be met, there will be inventiveness. Extracting the full potential of innovation is desirable, provided it is legal to do so, and where its benefits exceed costs. But there are an expanding array of institutional, contractual, governance and cultural impediments that are frustrating the innovation process.

These regulatory and institutional impediments to innovation can have a number of effects, including the ability to stop innovation altogether, or shift the innovation to another less efficient part of the value chain.

For example, during the period of the early 1900s with the introduction and rapid propagation of private motor vehicle ownership in the United States, there was a ride-sharing scheme started in 1914 by L P Draper, a car salesman in Los Angeles. He observed very long queues to catch the public transport trams in the city so he set up a sign on his car to say he would take passengers wherever they wanted to go for a 'jitney' (slang for a nickel).¹¹

Draper met with extraordinary success, by 1915 there were 50,000 rides per day in Seattle, 45,000 rides per day in Kansas and 150,000 rides per day in Los Angeles. Uber founder Travis Kalanick says that Uber 100 years later is doing 157,000 rides per day in LA. But within just a few years the Jitney bus was regulated and taxed out of existence, as the monopoly public transport authorities imposed onerous conditions and licensing fees on it because according to Kalanick they saw the ride-sharing scheme as pernicious.



The popularity of the Jitney led to many songs being written about the service
digital.library.msstate.edu/cdm/ref/collection/SheetMusic/id/11715

The global economy had to wait almost 100 years before another scaled attempt at ride sharing began. In the meantime, without ride sharing, car ownership exploded and so did the inefficiencies of accommodating a car fleet that was prevented from extracting the true efficiencies of the private motor vehicle. Kalanick argues the results are congestion, massive carbon emissions and excessive spare capacity as private vehicles were used for less than 10 percent of their productive capacity. Cities were affected, with at least 30 percent of the building stock devoted to car parks and building and maintaining bigger roads.¹²

Innovations in the electricity distribution network are occurring vigorously at the household level, particularly in the form of micro-solar production and storage

Customers can and should be driving change in the way assets and networks are governed

of energy. Regardless of the motivations of the households to adopt new technology (eg. reduced carbon or hedging against future energy costs) maintaining continuous, reliable and secure electricity remains essential for the vast majority of customers.

The costs associated for household to invest in their own energy production and storage to maintain an uninterrupted energy supply is onerous; and it may not be beneficial from a social welfare perspective for them to do so. That is because the risks associated with accessing a suitable energy source and preventing an outage could be achieved much more efficiently at a higher level of the network.

For example, dealing with these types of risk can be effectively managed, if regulation permitted more customer-led innovation and adoption of new technology to occur within the central network, and in this case at the sub-station. The basic economics at play is that installation of batteries at the the sub-station could enable better risk pooling across a larger groups of people/households.

Furthermore, different consumption and production profiles from households across neighbourhoods can enhance reliability and cost effectiveness where technology and innovation enables greater efficiency and reliable two way flows between generation, storage and consumption. Improving the network



Home battery used to independently store energy from solar panels for self-consumption use in the home.

configuration between households and their local sub-station may also infer wider economic benefits to management of the very elongated east coast grid and the role fossil fuel has had to play in helping to stabilise the network.

Customers can and should be driving change in the way assets and networks are governed. But too often regulatory and institutional arrangements are less dynamic, and can be quick to treat innovation as unnecessarily disruptive, denying both customers and taxpayers better services and superior productivity. While this could be boiled down to monopolies just seeking to protect their economic rent, it is also possible that infrastructure governance has over emphasised cost minimisation and protecting the status quo in the interests of continuity and reliability of service delivery.

Australia should seek to enable, as many parts of its infrastructure networks be open to innovation and led by the customer. However, when this is not possible owing to the impact of regulation or other restrictions, customer led innovation can be forced to the periphery of networks like at the household level. Greater freedom to adopt new technology and innovate at the household level can be very costly and potentially inefficient compared with what could be achieved if the network were more adaptable to customer requirements.

Chapter highlights

The bulk of Australia's infrastructure is ageing, and its economic lives are being extended beyond original expectations. At the same time the opportunities to revitalise this infrastructure have never been better.

Coupled with developing world type population growth and a shift in demographics, Australia will experience dramatic shifts in living patterns and use of infrastructure, placing new and unexpected demands on the system.

Australian society is more educated, connected and informed than previous generations and this is emerging as an important new ingredient to the infrastructure challenge.

There has been a subtle shift in describing the services the infrastructure asset delivers, particularly as private capital is involved and long-term contracts secured. This is a marked departure from the traditional physical description of infrastructure assets and its function.

Fulfilling higher expectations the community has towards infrastructure will demand different approaches from policymakers and the entire industry supply chain. The 'one size will fit all' approach for customers is rapidly approaching redundancy.

Supplier and customer boundaries are being eroded, and this is being enabled by technology that has lowered the transaction costs associated with making infrastructure available to a market of buyers and sellers. These systems have the capability to liberate latent spare capacity in existing infrastructure and will be effective in meeting the future infrastructure task.

Customers can and should be driving change in the way assets and networks are governed. But too often regulatory and institutional arrangements are less dynamic, and can be too quick to treat innovation as unnecessarily disruptive, denying both customers and taxpayers to better services and superior productivity.

Chapter 2

Infrastructure governance practices: a customer's friend or foe?

This chapter reviews current infrastructure governance practices with a special focus on land transport, and how this vital sector of infrastructure is engaging with, and enabling innovation, adaptability and customer-led services.

Introduction

The following section examines governance arrangements for publicly available contracts, some of which are PPPs, through two different but complementary lenses.

- Firstly, effectiveness in mobilising resources in the early life cycle of infrastructure, from project inception to final delivery.
- Second, to understand how asset owners and operators that work within these long term governance arrangements manage the changing requirements from shifting long-term economic and social change over the asset life cycle.

Access to contractual documents, especially those relating to PPPs was limited owing to commercial in confidence. Only Victorian contracts were examined, with contract summaries relied upon for other PPPs. A list of the contracts reviewed is detailed in Appendix B.

Getting the basics right

There is a broad range of public infrastructure governance models at work in Australia as outlined in Table 1, with many variations, they basically range from the examples given below.

- Direct government provision: cradle to grave direct government provision where public sector design and construction contracts are led by public works departments. Operation and maintenance occurs through traditional contracting with private sector parties to supply some or all of these services to government agencies.
- Corporatisation of government trading enterprises, which has introduced greater balance sheet discipline and accountability to the delivery of infrastructure services.
- Privatisation of assets, which is now commonplace in sectors such as airports and telecommunications.

The role of government as both a buyer and customer is very important in setting the way the market meets its needs.

Table 1: Overview of infrastructure governance models

Delivery Forms	Direct provision	Contracting	SOEs	PPPs	Regulated privatisation	Privatisation with liberalisations
Role of government	Planner, manager, producer	Planner and manager	Owner and planner	Planner and regulator	Regulator	Referee
Project selection	Government	Government	SOE and government	Government	Private firms but with government influence	Private firms
Governance mechanisms	Command and control	Public procurement law	Corporate governance	Contractual agreements	Sector regulation	Competition policy

Source: Organisation for Economic Co-operation and Development (OECD), Towards a Framework for the Governance of Infrastructure, September 2015 (pp.26)

Much of the focus on infrastructure governance reform has been concerned with seeking to get the basics right. Reform effort focused on project origination linked to infrastructure needs assessments and development of value for money criteria used at the investment decision (business case) stage and contract execution. Technical enhancements have also been sought in the preparation of project documentation and procurement, including risk allocations and ensuring transparent competitive processes.

Lifting the quality of governance around whole-of-life asset management has seen significant developments in design and lifecycle maintenance to maximise lifetime value. PPPs have been at the forefront of this advancement, using output (rather than input) specifications and a risk allocation process to help drive efficiencies in whole-of-life design and operation.

The role of government as both a buyer and customer is very important in setting the way the market meets its needs. Despite improvements in governance arrangements, governments still have much room for further improvement, especially in respect to customer-led infrastructure decision-making. This improvement process will take time and is most likely to occur when governments evolve from being a basic buyer of infrastructure assets to a facilitator for deeper interaction between customers and asset owners. This will require

governments placing market design at the centre of infrastructure governance.

Market design is concerned with the way governments organise market actors, information, pricing signals, risk allocation and scope for innovation to achieve public policy objectives. The most basic precondition for this to occur is for governments to be more explicit, clear and transparent about the objectives of their infrastructure interventions, and in turn bring equal clarity with respect to the problem they are seeking to remedy.

The setting of clear objectives and problem identification when commissioning projects can help give the public and private service providers greater latitude to innovate. That is because the government is less prescriptive about inputs, which can invite more vigorous innovation including extracting more value from existing infrastructure, rewarding capital savings initiatives that reflect their true economic value to the taxpayer, and focusing on service outcomes rather than the more superficial physical characteristics of the proposed solution.

From this perspective, market design matters, as it goes to the core of asking the right things of the markets and shaping the values and behaviours of the market participants to deliver against clearly stated public policy objectives.

Challenging infrastructure to adapt

Markets can be a powerful means of transmitting signals for change and as a catalyst for infrastructure to adapt to the dynamic needs of customers and community. Of course, markets require customers and suppliers, and while this is a simple proposition there has been an extraordinary level of administrative complexity that has evolved around procuring infrastructure and delivering services.

This has occurred because of a number of factors, not least among them is that much of the infrastructure sector is made up of large monopoly entities that require regulation to ensure market power is not used inappropriately. In other cases, regulatory standards are important so infrastructure complies with public policy objectives such as safety, reliability and universal access.

Governance arrangements for utility services, such as electricity, gas, water and telecommunications, have changed greatly in the past twenty years and market forces play a much greater role in determining the services provided and which parties provide them. The private sector's role has increased markedly over this period.

Governance arrangements for utility services have changed greatly and market forces play a much greater role

Road and rail services exhibit monopoly characteristics and the government's role is still dominant and relatively little use is made of market forces and cost reflective prices to find out consumer preferences and inform future investments. Subsidies enabling heavily discounted prices compared to cost of delivery have somewhat perversely enabled the availability of infrastructure services to meet universal access and social equity objectives, but at the same time they have also blunted the quality of customer interaction.

For many public infrastructure services, the procurement of assets and service delivery is done administratively, and therefore the purchaser (in other words the government department or agency) acts on behalf of the users and customers. While this is done on a best endeavours basis, it nonetheless causes a wider separation between final consumer and infrastructure service purchaser/procurer compared with competitive markets. It can also result in a less flexible service offering that is made on a 'take it or leave it' basis.

Equally, the distinction between funders and users is important. The latter generally has very limited scope to influence service provision because a government agency acts as purchaser and administratively determines service type and standard.

Table 2 provides a high level overview of the governance arrangements for service recipients and purchase arrangements and the scope for customer engagement that apply in a number of sectors that make up infrastructure. Despite a very wide spectrum of customer models there is a clear skew to relying on administrative-led service provision, which is where customer interaction is predetermined according to a production or service timetable schedule that is set by the infrastructure owner/purchaser.

In the case of urban arterial roads and urban passenger rail, the primary beneficiaries of the infrastructure services are direct community users (the travelling public). For urban water services, the direct beneficiaries are those who receive the water services; however, very important externalities exist also in respect of public health. This is similar to urban roads and urban passenger rail where externalities in respect of public safety, congestion, air quality, and land use agglomerations are involved. Importantly, urban water users are paying overall for the full cost of providing these services, but individually may not be bearing the direct cost of the water service provided to the household.

It would be fair to point out that highly competitive markets operate in stark contrast to these examples. For instance, direct community users are in fact customers and are both the purchaser and funder of the service or product. Mobile telephony comes closest to this in the infrastructure sector.

In essence, where users of the infrastructure services are also funders, there appears to be much more scope for them as active agents in determining what, when and how services are supplied. That is being a customer as opposed to a passive 'user' where services are offered on a 'take it or leave it' basis.

The extent to which infrastructure users can transform into infrastructure customers entirely depends upon the nature of the infrastructure governance arrangements in place. While urban water users still have relatively little impact on the nature of services provided, wholesale customers

appear to have a larger influence in electricity. In the case of mobile telecommunications, the customer is more fully empowered.

The state of play with governance in land transport towards supporting and empowering customers is in need of further reform. In fact, land transport continues to entrench the community as 'users' and significant reform is necessary to begin the transformation to the status of a customer and with it more disciplined investment, innovation and adoption of technology.

Table 2: Purchasers and service recipients

Sector	Service recipients	Purchaser	Customer engagement
Urban arterial roads	Direct community users (drivers and passengers)	Taxpayers (major); Direct community users (minor – despite tolls with full and partial cost recovery)	Limited, owing to lack of direct user charging (about 8 percent*) being a small proportion of road revenue. In the case of toll roads, there is potential of a higher level of engagement but may require a change in the contract deed to shift to a more active customer approach.
Urban passenger rail	Direct community users (passengers) Road users (via reduced road congestion)	Taxpayers (major); Users (minor – subsidised fares)	Limited, owing to lack of direct user charging to recover costs (under 30 percent**), prevents deeper price for quality exploration with customers. Strong attempts to create a customer oriented culture among public transport agencies through mainly punctuality and cleanliness performance criteria.
Urban water	Direct community users	Direct community users (postage stamp pricing)	Medium, scope to bundle services such as maintenance asset purchasing for water appliances and plumbing.
Corrections	General public (major) Inmates (minor)	Taxpayers	Very limited.
Highly competitive markets (eg mobile telephony)	Direct community users (customers)	Direct community users (customers, full cost recovery)	Unfettered for engaging, anticipating and shaping customer product and services. Active price discovery mechanism to allocate capital and manage risks. Full spectrum of price for quality offering.

* BITRE (2015) Australian Infrastructure Statistics Yearbook, Table T1.4

** BITRE (2013) Urban Public Transport: updated trends, information sheet 59, p.12

Translating administrative process to customer outcomes

Within Australia, specialist public sector agencies are responsible for arterial road and urban passenger rail system-wide service delivery. There has been considerable effort and reform to be more customer-centric. The models used range from a single entity with responsibility for planning, funding and delivery (eg roads in Victoria) to a purchaser-provider model (eg NSW, rail in Victoria).

It is important, however, to recognise that when infrastructure entities are established with relative autonomy and clear performance objectives and accountabilities, together this can help achieve better customer interaction and outcomes. This was borne out when the Australian Government and states undertook widespread corporatisation in the late 1980s and 1990s. Improving the technical efficiency of the government trading enterprises, along with more disciplined capital investment to meet customer requirements were important outcomes.

Under a purchaser-provider model, a central public transport entity coordinates public transport and undertakes network-wide planning and contracts specialist service delivery entities to meet specified service level requirements. Performance-based contracts set out service delivery and reporting requirements to be met by the specialist delivery agencies.

There are important differences between models, and also within models, that influence the service responsiveness of the agencies. This is illustrated below by looking at the nature of the objectives set for the delivery agencies and the scope and specificity of key performance indicators (KPIs).

Suppliers of infrastructure services through traditional government contracts often have little commercial incentive (and few tools) to change supply arrangements to better satisfy customer needs. For instance, even in the case of current toll road PPPs there is limited use of the price mechanism for users to pay for a particular service outcome (eg HOT lanes on a motorway¹³). In Australia, toll road owners/operators generally have contractual discretion to lower tolls in off-peak periods (but generally do not as demand is inelastic) but on the other hand they do not have the discretion to raise tolls during peak periods.

However, even in best practice jurisdictions, there appears to be room for further improvement to better reflect opportunities for a more dynamic and service oriented approach to the customer within the broader transport system. That is governance arrangements tend to be modally centric, and have limited emphasis concerning the quality of the intermodal interface between trains, trams, buses, cars, bicycles and walking.

However, there are positive developments toward a better modal interface. For example, Transport for NSW is about to provide a customer discount for changing modes with the Opal Card from mid-2016. This is a powerful indicator of system-wide governance awareness and giving greater priority to a more seamless intermodal approach to transport logistics.

It is not clear, however, the way in which service standards and levels are set among the agencies reviewed in Appendix A and what mechanisms are in play to allow these to be varied over time with changing customer and community priorities. Customer satisfaction surveys are important but they have limits in informing decision-makers about willingness to pay and the opportunity cost of investing in one area compared with another.

While considerable administrative effort has been expended by public agencies to understand user requirements and reflect it in specifying service type and quality, there is very little in these processes that resemble market characteristics where prices and quality of service are set by customer interactions. Surprisingly, it appears that clarity of objectives and accompanying KPIs directed at the customer appear to be more readily acknowledged with a purchaser-provider model than some PPPs. This is discussed further in the next section.

When market-based reforms are neither possible nor appropriate, governments can establish specialist delivery agencies with specific and transparent KPIs in favour of the customer, and reinforced with strong and independent monitoring arrangements. These were also the guiding principles at work in the period of wide spread reform of government trading enterprises in the late 1980s and early 1990s in Australia.

Internationally, some jurisdictions have been reforming their governance models for managing arterial roads that have been informed by the Australian experience and extended into areas that Australia did not include at that time. Box 1 discusses Highways England as an important case example to help inform the next wave of reform for Australia.

Box 1: Highways England

Highways England was established in 2015 as a government owned strategic highways company with responsibility for managing the English strategic roads network. Compared to the agency it replaced, Highways UK the new Highways England has been empowered with a strong governance model to be customer-centric and more accountable for its capital and maintenance decisions. It has the mandate to develop a 25-year vision along with a certainty of funding arrangements that are on a 5-year basis. Importantly, its funding level has been boosted significantly above that of recent years, to reflect past chronic underfunding of the road network.

Private contractors are responsible for the design and delivery of road maintenance in a particular area of England for a period of four or five years, with the option to extend to seven years. The road user has been placed at the centre of Highway England's focus along with much longer-term planning.

The Department of Transport has set Highways England clear and measurable performance targets aimed at providing better and more efficient roads that is financially sustainable and forward-looking. Rigorous and transparent assessment of Highway England's performance, including by specialist independent agencies, is as part of the reform process.

Understanding the changing needs of road users through regular surveys and through its 'Smart Motorways' initiative is a focus of Highways England. It is aiming to make use of communications and other innovations to increase the capacity of a motorway by a third while only slightly increasing its physical footprint.

Highways England is a useful case example to inform the Australian land transport reform agenda. Providing funding certainty and access to a big enough revenue base to meet the life cycle costs of managing an arterial road network will present special challenges and inevitably will require a new set of financial arrangements between the Australian Government and the states.

Source: <https://m.highways.gov.uk>



Wireless charging for electric vehicles is being tested by Highways England.



Driverless trains planned for Sydney Metro Northwest lines.

Can customer responsiveness thrive in PPPs?

An underlying intent to PPPs is that the parties will work cooperatively to address changing circumstances and together the contractual parties will be open to new opportunities that are mutually beneficial during the term of the contract. To facilitate this, PPP contracts generally make explicit provision for change initiatives proposed by the private party. Key elements to these provisions typically are:

- government approval is required before any change can be made
- government must respond as soon as possible to the private partner's proposal
- parties agree to sharing costs and benefits
- unless specifically agreed by a government, agreement to a change proposal does not provide the private partner any relief from meeting its original contractual obligation.

In practice, private partners have activated change provisions in relatively few circumstances, as shown in the following examples.

- In the case of availability PPPs, where the private partner's focus is on cost reduction rather than revenue enhancement, there is often little scope for initiatives that materially reduce its costs while providing additional benefit to

government. And where such proposals require significant additional payments by government, often the contracting agency does not have the fiscal autonomy to agree to such changes without going through the approval processes to secure an additional appropriation.

- Where the private partner's revenues come largely from users, there is greater scope in practice for private partners to suggest mutually beneficial value creation changes. However, in practice, these provisions are not designed for large value creation proposals. Governments have an underlying preference to use competitive tendering processes where it is practical to do so.

There appears to be a greater scope exercised by governments to transfer risk under PPP contracts, particularly full service toll road contracts. However, this has not translated to a high level of specificity in KPIs for customer service outcomes.

Risk transfer is based on the proposition that risk is transferred to the party best able to manage it. In the case of the private sector toll road concession holders, they generally have no control over the adjacent roads network or traffic flow and are essentially passive in their ability to control patronage. Developing new products and services, and use of the prices to engage and shape demand are extremely limited.

Risk transfer should be based on the proposition that risk is transferred to the party best able to manage it.

The upshot is that toll road concession holders are least able to manage patronage risk from a network perspective, and this is exacerbated further with very limited flexibility within the PPP contract to engage with and find the pricing and quality service outcomes.

This makes the operational flexibility of PPP toll roads very limited, and relatively static compared with the broader road network. Making changes is complex and potentially costly to the taxpayers, as the concession holder is entitled to compensation where changes are financially adverse.

There is also a high level of public interest sensitivity with variations to contracts. Some governments have established unsolicited bid frameworks to deal with large value creation proposals rather than rely on contractual mechanisms.¹⁴ For instance, the Victorian Guideline states that: "Proposals must

meet a series of important tests and be in the public interest to proceed under the guideline. Proposals will only proceed where they meet Government objectives, provide benefits to the community and achieve value-for-money."¹⁵

Unsolicited bids associated with live PPP projects that have been approved in Victoria include widening the Tullamarine Freeway component of City Link. This has required associated contractual amendments to the City Link PPP agreement.

While mechanisms exist to adjust PPP contracts, there is a legitimate question as to whether they are suited to the changes that arise in the adaptation to new technology and shifts in customer preferences over the medium to long term.

For example, road PPPs typically are very long-term contracts, ranging up to 40 years in length and rail PPPs can be up to 20 years. This period of time make it entirely possible that new technology, such as smart motorways and even 'driverless' vehicles could present a broad spectrum of challenges and opportunities to materially alter these contracts.

PPPs specify detailed performance requirements, and payment arrangements for meeting those performance requirements, day in, day out, for the length of the contract term. The winning

PPP tenderer is the party that shows it has the best proposal to meet those requirements for government. As such, PPPs can provide a best value for money outcome for government compared with other delivery models in meeting the prescribed performance requirements, and in doing so provide long-term certainty for both parties to meet their obligations.

PPPs generally contain mechanisms for dealing with changes, such as capacity augmentations and/or refinements to KPIs. In some tender processes, 'flexibility' is an evaluation criterion and tenderers are asked to provide a design that more readily allows for likely changes. For example, a government may anticipate that a proposed prison will require expansion in the future and ask PPP bidders to submit designs that will facilitate ready expansion when required in a way that minimises cost and disruption to prison operations.

the failure of previous governments to establish PPP contracts with stronger customer service incentives are keenly felt by motorists and the community today.

Consistent with this approach, change provisions in road and rail PPP contracts allow government options to secure additions like a road traffic lane or rail capacity. Change provisions also extend to improving service levels, along with mechanisms that determine the compensation provided to the private partner for undertaking the associated capital works and related ongoing operational costs. It should be noted, however, that the focus with these change provisions is concerned with securing the government's desired change at least cost.

All road PPPs acknowledge that government is free to make any changes – physical and operational (eg changing speed limits) to the broader arterial road network. The PPP contract cannot fetter government in its role as network operator. However,

governments can face greater administrative complexity and financial compensation claims if the change leads to the concessionaire losing money.

This is particularly relevant in toll road PPPs where the private party's revenues rely on vehicle numbers. In some PPPs, for example EastLink in Victoria, Cross City Tunnel and NorthConnex in NSW, the physical protection provisions for the private party are limited to direct feeder and egress roads, as well as to changes that specifically affect the toll road (eg speed limits). In other cases (eg City Link), a broader range of network changes encompassing physical or operational changes can lead to compensation claims.

In the case of NSW Smart Motorways, the state and federal governments are planning to fund the \$400 million upgrade to motorways that will entail variable speed limits and signage, extensive ramp metering and better use of on-shoulder traffic. Together these measures will result in substantially better service outcomes for the motorway customer for traffic flow and improved arrival time, and be financially beneficial to the PPP operator on the adjoining network.

A question in search of an answer is, how could PPP operators responsible for the adjacent motorways be incentivised to make a smart motorway type investment on the entire Sydney ring road?

Regardless of the earlier merits of the original PPP contracts that helped accelerate the building of the Sydney ring road, there was insufficient consideration given to the operational and financial incentives for operators to be continuously improving customer outcomes through innovation and adoption of new technologies.

These challenges are exacerbated by the lengthiness of the toll road contracts – up to 40 years. Current government practice to extend the contract term as a form of compensation for the cost of enhancements made by the concessionaire (such as through acceptance of unsolicited bids from the concessionaire), means it may be a long time before governments could resume full and unfettered operational control over their urban arterial road network: without recourse to paying compensation to PPP toll road concession holders.

More generally, the failure decades ago of previous governments to establish PPP contracts with stronger customer service incentives are keenly felt by motorists and the community today. This

highlights the limitations of past PPP contract practices, and the need to continue with a program of ongoing reform of contractual arrangements centred on services and customer outcomes over the long term.

The current road funding model provides little direct relationship between customer use, service standards and fees and charges for use of the network, even in the case of where the PPP can charge motorist full cost recovery.

This situation has been subject to considerable criticism; however, a simple shift to cost reflective pricing in the absence of other measures, like fully integrated land use and transport planning, is unlikely to overcome the problem of perceived inadequate road space and escalating traffic congestion.

The existence of long-term toll road contracts in major metropolitan areas is likely to further complicate the introduction of broader road user charging owing to the obligation to provide financial compensation in some cases where there are material adverse effects on concession holders.

Governments could either seek to renegotiate the tolling regime on these roads, and provide the owners with the negotiated financial compensation or accept that they will not be able to introduce a comprehensive consistent road user charging regime until the final toll road contract expires, sometime after 2050.

The use of availability PPPs in the road sector (as in Peninsula Link) do not appear to pose the same constraints on operation of the arterial road network. In the case of the Australian rail PPP models, these are essentially 'availability' based and leave the government with much broader options for network governance and pricing reform.

In the Peninsula Link contract, the private partner receives a quarterly availability payment from the state, which it receives in full if all contractual KPIs are met. Changes made by VicRoads to the broader physical road network may affect traffic on Peninsula Link but will not alter the private partner's revenues. If the state seeks to change service level KPIs on Peninsula Link, it will need to negotiate compensation arrangements with the private partner but this should be relatively simple because it does not involve modelling traffic and revenue projections.

Performance-based contracts, such as the NSW stewardship road maintenance contracts, appear to provide a good model for future road service delivery contracts. They are customer focused with simple measurable comprehensive KPIs and with real incentives/sanctions for performance. The contract term is long enough for the service provider to take a longer-term perspective. Not only are the KPIs relatively extensive and well-targeted compared with toll road PPPs, but also the incentives and sanctions are relatively more important in terms of revenue at risk.



HOT traffic lanes / express lanes in Virginia using a 29-mile portion of existing reversible lanes

Chapter highlights

Infrastructure should provide the right services to customers and the community at the right time and place. The focus of much of the infrastructure reforms in recent years has been on enhanced project origination, more effective project commissioning and cost abatement. Consideration of service quality and accommodating changes in customer preference has been secondary.

Governance arrangements for service delivery need to be structured to allow sufficient interaction with customers to understand their changing requirements over time and have the flexibility to adapt to these changing service needs. This is an important area for further reform to ensure governance arrangements are friendlier to the customer, and in doing so helpful towards achieving long-term efficiencies and value for money.

Traditionally, infrastructure governance has focused on the achievement of a broad range of competing government objectives, but without a framework for agencies to prioritise them.

When customers are bearing a high proportion of the economic cost of the infrastructure provision there appears to be greater likelihood of innovation and adoption of new technologies to better serve customers or to reduce costs. This is borne out in corporatised and privatised agencies, but is less evident in land transport PPPs.

Highways England is a useful case example to inform the Australian land transport reform agenda. Providing funding certainty and access to a large enough revenue base to meet the life cycle costs of managing an arterial road network will present special challenges and inevitably will require a combination of cost reflective pricing reform and a new set of financial arrangements between the Australian Government and the states. PPPs can provide governments with greater certainty with respect to achieving required performance infrastructure service standards, on-time and to-budget. This also provides certainty to private financiers and helps attract lower cost financing.

However, a focus on contractual certainty can be at the expense of flexibility to meet changing service needs over time. While all PPPs contain change mechanisms, these can be administratively complex – for probity and other public interest reasons – and governments can be reluctant to use them for large changes.

While these considerations may imply higher short-term costs to both customers and government, these would need to be assessed in relation to the scope for long-term benefits of greater contestability and adaptability of services and assets to current and emerging customer requirements.

Full privatisation has the benefit of businesses seeking to interact with customer and markets in dealing with the uncertainties and risks of the future. While there are limits to how PPP contracts can do this effectively, nonetheless they can play a useful role in the suite of possible governance models. The next chapter examines these issues further and the role that privatisation has played and can continue to play in the process of ongoing reform of infrastructure governance in favour of the customer and community.



Chapter 3

Shifting the mindset: play for the long game

This chapter argues that infrastructure governance should not lock in societies to second best infrastructure. Uncertainty about the future can be a powerful catalyst for innovation and is examined in the context of the Better Infrastructure Futures Framework. A case study on Australian airports concludes the chapter and is offered as an example of past infrastructure reform that can serve the nation well again in new areas of reform.

Introduction

There is a systemic preference that has emerged in the past 20 years around infrastructure governance.

On the one hand, there is an enormous concentration of effort in the continuity and reliability of infrastructure. While this is important, especially for life sustaining systems such as electricity and water, it has nonetheless come at a cost in the form of 'gold plating' infrastructure, especially in respect of some transport and electricity networks. However, a more subtle and potentially insidious cost has been the emergence of an overly cautious culture that risks stifling innovation.

While there may be sound reasons for this, one concern is that land transport is in need of much further reform to ensure it has access to full range of productivity enhancing options, in particular through tapping the latent capacity in the existing infrastructure through new technology and innovation.

This is an area that is in need of greater scrutiny and critique.

Managing a 'shovel ready' project culture

The planning of infrastructure is a very valuable period for policymakers because designers and engineers have the benefit of exercising the most flexibility in testing concepts and designs with the objective of finding the best and, hopefully, most enduring solution.

Governments can have a tendency to both rapidly conceive and announce major infrastructure projects that at times can be contrary to the long-term skilful planning of their departments. Speed and urgency to complete a project as soon as possible is often linked to the perceived need of policymakers to do so within the electoral cycle to demonstrate a fiscal stimulus is delivering on jobs and growth. While the transaction efficiency of major infrastructure is one dimension of social welfare, it is critical that the same process does not trade off the right scoping and right sizing of the proposed investment using flexible design.

Major projects concerned with building assets for the long term highlight the challenges for policymakers to commission them and ensure they can astutely navigate a very high level of uncertainty in the future. Reflecting these uncertainties in contracts such as PPPs is an onerous task and inevitably requires a range of assumptions to create enough certainty for the contract to be both workable and enforceable.

The longer the asset life, the more important it is to conceive a solution that can respond to uncertainty in the long term. Despite this obvious point, the governance of major projects in infrastructure often inserts assumptions about the future into contract terms with private owner/operators that are simply inflexible and constrain the asset owner to respond to uncertainty over the long life of the asset.

An example of unforeseen developments is in respect of Melbourne CityLink. The original contract was signed in 1995 allowing the concessionaire to increase tolls quarterly by whichever was higher, the inflation rate or 4.5% annually for the first 15 years after completion of the road. This contract was signed during a period when 4.5% annual inflation was not unusual. However, trend inflation had since fallen to around 3% annually making the toll increases well in excess of inflation for an extended period of time. This situation was compounded by a failure to link improved customer service outcomes with the onerous escalation in real prices the community has had to pay to use CityLink.

In response to the millennium drought many states invested in desalination plants as an insurance against future risks to water security in their jurisdictions. All of these were conceived with urgency as dam levels were diminishing. The Victorian and NSW desalination projects shared common characteristics including very large water

production capacity (eg Melbourne was set at 150 billion litres of water annually, making it the largest desalination plant in Australia).¹⁶ Both are PPPs where government pays the concessionaire an availability payment irrespective of use plus a volumetric payment.

Insurance policy type investments such as desalination plants make value for money difficult to judge, until they are next called upon. That said, building a smaller plant with options for additional capacity through modular and flexible design may have offered a degree of relief. Another option is to have had the plant producing water at a reduced capacity but on an ongoing basis to help enable dams to release water for environmental flows and improve the health of rivers. Together these may have helped taxpayers secure better value for money.

A certain future risks new opportunities

A culture and expectation has evolved that the provision of infrastructure services is better done in an environment of no surprises. Contractual certainty is highly valued by government and proponents alike because it is more conducive to the mobilisation of resources, and the attraction of cost-effective design and financing. While this can create efficiency benefits in the short to medium term, it can have an opportunity cost in the future should it lead to inflexibility and loss of incentive and competence to adapt to changing circumstances.



While the power of contractual certainty can be necessary and attractive to quickly mobilise resources in the early life of a project, these benefits potentially attenuate overtime. For example, inflexible high certainty contractual arrangements that make changes in scope and purpose difficult to achieve also risk creating disincentives for private proponents to not adopt essential behaviours that are abundantly evident in competitive markets. These involve using strategic investment and risk allocation to protect and expand their offering to first survive and then prosper in a changing marketplace.

High certainty contractual arrangements can blunt the willingness of proponents to learn, adapt and repurpose their assets and services as time progresses and circumstances may warrant it. This can be acute not only in the long term, but also in the early stages of project commissioning, particularly in periods of new information that may justify re-scoping, stopping or pausing on a major project.

Infrastructure is often referred to as being 'lumpy', that is it is difficult to break it down into smaller components or modules. While that can be the case, technology and engineering innovation is changing to where flexible design can more easily enable, but does not require, additional capacity.

The economics of flexible design is that it allows the building phase to meet the immediate demand, but with options to add more as growth occurs. On the other hand, inflexible design requires that the build is much larger so that the asset can accommodate future forecast growth.¹⁷

The difficulty with a project commissioning culture driven by urgency, is that it risks failing to take advantage of smaller but more flexible options. Establishing certainty through contractual arrangements to expedite a project can risk focussing on getting the project built while distracting from a proper exploration of flexible design through a culture that emphasises future benefits of agility, innovation and adaptation.

Framework for better infrastructure futures

Figure 3 introduces the 'Better Infrastructure Futures Framework' (BIFF) with the intention of helping policymakers, investors and the community to better understand the strategic space of uncertainty and opportunity around long-term infrastructure.

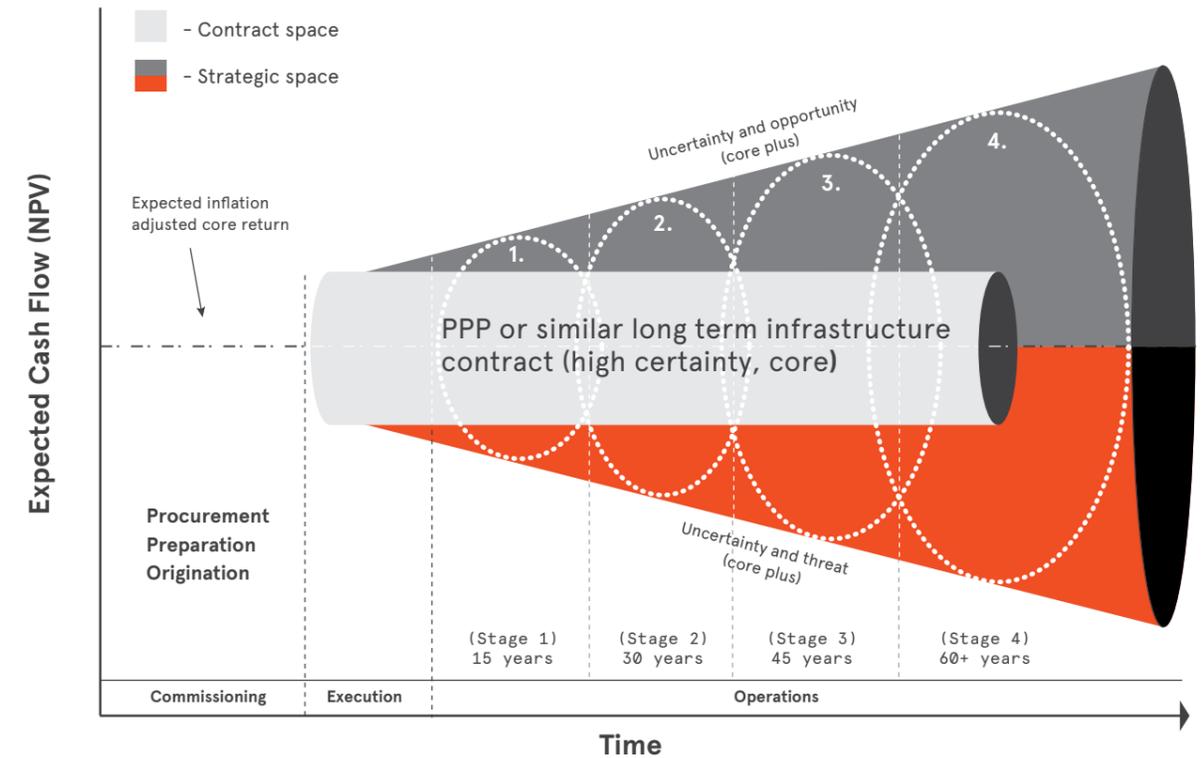
The shaded area that originates from the period of project commissioning forms a conical shape that indicates an expanding strategic space relevant to the operation of infrastructure over time. In other words, the longer it is in time from project commissioning, the greater is the area of both uncertainty to threats and opportunities.

The grey cylinder in Figure 3 extends into the future, and is a stylised representation of an availability based PPP or similar infrastructure contracts that can have a contract term of up to and beyond 40 years. These contracts are robust legal instruments that are intended to be capable of ensuring the government and the private proponent together can continue to provide operations with a relatively high level of certainty. To that end, the owner/operator has the benefit of a number of assurances that insulate it from competitive threats that could disrupt their viability through new entrants and or changes to the environment that could have an adverse impact. By the same token, these uncertainties include but are not limited to shifting demographics, technology, and social preferences that could also imply foregone opportunities.

The point of the BIFF is the benefits of the contractual certainties offered to the concession holder to ensure stable and ongoing operations are attractive in many ways, not least of which is the ability to attract cost-effective debt and equity at project commencement and subsequent refinancing. However, these benefits are not costless, and indeed may have an escalating opportunity cost over time to both investors and the economy.

In fact, the longer the contract period, the greater chance the benefits of contractual certainty at project commissioning may be offset in future decades. This is because the contract may prevent or give little incentive for the concession holder to respond to emerging threats and opportunities. The result is infrastructure that is inflexible and static to its environment and customers.

Figure 3: Better Infrastructure Futures Framework (BIFF)



Stages:

1. Maintain costs, exploit synergies
2. Change the system, harvest new value
3. Disrupt, energise new & old
4. Start over and do it again

Source: Better Infrastructure Initiative

In terms of long-term infrastructure efficiency, it is argued that the uncertainty and opportunity space denoted by the conical shape must be explored, and wherever possible contested by market actors to avoid the risk of stagnation and lock-in to a second best infrastructure solution. But the presence of a PPP contract can also work to shut down this uncertainty/opportunity space for other providers because of a lack of financial recourse to extract a return in light of the risk of contesting an incumbent PPP.

Should there be opportunities for the concessionaire or new entrants to develop additional products and services to explore this space, the figure shows that the spectrum of uncertainties and opportunities could complement and add value to the core contract, and equally there are threats that could detract from it.

Empowering market actors to engage this strategic space of customers, new services (core-plus) and products are critical to the long-term dynamic efficiency of infrastructure. Finding a way to achieve this without compromising the early stage benefits of certainty needs to be examined more comprehensively in the future.

The different stages of innovation are reflected in a stylised series of concentric circles in Figure 3. Each stage of the innovation process can influence the infrastructure contract to varying degrees.¹⁸ The innovation referred to occurs in the economy and the adjacent systems that can materially affect the contract.

Stage 1: Maintain costs, exploit synergies

At Stage 1 it is more than likely that the focus is on incremental (small scale) innovations concerned with doing things better and faster towards more competitive costs. For physical infrastructure, incremental innovations are closely linked with the day-to-day processes of replacing existing components with new ones rather than replacing like-with-like. Central to the decision whether to innovate is the life and serviceability of the existing asset.

Optimised asset management planning has become a central concern of public and private infrastructure operators and is generally accommodated within say a PPP contract. However, if a contract is so lean, the concessionaire could be financially constrained to invest in asset replacement and there can be a tendency to 'sweat the assets' rather than modernise.

Significant savings and service quality improvements can be achieved through increasing the scale and scope of operation (economies of scale). Examples include consolidation of railway companies in the 19th century or water companies in the 20th century and the emergence of the private multi-utility model in the 1990s. Regulation can affect this type of action and needs to be carefully assessed to ensure the benefits are justified relative to the possibility of loss of competition from greater concentration of asset ownership.

Stage 2: Change the system, harvest new value

At Stage 2 radical innovations involve major changes to the way a system is configured or operates, and are more likely to occur in the medium term. In the case of infrastructure these can be triggered by a shift in relative price by virtue of a regulatory change. The dramatic shift to renewable energy is a case in point, driven by a combination of technology, regulation and prices.

In the 1950s and 1960s the USSR, US and UK did this with the introduction of nuclear power. Other examples of radical innovation are concerned with environmental infrastructure investments, especially in wastewater treatment and solid waste that have largely been driven by new regulations that allowed waste to shift from a cost to a profit centre where energy can be produced and sold back into the grid.

Stage 3: Disrupt, energise new and old

Goldsmith refers to Stage 3 innovations as having systemic implications as they open up whole new ways of delivering infrastructure services. The pattern of use may not change overnight as it takes time to build the new networks and the incumbent infrastructure owners and operators have many options to respond and survive. Historical examples include the way railway technology replaced water canals, cars and roads replaced railways, electric lighting replaced town gas or mobile phones replacing fixed lines.

During the industrial revolution, canals were partially complementary to turnpike roads as they only took the heavy freight traffic for bulk materials or bulk manufactured goods off the roads and onto water. Canals were generally not used for short journeys or for passengers. Similarly, the invention of the internet gave a respite to the fixed telecoms operators faced with competition from mobiles as they could offer ADSL services over phone lines.

When the town gas monopolies were faced with being made redundant by the invention of electric lighting, they responded by reinventing themselves as suppliers of gas for cooking and heating. In fact, the survival strategies of 'old' infrastructures faced with new competition can lead to intense price competition that benefits customers along with unleashing a new wave of innovation about how to use the existing infrastructure better.

Stage 4: Start over and do it again

Just as this process began with small improvements and larger ones, all of them are intended to both improve and challenge the incumbent technology and service provider. Regardless of the merits of the incumbent their very presence should serve to invite the next disruptive technology that will trigger the commencement of a new cycle of innovation.

More competitive innovation trumps contractual certainty

Providing contractual certainty to infrastructure concession holders is central to modern PPPs. While PPPs invite intense innovation in the early stages of the project life cycle, they are particularly focused on cost management while ensuring the asset's continuity and availability. Despite these benefits, longer-term issues are at play that the concession holders are possibly less well equipped to manage by virtue of contractual arrangements.

From the perspective of designing infrastructure markets, long-term dynamic efficiency can only be achieved when the market explores the uncertainty and opportunity strategic space shown in Figure 3. When a contract from government prevents this, there needs to be greater scrutiny of the costs and benefits, because of the risk this could present in impediments to structural adjustment of the economy generally, and loss of customer focus and satisfaction specifically. Infrastructure generates a range of externalities, including a wider economic impact to the broader economy, which is why infrastructure governance needs to be comprehensive in its approach towards long-term efficiency.

Historical experience is clear on this point. The 150 years from the mid-1700s in Britain, slightly later in the United States, saw a massive mobilisation of resources by the private sector that created the legacy networks of energy, water and transport that continue to shape these economies today. The great railway companies of Britain and US were driven by enormous financial incentives to shift their land use patterns from their transport, energy and communication infrastructure. The dividends of these risky endeavours were to secure first mover advantage, especially with respect to land access and customers, along with capturing the land uplift from their improved infrastructure amenity. The period provides important lessons for the stewardship of current infrastructure challenges.

- Firstly competition between the emerging technologies was important in ensuring the nation had the benefit of best of breed infrastructure.
- Competition brought many complications, including haphazard development, duplication and overdevelopment, in some areas and underdevelopment in others. However the upshot of it ensured Britain did not prematurely settle for a second best technology that could have limited its long-term growth potential.
- Despite its shortcomings, competition played an important role in shifting the focus to service outcomes as opposed to basic provision of physical assets. It sharpened the perspective about the function of infrastructure from what it is (the asset), to what it does (the service). It was this outcomes perspective that ensured markets were dynamic, and driven by whichever strategy had the better feature for its customers.

Australia was one of the first nations to reform its airports, and 2016 represents the 20th anniversary of these important public policy initiatives.

Australian airport reform

Giving permission for greater adaptability, more innovative and better risk management

The mid-1980s to the early 2000s in Australia was an important period of modern infrastructure reform when both state and federal governments created an opportunity to shift away from cumbersome, inflexible and bureaucratic procedures for investing and managing major infrastructure to a more disciplined and an evidence-based regime. This was in the form of the corporatisation of government trading enterprises, especially in the telecommunications, energy and water utilities, which heralded significant improvement in asset management, productivity and customer satisfaction. It was followed by privatisation for some areas, most notably telecommunications and airports, which will be examined in further detail below.

Australia was one of the first nations to reform its airports, and 2016 represents the 20th anniversary of these important public policy initiatives.

Australia's experience post-privatisation demonstrates the importance of applying proper governance arrangements for more efficient investment and service outcomes directed at customers, made up of airlines as institutional customers, along with retail passengers and most importantly the community.

The airport sector has, and will continue to be, exposed to considerable disruption and is on the front line of shifts in economic and demographic changes. The micro-economic reform of airports is a valuable case example in examining how market-led, customer-focused governance is much better equipped to anticipate and respond to a dynamic market environment. Global macroeconomic changes, such as volatile oil prices, changes in passenger demand facilitated by the development of low-cost airlines, and geopolitical factors all add to the uncertainty and complexity of managing these assets, and the services they deliver.

Brief history

Proposals to divest airports were announced by the Keating Labor Government in the 1994-95 Federal Budget. The Airports Act 1996 established the regulatory framework for privatised airports, with privatisation of individual airports then pursued by the Howard Coalition Government. The Federal Airports Commission began divesting airports in 1997 with the sale of Melbourne, Brisbane and Perth airports. In 1998, Canberra, Adelaide and Gold Coast were privatised. Finally in 2002, Sydney Airport was privatised.

Critical to these governance arrangements was a move away from previous government arrangements put in place in 1997 that effectively required airports to secure the permission of the Australian Competition and Consumer Commission's (ACCC) for every piece of aviation investment. Decision making for investing for both strategic and operational matters was slow, cumbersome and struggled to reconcile competing commercial interests. One of the significant benefits of privatisation was that airports were able to respond proactively to a changing market environment, making capital investments that included developing new runways to cater for a new generation of aircraft and airport terminals that serviced low-cost carriers.

Regulatory settings

Airport privatisation in Australia occurred as part of a broad program of asset sales by both Labor and Coalition governments that included such corporations as the Commonwealth Bank of Australia, Qantas and Telstra. The primary focus of asset sales was to address fiscal imbalances coming out of Australia's 1990-1992 recession. In establishing the regulatory environment for privatisation, the Australian Government passed the Airports Act.

The Airports Act 1996 has played a critical role in establishing a regulatory environment that supports customer service and new capital investment. Of particular note, under Section 71 of the Act, airports are required to establish a master plan that includes specifying, under Section 71 (2) (a), the development objectives of the airport. The Act also specifically empowers the ACCC to monitor the quality of services and facilities and enables ACCC to publish quality of service information.



Evolution in aviation

According to Airports Council International's annual survey of 818 airports that collectively cover 4.8 billion passengers, the aviation industry is experiencing strong growth, with global passenger traffic growing by 6.1 percent in 2015.¹⁹ Industry income as a whole is growing faster than passenger growth, with an 8.2 percent increase in income to US\$142 billion in 2014. In Australia, domestic passenger growth was flat during 2014–15 with a rise of just 0.7 percent across the four major airports, while international passengers grew 3.7 percent.²⁰

The increase of 6.1 percent in 2015 is consistent with a decade-long trend. Airlines collectively are carrying 1.2 billion more passengers today than they were ten years ago. Australia has grown from 7.7 million inbound seats in 1993 to 21 million in 2013, with an average annual growth rate of 5.1 percent.²¹

One of the reasons for the growth of airlines passenger over the last decade is the rise of low-cost carriers (LCC). LCCs, which first developed in the US, represented 31 percent of seat capacity by 2012.²² In Europe, LCCs represented 37 percent of seat capacity by 2012, while in Mexico they represented 60 percent.²³ In 2013–14, LCCs accounted for around 16 percent of total international passenger traffic in Australia.²⁴

The evolution of the aviation industry globally is changing the business models of airports. The structural shift has opened up new retail investment for airports, which typically target 50% of revenues from non-aeronautical revenues.²⁵ Research has demonstrated that leisure travellers spend more time at an airport than business travellers, which influences the amount that is spent. The longer the time spent at an airport, the more passengers and visitors will spend.²⁶

There is no reason to expect that the structural shift is complete. From the perspective of airports, rather than airlines, this has been a fundamental change, with the shift away from the original air services model, which was about servicing an elite few, towards servicing mass markets.

It is clear that more people are travelling globally. But what is the impact? Research has demonstrated links between LCCs and tourism.²⁷ But does increased travel generate broader economic impacts? The World Bank has investigated whether LCCs can be catalytic by affecting employment and income generated by economic activities that rely

on the availability of air transportation. Studies have investigated how it affects flows of labour, migrants, knowledge and business connectivity. The World Bank concluded the development of air services can have a crucial impact on the aviation market, and consequently on other related and even unrelated industries. According to the World Bank, studies have shown air transport to have a considerable positive impact on employment, GDP, trade, tourism, and productivity, among others.²⁸

There is no doubt we have seen that low-cost carriers opened up new markets. But what will the next decade bring? For airports this is a significant question as capital investments take time to plan and execute.

Renowned urban planner Richard Florida argues we are witnessing an explosive growth of cities and urban areas worldwide. Florida argues that an impact of globalisation is “the tendency for higher-level economic activities such as innovation, design, finance, and media to cluster in a relatively small number of locations”.²⁹ For service economies based around creativity and knowledge, airports provide the connectivity that is essential for the circulation of ideas.

We have seen a structural shift over the last twenty years that was not fully anticipated at the time that Australian airports were privatised. It can be argued that the relationship between airlines and airports has now been inverted. Historically it was airlines that were more important than airports. Aircraft were scarce commodities while airports were fixed assets that required little more than building a runway and a terminal. Evolution of the aviation sector is likely to continue. The question is how is the industry adapting to changing circumstances?



Are airports adapting?

Privately owned airports have had to navigate a highly dynamic market environment. This involves balancing the investments in both large-scale projects, such as new runways and from terminals through to smaller investments that entail decongesting and removing bottlenecks from their existing infrastructure. Critically these decisions are subject to the rigors of balance sheet management to retain investor confidence that plans are in shareholder interests, as well as retaining the confidence of regulators and community support.

Over the last twenty years, Australian airports have needed to respond to a number of market developments. Some of these are listed and discussed below.

New generation aircraft

The development of the Airbus A380 and Boeing 787 Dreamliner required adaptations to runways at Australian airports. In 2005, Melbourne Airport was able to achieve a global first by widening the main 3.7 km long runway by 15m, upgrading the entire runway lighting and guiding system, replacing 60 distressed runway slabs and installing a series of stormwater and drainage systems within a timetable of six weeks while keeping the airport operational.³⁰

New terminals to service low-cost carriers

The rise of low-cost carriers created demands for new terminals designed specifically to meet the needs of passengers. One example is Melbourne Airport's Terminal 4, which opened in August 2015 and will service Tigerair Australia, Jetstar and Rex.

Demand for increased services

Airports have proactively sought to adapt to a changing aviation marketplace. The regulatory environment has also supported adaptation. The *Airports Act 1996* established a requirement under Section 71 for airports to establish a master plan that specifies development objectives. Master plans must also establish the strategic direction for efficient economic development at the airport over the planning period. In the last two years, Australia's major airports have had new master plans approved that will result in significant new capital investment over the next decade, and which are outlined in Box 2.

In contrast to Australia's regulatory settings that establish long-term master plans and a strong and attractive investment environment, airport capital expenditure in the US is managed through the Federal Aviation Administration's (FAA) Airport Improvement Program through which airports apply for funding. US airports that are almost entirely owned by local governments rely on the FAA for

Box 2: Summary of airport master plans

Adelaide Airport: the master plan approved in January 2015 provides for major terminal expansion, a 250-room hotel and an office complex within next five years at a cost of \$1 billion. It includes a plan to accommodate new generation aircraft, including the A380 and Dreamliner and build upon the existing 785ha site offices.

Perth Airport: the master plan approved in January 2015 provides for a third runway, hotel, and an Airport Link that will include two railway stations and a new terminal.

Brisbane Airport: the master plan approved in February 2015 commits \$4 billion to fund the new projects, including a new parallel runway (largest privately financed in world) and over the next 10 years establishing a Brisbane Airport precinct.

Sydney Airport: the master plan approved in March 2015 includes a new ground transport network for Terminal 2 and Terminal 3, a 430-room 4–5 star hotel and redevelopments to improve passenger access and convenience. A supplementary airport to serve the growing demand of western Sydney is considered as part of the master plan.

Melbourne Airport: the master plan approved in 2013 provides new east-west runway to meet capacity demands. It lays out plans for \$10 billion investment in airport infrastructure over the next 20 years.

capital funding, which principally focuses on small capital requirements such as runway rehabilitation. The ability for US airports to respond proactively to the changing market is limited to the extent to which the FAA can approve and fund improvements.

Compared to the US system, Australia's privatised airports have been able to determine capital needs according to their ability to fund them. They do not rely on the availability of Australian Government funding, and are not overtly influenced by political factors in whether they are able to develop or not. The Productivity Commission has stated that, since 2002, infrastructure investments in the airport sector have increased by around \$9 billion.³¹ It is questionable whether this amount of funding would have been allocated to airports if they were still owned by the Australian Government.

Room for investors to step up

The importance of infrastructure assets to the economy and local community is one of the main reasons they are so attractive to investors. A clear consequence of this is that investors should have a strong interest as to how these assets are managed – especially from the perspective of customer satisfaction and ongoing community acceptance.

The investors' mandate includes the need to exercise a legitimate interest into how their managers are in fact managing their infrastructure customers, and whether enough capital and effort are devoted to the betterment of the asset and strategic relationships. Both go to the heart of long-term enterprise value.

That said, it is important to understand that investors are not homogeneous. The way an investor approaches an asset reflects their particular objectives. An asset owner may even have different objectives depending on what it is seeking to achieve from owning a particular asset. The reason for this is that large asset owners – insurers, superannuation and pensions funds, and sovereign wealth funds – build a diversified portfolio of assets that generally include a range of different asset classes.

A large superannuation fund may, for instance, appoint an infrastructure investment manager to invest in infrastructure assets. Another manager may be appointed to invest in fixed interest assets that

may include infrastructure debt. The challenge of investing billions of dollars of other people's money – which is what institutional investors are tasked to do – inevitably results in large asset owners owning in many cases thousands of individual investments spread across different asset classes.

The reality is that a superannuation fund may not necessarily be aware of each decision that an investment manager makes on its behalf.

Institutional investors, including Australian superannuation funds and sovereign wealth funds, have been able to deliver long-term investment returns in a way that is in the community's interests. However, because of the way institutional investments are structured, we cannot assume that the interests of infrastructure asset owners will automatically align with the community's interests.

Establishing an environment where the community supports privatisation requires establishing an accountability framework for both governments and investors.

For governments, the objective of privatisation should not be based mainly on revenue raising, but on the long-term efficiency of the assets, and managing them responsibly.

In the case of infrastructure assets owners, a conversation is required about developing new accountability standards. The importance of infrastructure assets to the community and to a local economy – which is one of the main reasons that they are so attractive for investors in the first place – means that stakeholders have an interest in how assets are managed. This includes not only a legitimate interest in how investors are managing infrastructure consumers and whether enough capital investments are being made to maintain the quality of the asset, but also to ensure the asset meets future customer needs.

Chapter highlights

Australia has a rich case history of successful privatisations, many of which have stood the test of time and delivered a solid record of performance in community satisfaction and investor attractiveness. Despite this context, the political economy for asset privatisation has been negative and attracted community criticism.

The planning of infrastructure is a very valuable period for policymakers because designers and engineers have the benefit of exercising the most flexibility in testing concepts and designs with their objectives.

But there are questions as to whether planning periods are used to their full advantage.

A culture and expectation has evolved that it is better to provide infrastructure services in an environment of no surprises.

While the power of contractual certainty can be necessary and attractive to quickly mobilise resources in the early life of a project, these benefits can attenuate overtime.

High certainty contractual arrangements can blunt the willingness of proponents to learn, adapt and repurpose their assets and services as time progresses and circumstances may warrant it.

The economics of flexible design allows the building phase to meet the immediate demand, but with options to add more as growth occurs.

The Better Infrastructure Futures Framework highlights that longer contract terms are confronted with greater uncertainty and opportunity. The benefits of the contractual certainty to the concession holder to ensure stable and ongoing operations at project inception maybe valuable, but are not costless. Loss of incentive through inflexible contracts to learn and adapt to new technologies and customer preferences undermines the potency of infrastructure to serve the nation over the long term.

From an infrastructure markets design perspective, long-term dynamic efficiency can only be achieved when the market explores the uncertainty and opportunity strategic space shown in Figure 3.

Privatised business engages the future uncertainties of the market as a matter of course in allocating capital and managing risks; without the administrative complexity and constraints of being bound to a long term fixed contract.

Privatised airports are continuing to adapt, prioritising investments that will enhance passenger experience, including efficient gate transfers. Outside of direct aeronautical-related expenditure, airports are investing in precincts through office, shopping and hotel developments. While Australia's airports are adapting to the future, as a nation we need to understand the changes that are occurring in the global economy and the role the aviation sector has to play in fostering connectivity. This requires a renewed focus on microeconomic reform, including considering an open skies policy for Australia.

The ability to respond proactively to an evolving market environment would have been considerably different if airports were managed as a PPP, simply because their capital and operational decisions would have been subject to a highly specified contract that would have not been as dynamic or free flowing in respect of customer interaction and decisions about capital investment.

Given the complexities and uncertainties of the strategic and operating environment for airports and their success in dealing with this, a strong case exists for this model to be considered for other areas of infrastructure, and in particular land transport. Disciplined balance sheet management, a strong focus on customer interaction with accommodating regulatory structures to use and adapt the assets to the maximum benefit of customers and shareholders are critical ingredients of playing the long game.

Final remarks

Infrastructure is not a low risk activity and it must be managed for the long game; it faces an array of complexities and uncertainties in its future strategic and operating environment. The most effective way of dealing with these is through disciplined balanced sheet management, a strong focus on customer interaction and to use and adapt assets to the maximum benefit of customers and shareholders.

Australia's policymakers must reconcile their rhetorical argument that infrastructure is for the long term, with a commitment to ensure governance arrangements can better accommodate change so assets and services can adapt to future uncertainties and opportunities. This is a precondition to ensuring infrastructure is a catalyst for innovation and productivity and not a drag on it.

There is a great deal of benefit to owners and customers in repurposing legacy assets to work alongside other transport modes and new technology.

Infrastructure is not a low risk activity and it must be managed for the long game; it faces an array of complexities and uncertainties in its future strategic and operating environment. The most effective way of dealing with these is through disciplined balanced sheet management, a strong focus on customer interaction and to use and adapt assets to the maximum benefit of customers and shareholders.

It is from this perspective the community and economy can be better served when infrastructure is delivered where ever it is possible to do so by businesses with customers rather than as projects with inflexible contracts less sensitive to customer service and strategically dealing with future uncertainties.

The role of PPPs in infrastructure provision in Australia is important. However, the short-term efficiencies of PPPs in mobilising resources at project inception (on time and to budget) needs to be matched with long-term efficiencies gained from deeper customer interactions.

However, in certain circumstances using a contract such as a PPP to establish a framework to deliver defined outcomes in the future runs the risk that it may not fit with nor at least reflect the more dynamic market requirements of future customers.

While low risk and investor certainty to the future has been a powerful attractor within the investment community for infrastructure, these contractual assurances must ensure critical assets (energy, water and transport) are neither resistant to change nor are they a productivity laggard on the economy.

The next generation of PPPs must have the effect of choosing outcomes that are very customer focused.

For land transport, significant work is needed to prepare government and the public for further reform of Australia's arterial road network. Highways England is a relevant international example to inform the Australian agenda without excluding

Infrastructure is not a low risk activity and it must be managed for the long game

the possibility of even more intense private sector involvement in the future. The states must have the long term financial capacity to meet the full costs of running their arterial roads as this is critical to the viability and success of adopting a corporatised arterial road model.

Privatisation continues to be a sensitive conversation with the community. This is to be expected and requires more astute public policy reasoning and the development of clear objectives to guide and manage inevitable conflicts.

For the privatisation of public monopoly assets to be socially accepted there is a need for good public policy governance standards that can reconcile short-term and long-term issues. Just as governments have a role to play in establishing an environment for successful privatisation, so too do investors. In fact investors are central to the process of deepening the market of opportunities to improve both productivity and community amenity for which infrastructure is core. By consistently demonstrating long-term responsibility and stewardship are at work in every decision of the asset owner is a critical step towards consolidating trust and showing the values and behaviours of these infrastructure markets are worthy of community acceptance.

These issues were alive during the sale of Sydney Airport, and while it has been scrutinised and deemed to have been a good public policy outcome,³² one area of questioning persists in respect of the monopoly powers associated with building a second Sydney Airport.

For the owners of infrastructure assets, a conversation is required about developing new accountability standards. The importance of infrastructure assets to the community and to a local economy – which is one of the main reasons that they are so attractive for investors in the first place – means that stakeholders have an interest in how assets are managed. This includes a legitimate interest in how investors are managing infrastructure consumers and whether sufficient capital investments are being made to maintain the quality of the asset, but also to ensure the asset is delivering services to meet future customer needs.

Historically, societies have always faced uncertainty and change. Successful societies can take on these challenges by being flexible and adapting to whatever the future might throw at them. Australia has very good form in this regard, as a small, dynamic and open economy to international trade. It is critical we do not lose these credentials, and a first instalment to retaining them is to ensure governance settings for infrastructure do exactly that; embrace innovation and let the customer lead the nation in ensuring the infrastructure assets and services, both big and small, are fit for purpose and ready for the next wave of change.

This is what constitutes good governance and playing the long game.

Appendix A

Infrastructure governance in urban arterial roads and urban passenger rail

Infrastructure governance arrangements for purchasers of urban arterial road and urban passenger rail services

Service	Jurisdiction	Model/entity/funding	Entity objectives	Entity KPIs
Roads	1. VIC	VicRoads, a statutory authority, has the full range of responsibilities from planning to delivery; Annual budget allocations are primary funding source, with some commercial revenues	Four broad objectives relating to: 1) Ease and reliability of travel 2) Connectivity 3) Road safety 4) Environmental sustainability	Relate to each objective: 1) Travel time variability (peak/off-peak) - Cycling trips to work - % bicycle mode share of trips to work 2) Average travel speed (peak/off-peak) - Average delay (0-1 index) (peak/off-peak) - Total vehicle km travelled 3) Deaths and serious injuries 4) No of significant environmental incidents
	2. NSW	Roads and Maritime Services (RMS) is a corporatised delivery agency; Annual budget allocations, provided through Transport for NSW – purchaser of RMS’ services – primary funding sources. Some commercial revenues	Objectives are delivery focused	Relate to four areas: 1) Travel time and reliability (6 KPIs) 2) Asset quality, renewals maintenance (7 KPIs) 3) Access (1 KPI) 4) Safety (2 KPIs)
	3. UK	Highways England is a government owned company and is the network operator and responsible for delivery of investments. Its performance is monitored by the purchaser of its services – Department of Transport – and two independent agencies. Funding largely through Budget, on 5-year allocations.	Objectives are to meet its KPIs, and other PIs	8KPI areas (with targets): 1) Making the network safer (deaths and serious injuries) 2) Improving user satisfaction (surveys) 3) Supporting the smooth flow of traffic (average vehicle distance per minute) 4) Encouraging economic growth (average delay) 5) Delivering better environmental outcomes (noise, biodiversity) 6) Helping cyclists, walkers and other vulnerable users of the network (crossings upgraded) 7) Achieving real efficiency (savings in CAPEX and maintenance) 8) Keeping the network in good condition (pavement condition)

Rail	4. VIC	Public Transport Victoria (PTV) is a statutory authority with responsibility for all public transport (ie rail, tram and bus). PTV contracts service delivery to independent operators. Primarily budget funded annually. While passengers do pay fares, little is passed through to PTV	Broad objective: Primary objective is to plan, coordinate, provide, operate and maintain a safe, punctual, reliable and clean public transport system	Key KPIs relate to: 1) Service reliability 2) Punctuality 3) Customer Satisfaction (Detailed KPIs set in contracts with delivery entities)
	5. NSW	Sydney Trains, a publicly owned entity, is the operator and maintainer of metropolitan rail services. It operates under a Rail Service Contract with Transport for NSW.	Six strategic objectives, relating to: 1) Safety 2) Customer, accessibility and Travel 3) People 4) Business 5) Assets 6) Environment and community	Headline KPIs (targets and actuals relate to): 1) Punctuality 2) Customer Satisfaction Other KPIs relate to specific objectives, although some objectives have no KPIs and some KPIs have no targets

1. VicRoads (2015). Annual Report 2014-15. (pp. 7-21)
2. RMS (2015). Annual Report 2014-15. (pp.7, 11, 39)
3. Department of Transport (2015). Road Investment Strategy: for the 2015/16 - 2019/20 Road Period. March 2015
4. PTV website
5. Sydney Trains (2015). Annual Report 2014/15.

Appendix B

Overview of selected road contracts

Selected Road Contracts	
VIC	a. City Link (1995) b. East Link (2004) c. Pen Link (2010)
NSW	d. Cross City Tunnel (2002) Renegotiated 2007 after sale following receivership e. NorthConnex (2015) f. Stewardship Maintenance Agreements (South Zone 2013)

End notes

1. Organisation for Economic Co-operation and Development (OECD), *Historical population data and projections (1950-2050)*, viewed 21 June 2016, http://stats.oecd.org/OECDStat_Metadata/ShowMetadata.ashx?Dataset=POP_PROJ&ShowOnWeb=true&Lang=en
2. Flyvbjerg, B., Bruzelius, N., & Rothengatter, W. 2003, *Megaprojects and Risk: An Anatomy of Ambition*. Cambridge University Press
3. A good overview is provided in Straub, S. 2008. *Infrastructure and Development: A critical appraisal of the macro level literature*. World Bank Policy Research Working Paper 4590.
4. Goldsmith, H. 2014. *Long Run Evolution of Infrastructure Services*. CESinfo Working Paper No 5073, Category 1: public finance, November 2014.
5. Ibid, p.5 and *The Future of National Infrastructure Systems (A system by system approach)* edited by Jim W. Hall et al Cambridge University Press, 2016 p.5
6. Ibid, p.13
7. Bowditch, G. 2016. *Re-establishing Australia's Global Infrastructure Leadership, Better Infrastructure Initiative*. Policy Outlook Paper No. 1, John Grill Centre for Project Leadership, University of Sydney.
8. Hajkowicz S., Hannah Cook H. & Anna Littleboy A. 2012. *Our Future World, Global Megatrends that will change the way we live: 2012 Revision*. Commonwealth Scientific and Industrial Research Organisation (CSIRO).
9. FP Think. 2014. *Effects of Next-Generation Vehicles on Travel Demand and Highway Capacity*. White Paper 012414. Available at: http://orfe.princeton.edu/~alaink/papers/fp_nextgenvehiclewhitepaper012414.pdf
10. Bureau of Infrastructure, Transport and Regional Economics (BITRE). 2015. *Traffic and congestion cost trends for Australian capital cities*. Information Sheet 74. Available at: https://bitre.gov.au/publications/2015/files/is_074.pdf
11. Kalanick, T. 2016. *Uber's plan to get more people into fewer cars*, TED Ideas worth Spreading, February 2016.
12. Ibid
13. HOT lanes are used in the United States for certain PPP motorways where the customer wants a guarantee to travel at the speed limit any time of day.
14. NSW Treasury. 2014. *Guide for Submission and Assessment of Unsolicited Proposals*, 2014; Victorian Department of Treasury and Finance, 2014, Market-led Proposals Guideline, November 2015.
15. Ibid, Message from Treasurer
16. Victorian Department of Environment, Land, Water and Planning website: <http://www.delwp.vic.gov.au/>
17. de Neufville, R. & Scholtes, S. 2011. *Flexibility in Engineering Design*. MIT Press, Cambridge, Massachusetts, pp.58
18. Adapted from Freeman, Christopher. 1992. *The Economics of Hope. Essays on Technical Change, Economic Growth and the Environment*. Pinter, London
Freeman, Chris, and Francisco Louçã. 2001. *As Time Goes By: From the Industrial Revolutions to the Information Revolution*. Oxford University Press.
Goldsmith, H. 2014. *Long Run Evolution of Infrastructure Services*. CESinfo Working Paper No 5073, Category 1: public finance, November 2014.
19. Angela Gittens, Director General, ACI World (London, England). 2016. Keynote address from the ACI 8th Annual Airport Economics and Finance Conference, London, England, 8 March 2016. Available at: www.aci.aero/News/Speeches/2016/03/08/Keynote-from-the-ACI-8th-Annual-Airport-Economics-and-Finance-Conference-by-Angela-Gittens-Director-General-ACI-World-London-England
20. ACCC. 2016. *Airport Monitoring Report 2014-15*. Canberra: Commonwealth Government.
21. Australian Airports Association. 2015. *Liberalising Australia's Air Services Agreements: An Economic Opportunity*, August 2015.
22. International Civil Aviation Organization (ICAO). *Air Transport Policy and Regulation*, viewed 25 July 2016. Available at: www.icao.int/sustainability/Pages/Low-Cost-Carriers.aspx
23. The World Bank. 2015. *Can Low-Cost Carriers Help Developing Countries Take Off?*, viewed 26 July 2016. Available at: www.worldbank.org/en/news/feature/2015/02/24/can-low-cost-carriers-help-developing-countries-take-off
24. Productivity Commission. 2015. *Australia's International Tourism Industry*. Productivity Commission Research Paper, February 2015
25. Flores-Fillol, R., Iozzi, A. & Valletti, T. 2014. Platform Pricing and Consumer Foresight: The case of airports, CEIS Working Paper No. 335, Research Paper Series, 13 (2), October 6, 2014. Available at: http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2585098
26. Keating, B., Israel, M., Rubinfeld, D. & Willig, B. 2013. Airline Network Effects and Consumer Welfare. *Review of Network Economics* 2013, December 2013.
27. Schlumberger C. E. & Weisskopf, N. 2015. *Ready for Takeoff? The Potential for Low-Cost Carriers in Developing Countries*. World Bank Group, 2015.
28. Ibid
29. Florida, R. (2009). *Who's Your City?: How the Creative Economy Is Making Where to Live the Most Important Decision of Your Life* (Kindle Locations 1008-1012). Basic Books. Kindle Edition.
30. John Holland. 2016. *Melbourne Airport Main Runway Widening*, viewed 26 July 2016. Available at: www.johnholland.com.au/our-projects/melbourne-airport-main-runway-widening/
31. Deloitte Access Economics. 2012. *Connecting Australia, The economic and social contribution of Australia's airports*, May 2012
32. Productivity Commission has undertaken two separate inquiries in respect of airport privatisation. In 2006 and 2011 reviews both found that the more light-handed approach has led to better investment outcomes (ie allows the firm discretion in how to meet regulatory targets)

Authors



Garry Bowditch

Executive Director,
Better Infrastructure Initiative,
John Grill Centre

Garry is an active contributor to the debate on infrastructure governance and investment in Australia and globally. He is uniquely placed to challenge and shape the current and future agenda for cities, regional development and the role of government and the private sector in the provision of infrastructure services. Garry is well known for thought provoking presentations, speeches and reports on the future of infrastructure that have been shaped from his unique balance of commercial and government experience spanning Australia, Asia and the OECD.



Gordon Noble

Principal Advisor,
Better Infrastructure Initiative,
John Grill Centre

Over a 25 year career Gordon has worked in banking and superannuation, as a political adviser and in industrial relations. His previous roles include Director of Investments and Economy at the Association of Superannuation Funds of Australia and Deputy CEO of the Committee of Melbourne. Gordon also works with Inflection Point Capital Management, a UK based investment advisory business and is a Director of the Network for Sustainable Financial Markets and Steering Committee Member for Australian Alliance to Save Energy.



Glenn Maguire

Principal
4Sight One

Glenn has spent much of his career in government – initially in Canberra with the Productivity Commission and Australian Treasury focusing on microeconomic reform matters, and then over 20 years from the late 1980s with the Victorian Government in the infrastructure field in the Treasury, Premiers' and Energy portfolios with experience ranging from policy development to preparation of business cases, assessment of proposals for funding approval, tendering processes, utility reform and the undertaking of privatisations and commercial transactions such as PPPs. Since 2011, Glenn has worked in the private sector as an advisor on infrastructure matters.

Become a partner

Your organisation can strengthen its leadership position globally by teaming with the John Grill Centre. This is a partnership in creating new opportunities through developing critical thinking, collaboration, learning coupled with international experience for organisation's most important resource, your people.

Express your organisations interest to be a Leadership Partner by contacting the John Grill Centre for Project Leadership.

Garry Bowditch

garry.bowditch@sydney.edu.au

Vanessa Buchmann

vanessa.buchmann@sydney.edu.au

+ 61 2 9036 9072

johngrillcentre@sydney.edu.au

sydney.edu.au/john-grill-centre

The John Grill Centre for Project Leadership offers unique executive education and applied research to achieve greater social wellbeing and economic prosperity through projects.

Working with industry and government the centre partners with organisations to build effective leadership and governance capability. Executive education programs in project leadership and project governance are offered through experiential full year and one-day programs as well as bespoke programs for organisations.

Through our partnerships with government, industry and academia we undertake applied research to address the challenges of infrastructure, energy and technology-enabled business transformation to deliver the right projects for the future.