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CORPORATE MOBILITY REVIEW

How Business can Shape Mobility

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ABSTRACT:

This research is based around months of conversation with business leaders across major sectors of the Australian economy. It constitutes a business-led response to the challenge of mobility which is increasingly constraining the productivity and viability of Australian business. As part of the Sustainable Mobility Project, corporate involvement in mobility is investigated at all scales—from the smallest changes in company policy, to strategic new ventures in research and development. An extensive review of the literature is conducted to identify global trends and best practice in corporate mobility management. Transport challenges affecting a range of stakeholders like employees, customers, visitors and suppliers are discussed and various mobility initiatives evaluated. Mobility issues like flexible work, location policy and precinct-level travel management are also considered, before looking to new futures in urban passenger transportation and related opportunities for business participation. This literature review is coupled with an interview program conducted in Q4 2016 on ten organisations across unique industry sectors. Concurrent stakeholder engagement with Sustainable Business Australia member companies provided valuable ongoing feedback and ensured that emerging ideas could be adequately tested.

The findings revealed a divergence across the business community's involvement in mobility. Whilst some companies had a coherent strategy in place operationalised through worthwhile initiatives, others paid lip service to mobility issues and failed to translate the challenges they identified into action. There were some exceptional, forward-thinking leaders innovating to enter the future mobility marketplace with visions and targets set until the end of the century. Based on these findings, recommendations were then developed for businesses across sectors with the aim of generating dialogue and debate amongst the business community. These include: (1) collaborate across three dimensions—vertically within one's own value chain with suppliers and customers, horizontally with competitors and other sectors, and orthogonally with government and industry associations; (2) challenge the status quo—whether it be on work practices, company culture or mobility solutions to lead new thinking across the organisation; (3) devise a mobility management plan—regularly survey stakeholders across the business (employees, customers, visitors and suppliers) on a range of indicators to understand their mobility requirements, and use this data to inform mobility initiative development; and (4) innovate to compete in the new mobility paradigm, adapting the company business model and seizing new opportunities as markets evolve. The key lesson here

is that there are ample opportunities for business to shape mobility and that it is never too early (nor disadvantageous) to start the conversation.

KEY WORDS:	***Mobility management, Cross-sector collaboration, Business location, Digital disruption, Mobility as a service (MaaS)***

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1. Introducing the Research

1.1. Overview

Transportation is closely intertwined with our existence as humanity. The movement of people, goods and information have always been fundamental to the operation of human societies, and are increasingly a driving force for the global economy. Cities as a spatial aggregation of people and activities are an attempt to solve the transportation problem. By improving people's access to jobs and opportunities, however, it opens challenges in moving large numbers of people within spatially confined environments. Urban congestion arising from high automobile dominance already costs the Australian economy $16.5 billion per year, with Sydney alone accounting for almost 40 percent of this cost (BITRE, 2015: 22). Coupled with this are unpriced social, economic and environmental externalities which impact businesses large and small as well as the broader Australian community.

Business, as the engine rooms of the Australian economy, are important stakeholders in the transport debate and the move towards sustainable mobility. Businesses are uniquely placed as a conduit between government and individuals to influence the travel behaviour of their employees, visitors, customers, suppliers as well as the public at large through the products and services they bring to market. The success of the business community is also closely linked with the efficiency of passenger and freight transport networks, affecting firm costs, talent attraction and retention, supply chain relationships, customer catchments and even business models.

It is in this context that the **Sustainable Mobility Project** is undertaken—a cross-sector collaboration to lead an Australian business response to the challenges and opportunities of meeting Sydney's mobility needs more sustainably. Led by Sustainable Business Australia (SBA) and a Work Group of SBA members, the project aims to explore what sustainable mobility means for Sydney and how business can bring forward solutions that can shape mobility; through collaborative engagement, innovation and new business models. The project will define and launch a business response to sustainable mobility in Sydney, gaining business ownership and participation in the mobility challenge.

Stage 1 of the *Sustainable Mobility Project*—Framing the Mobility Challenge for Sydney, was based on establishing a baseline of Sydney's sustainable mobility performance benchmarked against global peers. These efforts were concluded in November 2016 with results published in *A Business Perspective on Sydney's Mobility Challenge* (SBA, 2016). Building on these findings, the present research contributes to Stage 2 of the *Sustainable Mobility Project*—Prioritising Solutions and Levering Opportunities for Mobility in Sydney. The focus of Stage 2 is on understanding how business can shape mobility, by identifying best and poor practice both at home and abroad.

1.2. Project Partners

This research is the result of a partnership between Sustainable Business Australia and the Institute of Transport and Logistics Studies at the University of Sydney Business School (an SBA member). **Sustainable Business Australia** (SBA) is the peak body in Australia for the low carbon and environmental goods and services sector, as well as a think tank with a focus on "new markets, new industries and new jobs". SBA represents member companies, public sector enterprises and institutions, business-oriented international non-governmental organisations and community organisations, in turn representing more than 100 000 Australian employees. Through its members, SBA promotes national and global efforts to advance corporate responsibility across leadership and management to generate constructive commercial solutions and responsible shared action. Since 2014, SBA has been an Australian Global Network Partner of the World Business Council for Sustainable Development (WBCSD), and the *Sustainable Mobility Project* sits within WBCSD's global mobility project—SMP 2.0.

The **Institute of Transport and Logistics Studies** (ITLS) is a renowned international centre of thought leadership in the crucially linked areas of transport, infrastructure, logistics and supply chain management. ITLS focuses on providing impartial, evidence based research on these key facets of Australia's economic competitiveness, environmental prosperity and social wellbeing, with a view to inform the management and policy directions of industry and government. Recognised as an Australian Key Centre of Excellence of Teaching and Research in Transport Management since 1995, ITLS holds the Australian government's highest possible rating (ERA 5) for a research institute—well above world standards. The partnership with SBA embodies the University of Sydney Business School's strategic vision "business not as usual" to forge new relationships with industry partners, challenge the status quo, embrace innovation and set future trends in business.

1.3. Research Objectives

The *Sustainable Mobility Project* defines mobility as access, connecting people to opportunities—goods, services, activities and destinations. It focuses on people, their quality of life and the advancement of economic and social development, as much as vehicles, infrastructure and the physical transportation system. Sustainable mobility is then defined as the ability to meet society's mobility needs in a manner that is safe, affordable, accessible, efficient, and resilient, whilst minimising carbon and other emissions and environmental impacts (SBA, 2016).

In the spirit of such definition, this research encompasses a topic area far broader than simply a review of corporate mobility initiatives. Corporate mobility programs have traditionally targeted employee journey-to-work, but are increasingly encompassing broader mobility issues for visitors, customers and suppliers alike. Although there is real value in finding sustainable mobility solutions organisations can introduce to benefit themselves and their stakeholders directly, it is equally important to understand the broader context behind business involvement in mobility. The key drivers for individual mobility initiatives, implementation conflicts between corporate divisions and patterns in mobility management across different industries and sectors are all of interest to this study. Whilst understanding the opportunities and realities for corporate mobility management is crucial, it is also important to investigate the extent to which organisations feel a community sense of wanting to undertake projects or programs that society could benefit from for which they themselves may not directly derive a benefit—in line with the ethos of the WBCSD agenda. Particularly topical are the new mobility opportunities associated with emerging transport technologies (Chapter 7), and what forward-thinking businesses are doing to capitalise on these developments. In summary, the objective for this research is to understand not only business involvement in mobility (for employees, customers, visitors and suppliers), but also to what extent businesses are thinking and preparing for this future transportation paradigm.

The program of work for this research consists of three components (Figure 1). The first task establishes the multitude of ways in which business can shape mobility. Through an extensive review of the scientific and grey literatures, global trends and best practice in corporate mobility management across sectors are identified. This is supported by a program of ten face-to-face, in-depth interviews with key informants from major Australian businesses, with the aim of identifying business innovation domestically and to gain a more thorough insight into the stories behind individual mobility initiatives and business ventures. Finally, the author has been actively engaged with stakeholders through the SBA Sustainable Mobility Program, including participation in roundtables, Work Group meetings and the inaugural Sustainable Development Goals Australia (SDGA 2016) conference. These discussions have provided valuable ongoing feedback on this research from a broader range of prominent Australian businesses.

Figure 1: The three components of this research program on corporate mobility management

This remainder of this report is structured as follows:

- **Chapter 2** motivates the research, presenting the changing landscape in transport planning, the sustainability agenda and the role for business in shaping mobility
- **Chapter 3** discusses some methods for managing employee mobility, covering journey-to-work, business travel and flexible work practices
- **Chapter 4** argues the case for managing customer travel, often neglected in the conversation on corporate mobility
- **Chapter 5** reviews freight and supply chain initiatives, both within and between companies as well as at the interface with the customer
- **Chapter 6** considers the importance of location issues and precinct-level travel management
- **Chapter 7** looks to new futures in urban passenger transport and examines some innovative work in this space by forward-thinking businesses
- **Chapter 8** outlines the empirical data collection process for this research
- **Chapter 9** analyses the findings from the interview program. Included in this chapter are case studies of innovative corporate mobility initiatives or business ventures obtained as part of this process
- **Chapter 10** summarises the report's findings and offers recommendations for business, government and the community

2. The Case for Managing Corporate Mobility

2.1. Paradigm Shift in Transport Planning

The global pursuit of social, economic and environmental sustainability has brought about a new way in how transportation challenges are conceived and addressed. Exemplified by the growing recognition that "you cannot build your way out of congestion", this shift from a capacity and supply focus to demand-side strategies constitutes a new philosophical paradigm that has, in recent years, gathered acceptance across all infrastructure sectors (Guy and Marvin, 1996). Demand management in transport manifests itself through goals like mode substitution, trip degeneration and peak spreading, and is delivered through parking pricing, congestion pricing, vehicle quotas, high-occupancy vehicle lanes, amongst other policy measures.

Table 1 compares and summarises the paradigm shift in transportation planning taking place over the past few decades. The old paradigm revolved around speed, convenience and the affordability of automobile travel, but peaking vehicle usage (at least in developed countries), rising oil prices, increasing urbanisation, health and environmental concerns have led to a new wave of thinking that is more comprehensive and multimodal (Litman, 2013). By extending the traditional engineering mindset to a systems thinking approach, there is far better integration with land use, wellbeing and wider economic objectives. This new approach is consistent with the definition of mobility (in essence, accessibility) of the *Sustainable Mobility Project*. Corporate mobility management is a manifestation of this new way of thinking which reverses the old paradigm by prioritising demand management strategies over infrastructure expansion.

Table 1: A comparison of the old and new transportation planning paradigms (Litman, 2013: 26)

Issue	Old Paradigm	New Paradigm
Definition of transportation	Mobility (physical travel)	Accessibility (people's overall ability to reach services and activities)
Transport planning goals	Maximise travel speeds and minimise user costs	Optimise transport system efficiency and equity
Modes considered	Mainly automobile	Multimodal: walking, cycling, public transport and automobile
Performance indicators	Vehicle traffic speeds, roadway level-of-service (LOS), distance-based crash and emission rates	Quality of transport options, multimodal LOS. Land use accessibility
Consideration of transportation demand management (TDM)	Generally considers vehicle travel reductions undesirable. Considers TDM a solution of last resort	Supports TDM whenever cost-effective
Favoured transport improvement strategies	Road and parking facility expansion	Improve travel options, TDM, more accessible land development
Health impacts considered	Per-kilometre traffic crash and pollution emission rates	Per capita crash and emission rates, physical activity and basic access

2.2. The Sustainability Imperative

The present-day focus on environmental sustainability in business has evolved through three distinct waves of pressure since the 1960s. Initially, the motivation for managing corporate mobility and sustainability in general stemmed from the need to meet external regulations, as well as to reduce

transport related costs (OECD/ITF, 2010). This need for compliance was particularly prevalent with the increase in environmental legislation in the Organisation for Economic Co-operation and Development (OECD) region through the 1970s (Elkington, 2006). The next wave can be defined in terms of risk management as businesses sought to avoid potential downstream issues like land contamination. During this time, the landmark report *Our Common Future* (Brundtland et al., 1987) placed the social and economic considerations firmly on the environmental agenda, introducing the notion of "ecologically sustainable development" and focus on the triple bottom line.

In the third wave, sustainability has been placed as part of business' core agenda, and seen as a source of competitive advantage with clear monetary benefits for business. Smart mobility solutions, for instance, can be a source of direct or indirect revenue for businesses. Increasingly, it can also be seen as a corporate social responsibility initiative, voluntarily going 'beyond compliance' (Boyle and McGuirk, 2012) to meet anticipated shifts in governance and community values. Often, such initiatives are still dominated by the economic imperative (Boyle and McGuirk, 2012), with businesses positioning themselves in the market to compete not just for customers, but also to attract the best workers. This is especially true for young professionals who are arguably more invested in the sustainability agenda (Boyle and McGuirk, 2012). For some transport-related organisations, mobility management programs are also directly linked to their immediate line of work as a major stakeholder in the transportation space. These three waves—labelled *limits*, *green* and *globalisation* in Elkington (2006)—have seen the sustainability agenda gradually moving from the realm of public relations managers and lawyers to the boardroom and into corporate strategy (Elkington, 2006).

Despite these developments, there is evidence that Sustainability Divisions within business remain under resourced, an ever-present challenge that results in these divisions being seen as better risk managers than opportunity seekers. The key challenge for sustainable mobility is that it is an extreme cross-cutting issue touching on numerous different parts of business management functions. This makes it difficult to assign an owner to comprehensively manage the issue (with present responsibility devolved anywhere from Fleet/Facilities Management to Human Resources), and by extension, develop cross-functional mobility management teams or to receive external expert advice. A key question is whether mobility can become like other aspects of sustainability, with businesses considering the issue from a competitive advantage (or revenue generation) standpoint to become part of their core business. This is the major impetus for this study's focus on emerging transport technologies and opportunities for forward-thinking businesses to innovate and test new business models, discussed at length in Chapter 7.

2.3. Business as a Unit for Intervention

In seeking to alter human behaviour, mobility policies have traditionally focused on individuals and households or aggregated spatial units like municipalities and cities (Vanoutrive et al., 2012). Area-wide policy and planning allow transport issues to be diagnosed at a larger geographic scale, recognising network effects on the experience of individual agents. A logical alternative is to target organisations—including private sector businesses, public agencies as well as civic institutions like schools, universities and hospitals. These workplaces are not only important stakeholders in the community, but also, in effect, an aggregation of trip destinations shared by many individuals. Each workplace is a physical location with a set of accessibility characteristics, making it an ideal unit for targeting mobility policies to employees, visitors, suppliers and customers. Finally, workplaces are not only physical environments, but also social settings where employers enjoy a privileged relationship with employees, offering themselves as a conduit between governments and individuals (Van Acker et al., 2010, Vanoutrive et al., 2012).

Corporate mobility programs are specific to each company and vary significantly across jurisdictions because of institutional context (Van Malderen et al., 2009, Vanoutrive et al., 2010). The landmark review OECD/ITF (2010) of best practice in corporate mobility management placed mobility (travel) plans at the centre of this strategy. A mobility plan consists of five stages including a diagnosis of the status quo, the setting of well-defined targets to be achieved, an action plan defining the range of measures and allocating responsibility for the delivery of each, a work plan for implementation and a final evaluation stage to determine the success of each initiative. In terms of specific initiatives, the review categorised them according to four travel types and three measure types (OECD/ITF, 2010). The travel types included home-to-work travel (commuting), business travel, energy efficient car use and customer travel, whilst measure types encompassed infrastructure, organisation and incentivisation, and finally, information and awareness raising. The following review of the scientific and grey literatures (Chapters 3-7) adopts this framework by structuring mobility initiatives into ones targeting employees, customers and freight/logistics, followed by a generic discussion on location policy and innovation in the new mobility space. These chapters are not intended to be an exhaustive discussion, but rather, offers a glimpse into some of the debates and trends in corporate mobility management from around the world.

3. Managing Employee Mobility

3.1. Targeting Journey-to-Work

Corporate mobility programs have traditionally targeted employee journey-to-work, whose travel—a regular, daily occurrence—ensures the greatest impact for efforts spent. Typically, the focus of commutes have been on peak periods when transport systems run at capacity, though it is important to note that only one part of peak demand is for journey-to-work. Indeed, research in Melbourne has shown that just one third of morning peak trip purpose is for journey-to-work, whilst a fifth is for travel to education (school, TAFE or university) and the rest (around half) for other trip purposes (McGeoch, 2011). Despite this, commuting carries a mental and physical burden for employees and work-related psychological stressors have been shown to cause unsafe driving behaviour (Turgeman-Lupo and Biron, 2017). Major contributors include interpersonal relationships at work and work/life conflicts, especially familial responsibilities particularly prevalent for women (Kirkcaldy et al., 1997)—demonstrating the need to manage the commute. Businesses yield significant influence over employee commutes by facilitating sustainable mobility options and policies to discourage the use of private vehicles.

Public transport is the preferred mode for travel, being spatially efficient in bringing many people together onto a single vehicle, reducing road space and the need for parking, whilst delivering health and social benefits for the passenger. Businesses can promote transit through measures from covering the cost of tickets, to raising awareness for the product offering, and even chartering shuttle services to and from the workplace (OECD/ITF, 2010). However, mass transit is inevitably reliant on mass, being a viable proposition only when serving travel flows with high volumes. For this reason, the best transit service is found on radial routes/lines which serve the city centre where there is a high concentration of activity. Travel in the suburbs are more dispersed and so serving suburban workplaces effectively remains an ongoing challenge. An extended discussion of these location issues is provided in Chapter 6.1.

The large number of technology firms clustered around Silicon Valley are a prominent example of the follies of campus-style accommodation in suburban settings and the employee shuttles organised by these companies to transport workers from San Francisco to the Valley are a classic example (and potentially to largest concentrated example in the developed world) of businesses directly providing transportation to employees. These employer-provided shuttles were pioneered by Google in 2004 for the express purpose of employee recruitment, retention and productivity. Their full-sized coaches operate to fixed route and schedules, complete with luxury seating, AC power and Wi-Fi on board. Other companies like Yahoo! (2005), Genentech (2006), Apple (2007), eBay (2007) and Facebook (2009) quickly followed suit to provide a similar level of benefit for employees (Dai and Weinzimmer, 2014). Google now operates about 100 buses across 80 shuttle stops across the Bay Area with 380 daily departures and approximately 10 000 daily one-way trips (Dai and Weinzimmer, 2014), and remains the largest service provider (Figure 2).

Whilst employee shuttles deliver a range of benefits, they also bring several issues for the community through competition with public transport and impacts on land use. Mass transit succeeds when it brings people of different socioeconomic status, trip purposes and destinations onto the same vehicle, and so a segmentation of the market can hurt transit viability and lead to a deterioration of service. One caveat is that private service delivery geared towards peak periods can improve the productivity of transit resources (Taylor et al., 2000), by limiting peak demand which defines vehicle requirements, vehicle capacities and staffing levels (De Borger and Kerstens, 2007, Vuchic, 2005). In the Silicon Valley case, only 20 percent of shuttle employees have shifted from public transport, whilst 50 percent have shifted from sole occupancy driving (Dai and Weinzimmer, 2014). In fact, an

estimated 327 000 sole occupancy vehicle return journeys have been eliminated per year from the Bay Area as a result of these shuttle services (Cosgrove, 2010). This is notable as conventional public transport (Caltrain and buses) have always struggled to compete in terms of speed, directness and the number of connections required (Walker, 2012b).
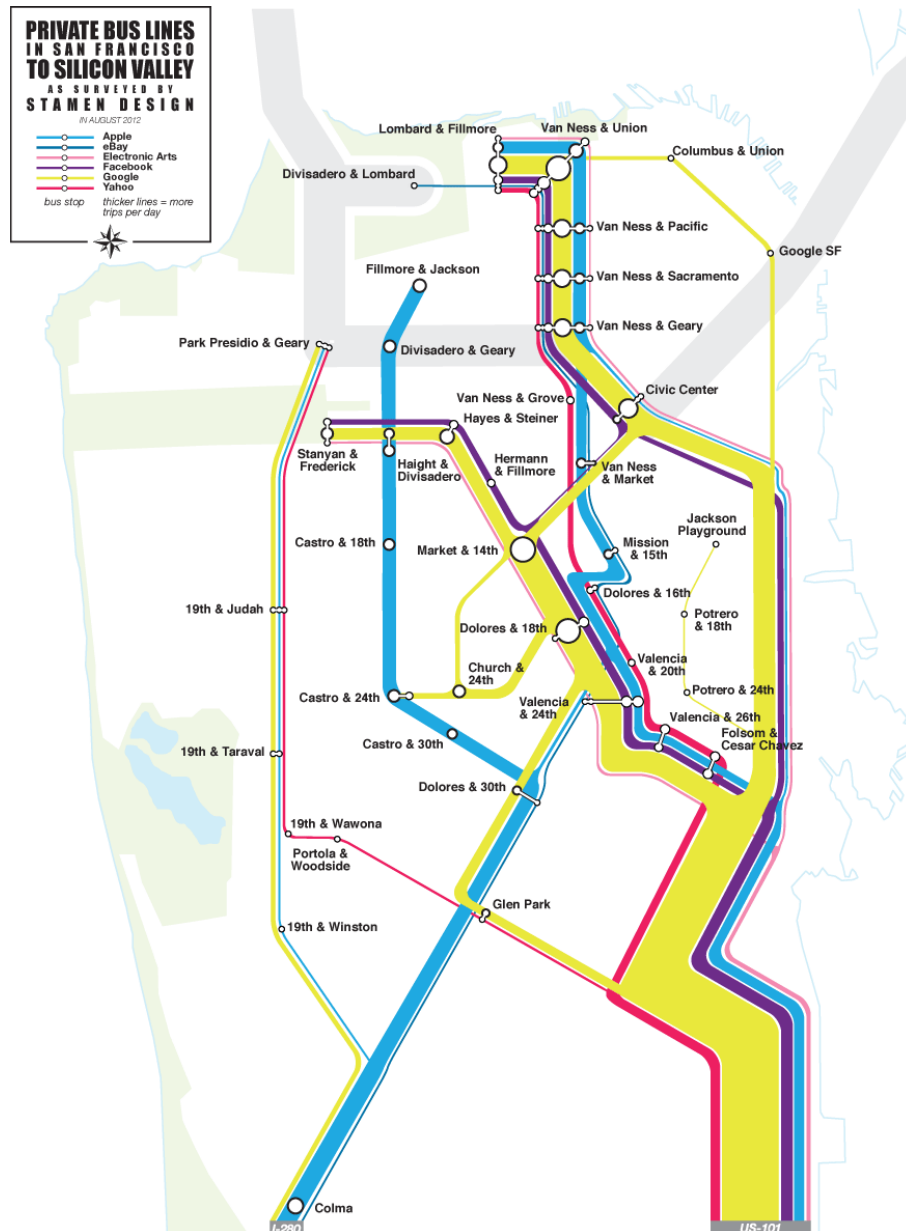

Figure 2: Employee shuttles in the Silicon Valley, coloured by employer and with line widths proportional to service volume (Stamen Design, 2015)

There is also evidence that employee shuttles impact land use and the urban form. Silicon Valley employees have citied the shuttles as their most important employee benefit and have allowed some 22 percent of shuttle users to move further from their jobs since using the service (Dai and Weinzimmer, 2014). This result exacerbates the jobs-housing imbalance by enabling individuals to live further from their place of work, encouraging urban sprawl and directly conflicting with the goals for sustainable cities. There are other models of employee shuttles which may circumvent some of these issues—for instance, shuttles which connect to high-frequency mass transit like railways, rather than offering point-to-point transportation directly from home to work (Minerva et al., 1996). Such model

perhaps better resembles the Australian example of employee shuttles operated by Optus to their Macquarie Park headquarters discussed as a case study in Chapter 9.

Others have proposed that business and local government run shuttles jointly so as to benefit not only employees but also serve other community residents as well (Deakin and Cervero, 2008, Singa and Margulici, 2010), though the exact viability of this will depend on travel time impacts and the mix of passengers on board. Microsoft, based in Seattle, has taken a different tact to Silicon Valley companies through their Microsoft Connector service introduced in 2007. Under a partnership with local transit provider King County Metro, employees are offered a free universal transit pass and dedicated employee shuttles are only provided to augment areas with poor public transport (Cosgrove, 2010). In this setting, "the role of the transit agency can expand from simply that of transit provider to that of travel agent, brokering customer needs with a variety of service providers and providing one-stop customer information on all available travel services" (Singa and Margulici, 2010: 30), similar to some of the new mobility models being introduced through digital applications (Chapter 7.1).

Carpooling represents a low cost, next best alternative preferable to the use of sole-occupancy vehicles (Vanoutrive et al., 2010, Stopher and Stanley, 2014). Carpooling represents a better use of road space, a scarce commodity in dense urban environments, whilst offering virtually point-to-point transportation in the comfort of personal vehicles. The challenge always has been to match the vehicle occupants' origins and destinations, to minimise delay for the driver and passenger(s). A recent analysis of carpooling initiatives in Belgium (Vanoutrive et al., 2012) also drew attention to barriers like taxation and insurance issues. The increasing prevalence of trip chaining (Currie and Delbosc, 2011) also makes organised travel more difficult. Further, unforeseen commitments for the driver may complicate passengers' return journeys (Van Malderen et al., 2009), and so some companies have implemented a guaranteed ride home policy through the provision of taxi vouchers (Stopher and Stanley, 2014). Carpooling also implies a higher level of personal intimacy than mass transit, a psychological barrier for some users (Gardner and Abraham, 2007). However, this is likely to recede with the growth of collaborative consumption and new shared mobility services like ridesourcing and microtransit.

In Australia, the largest challenge identified for shifting away from sole-occupancy vehicles as a commute mode stems from the generous tax concessions which allow employees to write-off cars and parking expenses from their income tax, not possible with public transport fares and alternative travel expenses (OECD/ITF, 2010, Potter et al., 2006). Further, businesses often provide free parking and company cars to attract employees (Vanoutrive et al., 2010), counterintuitively in tandem with their sustainability efforts. Company cars continue to symbolise employment status and are directly linked with seniority, though there are signs that this emotional attachment is shifting. The thinking amongst fleet managers is shifting from a focus on the total cost of ownership towards the total cost of mobility (Neckermann, 2016). Coupled with this is the increasing acceptance of pooled fleets (carsharing amongst colleague) to increase temporal efficiency and avoid having stationary vehicle assets taking up parking. On the issue of parking, recent controversy surrounding the introduction of paid parking in Canberra's Parliamentary Triangle shows the continued importance of free and abundant parking for employees. This measure was made more acceptable through an 18 percent boost in public transport service, which resulted in a 30 percent growth in bus patronage (Wong, 2014). Such blanket schemes can even be regarded as a form of precinct-level travel management (Chapter 6.2).

3.2. Rethinking Business Travel

The need for business travel has been increasing with globalisation and new trends in networking and outsourcing (Gustafson, 2012). Although the ubiquity and capabilities of modern technologies make virtual meetings a more viable proposition, it is unlikely to replace face-to-face interactions for us humans as social creatures. Gustafson (2012) revealed topical issues with status and prestige associated with business travel which make trip degeneration and mode substitution difficult. Indeed, 'hypermobility' is a term coined to describe the corporate elite who take frequent trips across vast distances, accounting for a significant portion of global air kilometres travelled. There has been little work on the psychological and emotional aspects of business travel which can aide its management and the move towards more sustainable alternatives. New trends in extended personal business trips also lends itself as an opportunity to revisit this space in the pursuit of new ways of conducting business.

Technological change has prompted businesses to accept new transport models like ridesourcing, which provides lower fares and no risk of ownership or driver liability (Neckermann, 2016). Uber for Business features automatic invoicing (unlike taxis), which improves employee productivity and reduces overheads on travel expenses management. Airbnb has also built similar capabilities for business into their accommodation products. Another advantage of these services is the consistent experience they offer across countries and continents, greatly simplifying information provision, especially relevant for multinational companies. Uber Travel is a new product in development which integrates airlines, accommodation and local transportation into one booking application. In this way, Uber becomes a digital travel agent—a broker providing an end-to-end travel solution (see mobility as a service in Chapter 7.1), particularly attractive to the business travel market (Neckermann, 2016).

3.3. Flexible Work and Trip Degeneration

Corporate mobility programs and travel plans not only target mode choice but also work practices that may aid trip degeneration or help smooth commuting peaks. Flexible work schedules can help reduce peak congestion (Van Malderen et al., 2009), and compress the working week by allowing employees to work from home. Telecommuting brings reduced costs for the employer and employee, greater productivity and enhanced opportunities for the labour market. This is all predicated on a move from hours-based to outcome or task-based work. One counter argument for these initiatives is that by reducing the number of commuting days, it may entice employees to travel longer distances, thereby encouraging urban sprawl. In Sydney, this manifests itself in such workers moving to the Blue Mountains or the Central Coast in search of a 'tree-change' or 'sea-change'. Flexible work also offers social benefits in helping families juggle familial responsibilities, in particular boosting female workforce participation. One caveat is that flexible often needs to be organised in advance, in which case it is not truly flexible for the employee.

Whilst mobility management programs and travel plans work at a site level, evidence from the United Kingdom shows network effects to be less clear (Rye, 2002). It suggests, for instance, that displaced trips may simply be replaced by another, potentially far worse alternative. Such observation confirms the postulation that humans have an innate desire to travel, encapsulated by the oft-cited Marchetti's Constant (Marchetti, 1994)—the observation that humans travel on average one hour each day (30 minutes one way) throughout history and that faster transportation technologies (horses, to railways, to automobiles) have not reduced this but merely allowed cities to expand in size. Travel plans can also be implemented at many different scales, including at a precinct-level as opposed to an employer. For instance, Connect Macquarie Park + North Ryde brings together local businesses, three levels of government, developers and institutions to deliver sustainable transport outcomes for the business park (see Chapter 9 case study). Rouse Hill Town Centre in northwest Sydney has also

implemented a Travel Demand Management Program with dedicated funding as part of its developer agreement (Wiblin et al., 2012). Beyond this, TravelSmart is a prominent Australian initiative coordinated by federal and state governments to help larger employers develop tailored mobility plans (OECD/ITF, 2010).

4. Managing Customer Travel

Customers are arguably the most important stakeholder for any business, but their mobility requirements are too often neglected in the transport management debate. Customers may be downstream businesses in the supply chain (in which case they constitute visitors), or end users of goods and services for firms in the retail sector. For most businesses, mobility initiatives targeting customers and visitors are very similar for those aimed at employee journey-to-work, in end-of-trip infrastructure, incentivisation and information provision (OECD/ITF, 2010). The retail sector is an exception with its very strong focus on firm location and customer catchment. Many models on location choice have theoretical antecedents in the law of retail gravitation (Reilly, 1931), which suggests that customers are willing to travel longer distances to access larger retail centres, and the central place theory (Christaller, 1933, Lösch, 1954) postulating a hierarchy of settlements. For many retailers, longer customer journeys demonstrate customer loyalty and held as a badge of pride—inconsistent with environmental objectives.

Retail agglomeration in the form of shopping centres have proliferated throughout Australia since their introduction in Chermside, Brisbane in 1957 (Shobeirinejad et al., 2013). Despite this, there remains limited understanding on retail customer travel behaviour, including their destination and mode choice. Recent research suggests shopping centres with food courts have a significant positive effect of customers' destination preference (Shobeirinejad et al., 2013), allowing them to trip chain and complete multiple activities in one journey. This supports the trend for shopping centres to incorporate public facilities like transport interchanges, libraries, childcare services and other civic amenities as part of (re)development, often in partnership with state and local governments.

Demand management strategies are equally important for influencing customer travel. A Knox City Council initiated project in Melbourne's outer east centred around Knox City shopping centre is one of the first major efforts in Australia to manage shopping-related travel (Woodruff and Hui, 2010). Only one other shopping centre in Australia—the Rouse Hill Town Centre in north west Sydney—has established a similarly comprehensive travel plan (Wiblin et al., 2012, Woodruff and Hui, 2010). Research in the United Kingdom show that customers who access shopping centres by active modes or public transport visit more often than car drivers, and that retailers often overestimate the importance of car drivers and parking provision on shopping centre profits (Woodruff and Hui, 2010). Travel plans are a useful means to start the dialogue and generate acceptance across tenants for investment into sustainable transport options. To drive sustainable outcomes, large shopping centres are increasingly required to implement travel plans, developed in conjunction with stakeholders like the centre owner/manager, tenants, local council and transport agencies (Department of Transport, 2016).

Whilst the aforementioned examples are primarily government-led, there is a major industry initiative arising from a conservation partnership between the World Wide Fund for Nature (WWF) and IKEA. Their publication *Sustainable Customer Transportation: An Opportunities Guide for Retailers and Shopping Centers* (WWF/IKEA, 2011) focuses on reducing the carbon footprint of customer transportation which is a substantial source of indirect emissions for retailers. As an example, customer transport to IKEA stores in 2010 produced more than three times the energy emissions of all IKEA buildings (WWF/IKEA, 2011). The report states that "Few companies have sought remedies to the problem of sustainable customer transportation, so there is a chance to take a leadership, trendsetting, and brand-building position in addressing this important issue" (WWF/IKEA, 2011: 5). It proposes eight ways in which retailers can contribute to sustainable transportation: smart shopping, multiple stops per trip, home shopping, improved long-haul efficiency, mass transit and alternative transportation, store location, efficient home delivery and fuel-efficient customer vehicles

(WWF/IKEA, 2011). Included also is a step-by-step guide to help businesses start managing customer transport.

A recent trend in the supermarket sector is the growth of smaller format stores in high density urban environments like the inner suburbs of Sydney. Woolworths Metro and Coles Central are almost entering the space of convenience stores, following an European model that has proliferated in past decades. The model is based on customers making smaller purchases but more frequent trips, closely tied with demographic change, land use and mode choice. People may augment these trips with a visit to a full line store less regularly. A related development is online retailing, which has become almost a precondition for survival in the 21st century marketplace. Here, retailers are transcending the traditional need for customers to travel to their stores and delivering products when and where customers demand them. Recently, Myer opened the world's first virtual reality store in partnership with eBay, which (literally) adds another dimension to the shopping experience. One interesting twist is that whilst the rest of the market is scrambling to secure an online presence, Amazon, itself a pioneer of online distribution channels, has recently entered the brick and mortar space by opening its first store in Seattle. Amazon Go targets fill-in trips for quick errands, and features the world's first checkout free experience which automatically detects items as they are removed from the shelves. These new models of retailing are closely linked with developments in online shopping and home deliveries—the focus of Chapter 5.2.

5. Logistics and Supply Chain Management

5.1. Freight Distribution Initiatives

The movement of freight is an inherent part of the modern economy, allowing regions and countries to reap economies of scale by specialising in their comparative advantages (Rodrigue et al., 2009). Freight initiatives appear to receive less attention in the corporate mobility literature, and rates only a passing mention in other reviews of corporate mobility management (OECD/ITF, 2010). Rather, the overwhelming focus has been on passenger transportation and demand-side management. That said, however, there is substantial literature on logistics and supply chain management—just not framed in terms of corporate mobility management. One reason may be that freight issues are thought to be restricted to the domain of logistics companies, who often undertake outsourced work from manufacturers and retailers to handle freight. The services sector, representing the majority of developed country economies, do not sell physical products and so freight issues are thought to be of less importance. It is worth noting, however, that supply chain issues affect businesses across all industry sectors, as all businesses require material inputs like office supplies and other consumables, and so too are important stakeholders in the supply chain.

Freight transport is facilitated by a variety of modes, each with different costs and attributes relating to reliability, speed, flexibility and security. A major policy direction globally has been to encourage a modal shift from road to rail freight transport, in an effort to reduce the negative externalities caused by trucks. This is hindered by the limited geographic reach of rail, and the need to transport large volumes over vast distances for rail to make economic sense. Ortolani et al. (2011) applied cost estimates on a case study to show that rail transport can be more competitive with road (with a shorter break-even distance), but only by internalising externalities not captured by the price mechanism. One such initiative is the Low Emission Zone in London which charges up to £200 per day for vehicles which fail to meet defined standards (Transport for London, 2017), encouraging logistics companies to green their fleet or shift to rail. The issue of insufficient freight volumes to justify rail transport also manifests itself in the trucking space. The CO^3 project [1] brokered horizontal collaboration between competitors to improve the efficiency and sustainability of supply chains. One such collaboration took place between PepsiCo, Nestlé, STEF, BABM and TRI-VIZOR—all facing the issue of *less than full truck* loads in their delivery of fast moving consumer goods to retail distribution centres (CO^3, 2014). The collaborative freight project [2] helped synergise distribution flows, consolidating truck movements and eliminating empty running to reduce both carbon emissions and transportation costs.

Supply chain initiatives targeting the long distances between producers and distributors are important, but so too are deliveries to retailers and customers which take place in dense urban settings. For couriers, new technologies allow instantaneous rescheduling due to traffic incidents and changes in customer requirements. Machine learning software can even predict disruptions in the supply chain (Premonition, 2017), all helping to reduce vehicle kilometres travelled by 5-15 percent for a given job. Urban freight transport is most challenging in congested central business districts (CBDs), with implications not only on the costs for logistics companies, but also on other road users and the urban realm at large. Transport for New South Wales through the CBD Coordination Office has established a Courier Hub in the Sydney CBD, partnering with city businesses to optimise vehicle sizes (Michael Stokoe, personal communication, 11 October 2016). Deliveries arrive in spatially efficient large trucks which are then distributed onto smaller vans for agility and bike couriers to beat congestion. There are similar moves in London to reduce the number of freight vehicles entering the

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[1] CO^3 was a three-year project funded by the European Union which concluded in mid-2014
[2] This scheme was subsequently awarded the CO^3 Award for Best European Horizontal Collaboration Project

city and to ensure that all available capacity in those trucks are adequately used (Transport for London, n.d.). Specific initiatives include the establishment of micro-consolidation centres closer to delivery points and the use of last mile solutions like cargos bikes and small electric vans. Not only can supply chain collaboration be government-led, but they can also be driven by business. Increasingly, businesses are seeing the shared value which can be unlocked through industry collaboration and new relationships with suppliers. Aircraft giants like Airbus and Boeing, for instance, are redesignating suppliers as project partners which reduces their capital outlay and builds a shared interest in the success of their products. Modern supply chains are agile and based on the premise of 'just-in-time' logistics, reducing inventory costs and allowing the dynamic adjustment of production to better reflect demand. Emerging technological developments like three-dimensional printing will continue to shape supply chains in ways previously not thought possible.

5.2. Online Shopping and Home Deliveries

A growth in home deliveries has been observed with the rise of the 'convenience economy'. Building on the discussion in Chapter 4, click-and-collect groceries and home deliveries are becoming increasingly popular in the supermarket sector. It is inefficient to deliver groceries direct from warehouse to the customer as distribution centres are usually located away from residential areas and because of independent supply chains for fast and slow moving goods (consider milk versus rice as a case in point). Having workers collect goods in store for delivery is also problematic due to conflicting movements with customers. Retailers have streamlined supply chains by introducing dark stores in high density delivery areas—essentially conventional supermarkets not open to customers—which first gained popularity in the United Kingdom, before spreading across Europe. Dark stores have even reached the supermarket giants in Australia, being tested by Coles in Richmond, Melbourne and Woolworths in Mascot, Sydney. One issue is that dark stores usually emulate traditional store designs, characterised by inefficient layouts which seek to maximise product exposure rather than minimise the path for customers. The latest generation of dark stores seek to change this, and incorporate new technologies like mechanised systems which can bring products directly to the 'pickers'.

The question remains whether the growth in online shopping will bring a net benefit for sustainability. Edwards et al. (2010) found home deliveries to be less carbon intensive, but this was contingent on a range of caveats including whether it actually results in trip degeneration, the number of items purchased per visit, the mode choice of customers and their propensity to trip chain. One view is that retail delivery services will induce more consumers onto public transport (Wiese et al., 2015), based on the premise that brick-and-mortar stores are increasingly becoming showrooms, with customers browsing in-store then making purchases online, especially for big ticket items. Issues surrounding missed deliveries (resulting in the proliferation of parcel lockers, notably around transport hubs) and the need for returns, particularly for fashion products, also raises questions for the net impact of deliveries on greening the supply chain. In the food industry, new players like UberEATS, Foodora, Menulog, Deliveroo are creating an online, virtual food court, as well as another opportunity for people to take advantage of underutilised assets. Finally, technological developments like terrestrial and aerial drones (both already trialled by Domino's Pizza) will further alter the delivery landscape.

6. Employer Location and the Land Use Connection

6.1. Travel Management versus Location Policy

The need for mobility management programs and travel plans has been questioned for well-located businesses. Indeed, it is perhaps more prudent to direct company efforts at improving location policy and to situate firm activities in areas of high public transport accessibility. The existing pattern of workplace locations across Greater Sydney is shaped by the increasing suburbanisation of workplaces in Australian cities (Freestone and Murphy, 1998, Fagan and Dowling, 2005). Whilst professional service firms continue to dominate Sydney's Central Business District (CBD) (Boyle and McGuirk, 2012), new employment hubs have sprouted up especially in Western Sydney—in major centres as well as purpose-built business parks like Macquarie Park, Norwest Business Park (Bella Vista) and Sydney Business Park (Marsden Park). These developments address the uneven spatial distribution of employment across the west, bringing jobs closer to where people live and to encourage greater self-sufficiency in communities. Whilst it is laudable from an equality perspective, such developments can also generate challenges in the provision of quality public transport.

Businesses agglomerate for safety, economic and environmental reasons. For instance, the physical clustering of chain industries can reduce freight costs (Van Eetvelde et al., 2007), whilst related businesses located together can benefit from the joint use of utility facilities (Pellenbarg, 2002). The agglomeration of tertiary and quaternary industries in office parks is a more recent phenomenon (Pellenbarg, 2002), and is the result of the segmentation of the location market and government policies to integrate economic and environmental objectives. Business parks achieve symbiosis and utility (Eilering and Vermeulen, 2004), and have even been said to encourage corporate social responsibility (Van Eetvelde et al., 2007). From a transit perspective, however, business parks are notoriously difficult to serve and so many such workers, particularly those in campus-style accommodation, rely on private vehicles as their primary method of commute.

Public transport operates best if it is able to cater for a diverse range of passengers—bringing, for instance, commuters, students, seniors and tourists onto the same vehicle. In this way, the different travelling times and destinations of various passenger types are able to smooth each other out both spatially and temporally (Walker, 2012a, Vuchic, 2005), such that transit vehicles need not cater for the peaks exclusively and run empty at other times of the day. Such travel patterns require a transit-conducive urban form, thought to comprise of reasonably high population and employment densities, land use diversity and a pedestrian-friendly urban design (Cervero and Kockelman, 1997, Ewing and Cervero, 2010). Office parks perform poorly on all three of these measures, though some are arguably better designed than others. Their land use is often very homogenous and low density (Cervero, 1988), with buildings situated behind massive carparks and at vast distances from major arterials. Campus-style accommodation are least favourable, with their nooks and crannies forcing public transport to enter each cul-de-sac individually and thus delay through-riders (Walker, 2012a).

6.2. Precinct-Level Travel Management

Location-specific challenges give rise to the role for a precinct-level travel manager who can broker businesses and generate the critical mass required to implement mobility solutions. Whilst example schemes for shopping precincts are aplenty (see Chapter 4), travel managers with a business park or Central Business District (CBD) focus are rarer. Connect Macquarie Park + North Ryde is one such example which helps member organisations survey employees and devise communications plans, whilst offering a coordinated business response on transport issues to federal, state and local governments. The innovation behind this organisation and their work is further detailed as a case study in Chapter 9. Another example of precinct-level travel management is the New South Wales government's CBD Travel Choices campaign, established in August 2015 to manage the disruption

surrounding construction of the CBD and South East Light Rail. Though modelled on temporary transport management plans of the Sydney and London Olympics, this was a global-first campaign in terms of its size, scale and longevity. It brought together more than 620 CBD businesses, offering information workshops and one-to-one support to lead behaviour change centred around the four Rs "retime, remode, reduce and reroute" (Transport for NSW, 2016d). Travel Choices received the Institute of Transportation Engineers' Sustainable Transport Award (2016) in recognition for its significant contribution to promoting sustainable transport.

7. New Futures in Urban Passenger Transport

7.1. Digital Disruption and Mobility as a Service

The land passenger transport sector lies at the cusp of a major transformation, arguably the greatest since the advent of the automobile. This emerging transport paradigm is guided by key drivers including automated vehicles, collaborative consumption, demographic changes and digital technologies. Autonomous and connected vehicles will transform our relationship with cars, and has implications for safety, productivity, traffic congestion, road capacity and urban form. The advent of collaborative consumption has seen the market welcome carshare and various transportation network companies, providing ridesourcing (e.g. UberX, GoCatch) and microtransit (e.g. UberPOOL, Bridj) which are steadily disrupting mainstream public transport in many markets. Demographic changes exhibit itself through a generational decline in emotional attachment towards cars, making it more acceptable to shift from vehicle ownership to access. These trends are all underpinned by digital technologies which form the interface for connecting demanders and suppliers and facilitating the delivery of physical transportation.

One major innovation that brings together many of these digital disruptors is **mobility as a service**—a personalised, one-stop travel management platform digitally unifying trip creation, purchase and delivery across all modes. It provides total transport integration across public, on demand (paratransit) and private (through sharing) modes in a way where the end user can be truly mode agnostic with the most appropriate mode deployed per time of day and geographic context, for a given price. The service provides user benefits in terms of true competition with vehicle ownership and a seamless customer experience, and benefits service providers by improving the capacity utilisation of their vehicles and new opportunities for forward-thinking businesses. For society, mobility as service could circumvent some of the potential issues associated with new transport technologies and trends—such as a proliferation of zero occupancy vehicles autonomously roaming the streets, or a destructive cycle where mass transit is increasingly replaced by less spatially efficient point-to-point transportation (Wong et al., forthcoming). Already, mobility services are being piloted by the world's first mobility as a service company, MaaS-Global[3] through the mobile application Whim in Helsinki, Finland and soon to be rolled out in Birmingham, United Kingdom this year. This is joined by the vast array of new mobility propositions launched almost every other day around the globe, led by new vehicle propulsion technologies or new models of service delivery.

The design and implementation of mobility as a service may be related to the *three B*s— bundles, budgets and brokers (Hensher, 2017). A key component of the service is how customers are able to purchase '**bundles**' of mobility granting them a defined volume of access to each mode, with a specified level of service (e.g. pickups within 5 minutes). This is similar to telecommunications plans which bring together different services like calls, text and internet access. These mobility packages may be sold as subscriptions, or as pay-as-you-go options, and may be tailored by age, occupation or location to suit different market segments, and enable providers to cross subsidise between mobility options or practise price discrimination. **Budgets** refer to end user preferences and service provision possibilities which are currently the focus of research into transportation futures at the Institute of Transport and Logistics Studies—a key partner in the *Sustainable Mobility Project*. This consists of a stated choice experiment investigating the prospects of consumers switching out of conventional transport services to mobility as a service packages, being conducted in the inner and middle suburbs of Sydney (Hensher et al., forthcoming). Understanding behaviour will help discern willingness-to-pay for various mobility packages, as well as forecast demand and mode shares for new transport propositions, helping develop the appropriate pricing regime and design of packages consistent with

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[3] MaaS-Global is itself a multi-stakeholder collaboration—see Chapter 7.2 for additional commentary

the social and environmental goals of cities. Further, it will enable the testing of end user preferences for autonomous vehicles and various hypothesised models of service delivery, including cars coupled as consists which permit more efficient vehicle rebalancing in one way carshare schemes (e.g. ESPRIT in the United Kingdom).

Finally, **brokers** describe entities which bring together demanders (customers) and suppliers (independent contractors) (Figure 3). Uber, the world's largest taxi company which owns no vehicles, and Airbnb, the world's largest hotel chain which owns no hotels, are prominent examples of this. Again, there is a link with the telecommunication industry where there is a clear distinction between customer-facing service businesses and infrastructure providers who supply the asset/capacity. The mobility as a service broker adds value by being a one-stop shop for mobility, with potential natural monopoly characteristics with strong network features which work only at scale. There are various opportunities for business involvement and investigating scenarios which may interest industry and organisations is very much a part of the research agenda. Sustainable Business Australia, for instance, may be a stakeholder or partner in the broker scenario through its broad membership base.
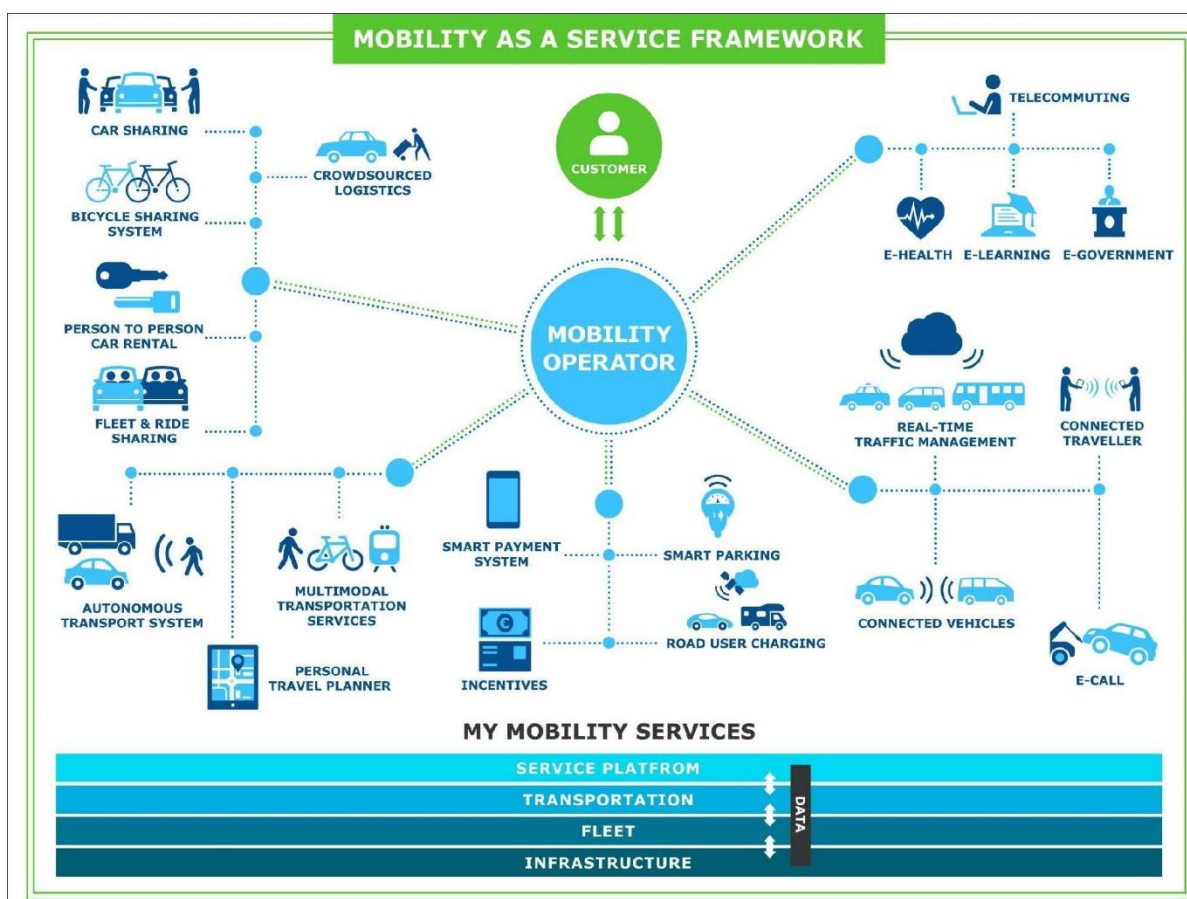

Figure 3: The mobility as a service framework illustrating how a mobility operator or broker can bring together demanders (end users) and suppliers (transport, infrastructure or technology providers)—value adding by integrating services to provide a seamless customer experience (Telematics Wire, 2016)

More broadly, there is a link with public transport contracts (Hensher, 2017), given the increasing interest on service quality (Singapore), multimodal offerings (Newcastle, Australia) and access contracts to railway stations (Melbourne). Whilst traditional contracts are output-based and mode-specific, revolving around asset management and the delivery of kilometres on defined vehicle types, there is growing interest in government around the design of future contracts, particularly in

light of new mobility technologies and models of service delivery. The notion of outcome-based offerings is increasing gaining recognition, where the contracted entity has the flexibility to bring together demanders and suppliers of their own choosing. Key performance indicators could be measured in terms of the mobility/accessibility delivered—for instance, as X percent of the population offered service with Y minutes, for defined hours of the day. As government realises it does not necessary know best, they are inviting the private sector on board as equal partners rather than mere suppliers. There is hence an opportunity for business to help define the new paradigm within which they will operate, offering themselves as new entrants and brokers in the mobility as a service marketplace.

7.2. Opportunities for Forward-Thinking Businesses

Mobility as a service, bringing together a range of digital disruptors, is fast becoming mainstream, particularly in northern Europe. A range of trials are underway or have already taken place in a range of European cities to market test some of these advanced mobility models (e.g. Hannovermobil, EMMA, Smile, Moovel). MaaS-Global, as mentioned, is a pioneer and leader in this task, their success linked to the broad range of knowledge it has been able to bring together—being a collaboration between French transportation giant Transdev, Karsan Otomotiv Sanayii, Ticaret AS, Sampo Hietanen[4], InMob Holdings of Cyprus, Neocard, Korsisaari, GoSwift, MaaS Australia, Goodsign, IQ Payments and Delta Capital Force (Hietanen, 2016). MaaS-Global is itself a part of the MaaS-Alliance, a cross-sector industry collaboration with government to deliver mobility as a service, with an emphasis on unlocking economies of scale potentials for successful implementation in Europe and beyond. It is these sorts of partnerships built on generating shared value for all stakeholders which help drive innovation and make future mobility models a reality.

Testing new business models have also become the domain of automotive manufacturers as they accept the shift from vehicle ownership to access and realise that selling cars may not be their core business in the future. Even today, it is increasingly the case that the majority of revenues are not made from the sale itself, but from the entire lifecycle of the vehicle, including consumer finance, vehicle insurance and particularly, vehicle servicing. Many of these manufacturers are venturing into digital service provision, including testing various models of shared mobility, whilst investigating new propulsion and autonomous vehicle technologies (Figure 4). As an example, Ford, through its Smart Mobility subsidiary—a partnership with various Silicon Valley start-ups, has an interest in driving connected and autonomous vehicle leadership, the customer experience (through FordPass) as well as data and analytics (through a partnership with IBM). Of particular interest is the company's venture into the mobility services market, including market testing consumer preferences on more than thirty different mobility ecosystems piloted around the world, with the view of transitioning the company into "both an auto *and* a mobility company" (Ford, 2016).

Whilst traditional transportation giants are foraying into new markets in a bid to stay relevant (Henry Ford having brought the world ubiquitous vehicle ownership and fossil fuel dependence through the moving assembly line Model T), relatively recent players in the transportation space like Uber are also surprising the market with new ventures as they continually innovate. Pilot schemes, primarily in the United States, focused on autonomous vehicles (Pittsburgh and San Francisco in partnership with Volvo), Smart Routes (for UberPOOL), UberHOP, UberCOMMUTE, UberCOPTER and UberFreight serve as testing grounds for new models of service delivery. The Uber Advanced Technologies Group is the company's research and development centre leading this charge into future transportation. Their thinking has even moved beyond terrestrial transport, by entering the third dimensional plane to investigate how vertical take-off and landing aircraft, supported by 'vertiports'

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[4] Considered the "father of mobility as a service"

can play a role in future urban transportation (Uber, 2016). The group envisages that under its ridesharing model, on demand aviation can become sufficiently affordable and attractive as a form of daily transportation for the masses. Similar thinking has also taken hold at Airbus, where futurists and engineers have been developing three products—Project Vahana, a software platform for booking urban air mobility; Skyways, unmanned drones for freight transportation; and CityAirbus, a flying taxi prototype for passengers. There forays are all led by A³, the company's Silicon Valley research outpost aiming to define the future of flight (Airbus, 2016).
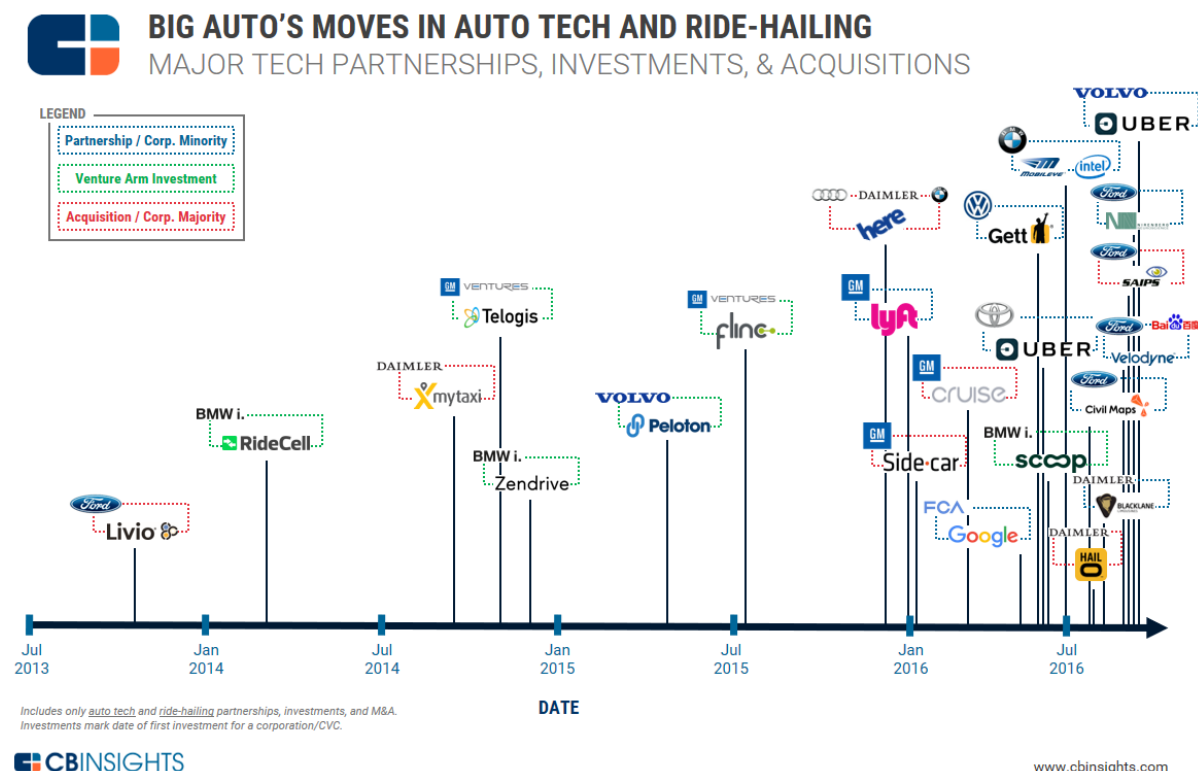

Figure 4: Big automotive forays into new propulsion technologies, autonomous vehicle technologies and new business models (mobility services) (CB Insights, 2016)

Closer to home, forward-thinking businesses are also exploring future possibilities in the transportation space. The National Roads and Motorists' Association (NRMA), chair of the *Sustainable Mobility Project* of which this report is part, identifies challenges with its existing business model premised on vehicle ownership. NRMA has recently established a New Mobility Unit with a focus on "journey enablement" to transport people from A to B regardless of mode—a concept resembling mobility as a service. Transurban, in its shift from an engineering to technology business, recently embarked on one of the world's first studies to test the acceptability of road pricing—access charges to road infrastructure based on geography and time of day (Transurban, 2016). Road pricing reform offers itself as a sustainable revenue stream for government not linked to petrol consumption (problematic as vehicles become increasingly fuel efficient), with the added benefit of allowing demand management in a fair and equitable manner. Transurban has also partnered with universities and research organisations through its Innovation Grants program on infrastructure and sustainable transport.

The New South Wales (NSW) government through its Future Transport program (Transport for NSW, 2016b) is also leading the way by collaborating with industry, community and customers to grasp future transport opportunities. Its Future Technology Roadmap (Transport for NSW, 2016c)

offers thought leadership and sets a strategic direction for transport over the next forty years, including plans to pilot personalised, on demand propositions in conjunction with industry. The related Agile Urban Transport test bed, a partnership between Transport for NSW Smart Innovation Centre and the Hunter Innovation Project will establish Newcastle as a hub for testing multimodal mobility as a service, driverless vehicle services, micropowered vehicles and personal mobility devices. The choice of a distinct geographic location for the test bed mitigates any potential risks associated with regulatory and policy reform. Confirmed industry, community, academic and government collaborators include the City of Newcastle, the University of Newcastle, Newcastle Now, the Hunter Digital Innovation and Growth Industry Taskforce (Hunter DiGiT), CSIRO, the Department of Innovation, Industry and Science, Ai Group, Eighteen04, Cisco, NRMA, IBM, Keolis Downer, GoGet, IAG, Liftango and Interbike (Transport for NSW, 2016a).

7.3. Beyond Transportation

Whilst there are an abundance of opportunities for businesses to participate in new service offerings, these possibilities are not restricted to the transport sector alone. The emerging technologies which are steadily disrupting the mobility market have ramifications for companies beyond those whose core business are in transportation. These developments will create new industries presently unheard of whilst decimating others thought to be irreplaceable. In a recent publication by McKinsey and Bloomberg (2016), the authors describe the potential knock-on effects across sectors for some of these trends, as well as how the boundaries between sectors may erode (Figure 5). A number of key examples were provided from across the economy (McKinsey and Bloomberg, 2016):

- **Power sector**—The electrification of transport may blur the boundary between utilities companies, fleet operators and vehicle manufactures as energy providers look to enter the charging infrastructure space and innovate new propulsion technologies.
- **Oil sector**—Electric vehicles and shared mobility may place fuel sales at risk, impacting upstream oil and gas providers, as well as downstream retailers (e.g. petrol stations) who may benefit from diversification.
- **Automotive sector**—Changing industry dynamics are allowing new players from the technology (e.g. Apple, Intel, Uber) and media sectors (e.g. Google, Baidu) to enter the vehicle manufacturing space, as customers seek connected products which seamlessly integrate with their lifestyles.
- **Public sector**—There is increasing interest for government to partner with private enterprise in service delivery, whilst new business models and propulsion technologies will threaten existing revenue and taxation models (e.g. fuel excise). This opens up opportunities for reform like access charges on infrastructure by time of day (i.e. road pricing) to shape travel behaviour.
- **Technology sector**—The growth of the internet of things[5] open new opportunities around machine learning, big data analytics and predictive analytics, as well as offering an integrative

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[5] The latest model Tesla generates two gigabytes of data per day, for instance

role for technology players to bring vehicles, infrastructure and people together (as mobility as a service does).
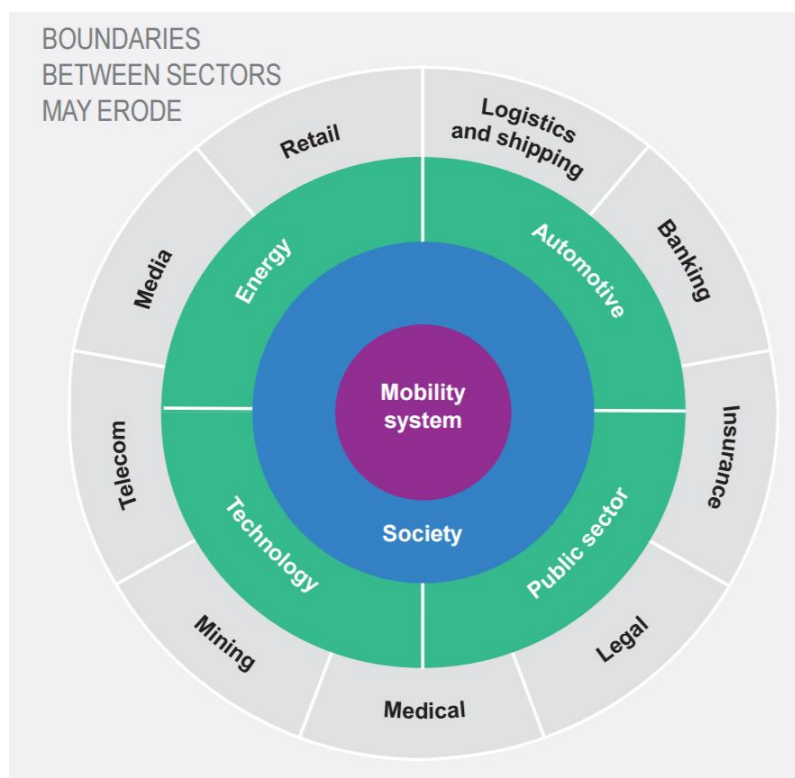

Figure 5: New business opportunities associated with new mobility developments may erode boundaries and lead to a convergence both between and within sectors (McKinsey and Bloomberg, 2016: 49)

Turning to corporate mobility, specifically business travel, autonomous vehicle technologies could even disrupt hotel and airline businesses not traditionally associated with urban mobility. People can sleep and work in moving vehicles en route to their destination, particularly at the scale of short-haul flights (less than three hours), eliminating the access and egress components to and from the airport, with related benefits for employee productivity and company overhead (Neckermann, 2016). Under the mobility as a service paradigm, transportation may be so intertwined with the work of all businesses that there may no longer be a useful distinction between transport and other sectors of the economy. There is the potential for mobility brokers to partner with any business, allowing them to control the destiny of how they service customers and attract employees. For instance, organisations can purchase a mobility service plan which includes journey-to-work as part of fringe benefits for staff. They may also offer discounts in conjunction with the mobility provider (as partners or downstream customers) to become the retailer of choice as they compete in the marketplace. Indeed, any organisation who are not yet conventional providers of transport (even banks and insurers) can invest in these mobility schemes just as they currently do with transport infrastructure like toll roads and airports. As industry sectors converge, mobility propositions coupled with or without an infrastructure component may also return predictable capital growth and high dividend income—becoming attractive investments in a way where "*mobility becomes the new infrastructure*" (David Hensher, personal communication, 10 October 2016).

8. Interview Program

The preceding literature review is complemented by an in-depth investigation of corporate mobility initiatives across ten Australian organisations. Ten interviews are a standard number (e.g. employed in Puckett et al. (2006)) sufficient to reach a point of saturation (Minichiello et al., 1995), beyond which any additional information gained becomes very marginal and repetitive. The ten organisations were selected as per the following criteria:

- Ensured a broad representation of sectors and industry groups, as well as a spread of geographic locations for company headquarters
- Were members of Sustainable Business Australia (SBA) and/or the World Business Council for Sustainable Development
- Had contacts available through SBA and the Institute of Transport and Logistics Studies
- Ran mobility initiatives of interest or had raised sufficient mobility issues worthy of investigation

Business sectors and industry groups were defined based on the Global Industry Classification Standard (GICS) industry taxonomy developed in 1999. Nine businesses were selected for the ten interviews covering nine of the eleven GICS sectors. The final interview was conducted on a precinct-level travel manager (Connect Macquarie Park + North Ryde), due to interest in its unique setup and direct engagement with companies in the business park—such that interviewing this one organisation in effect garnered the views of multiple businesses. In most cases, the point of contact for each organisation was through their Sustainability Manager, who acted as a broker to put the author in touch with the most appropriate personnel for the objectives of this project. The key informant ultimately selected from each organisation (Table 2) hailed from a variety of roles—some more invested in mobility than others, but all were well informed about mobility issues within each company. Each interview lasted approximately one hour in length and was held at the workplace of the organisation or a neutral third-party location.

Each participant was provided a thorough introduction to the *Sustainable Mobility Project* to ensure that they understood the objectives of the research—in particular, the definition of "mobility". In previous surveys conducted by SBA, corporate managers have defined mobility as anything from access for the disabled to the use of mobile communication technologies. For this study, a set of open-ended questions were developed informed by the literature review and expertise from the *Sustainable Mobility Project* Work Group. The questionnaire proforma developed revolved around the following themes:

- How the business defines mobility and whether they have determined how/if mobility impacts their business
- The relative importance of employees, visitors, suppliers and customers to the firm's sustainability agenda
- Their evaluation of any previous, ongoing or planned programs on mobility
- Internal and external barriers to the development and implementation of mobility initiatives
- The conditions for location, relocation and colocation of company headquarters and operations
- Their thinking on future mobility issues including new opportunities for market entry

Questions were kept broad and the interviews semi-structured so as to avoid placing specific ideas into participants' minds and to encourage them to raise their own issues which motivated their firm's mobility agenda. Notwithstanding this, the questionnaire proformas were tailored for each company to cater for their unique context and individual mobility initiatives. Prompts for later

interviews were also informed by earlier discussions through a process of emergent design (Given, 2008) to test ideas and conclusions which had previously been drawn. The following discussion (Chapter 9) aggregates findings from individual companies and is anonymised (including quotations) to protect the interests of individual firms. The exceptions are four organisations who have kindly agreed to have case studies written in general terms about their corporate mobility initiatives or business ventures which are innovative and of interest to the *Sustainable Mobility Project*.

Table 2: Interviews conducted in Q4 2016 as part of the in-depth investigation phase of the project

Organisation Name	GICS Sector and Industry Group	Headquarter Location	Key Informant	Role in Company
AGL	Utilities/Energy	CBD (Melbourne)	Mr K Handberg	Electric Vehicle Lead, AGL New Energy
Woolworths	Consumer Staples: Food & Staples Retailing	Business Park (Norwest)	Ms F Walmsley	Sustainability Manager
Connect Macquarie Park + North Ryde	*Precinct-Level Travel Manager*	*Business Park (Macquarie Park)*	*Ms Z Whitwell*	*General Manager*
Stockland	Real Estate	CBD (Sydney)	Ms D Rooney	General Manager, Sustainability
Optus	Telecommunication Services	Business Park (Macquarie Park)	Ms P Dillon	Sustainable Transport Manager, Employee Experience
Fujitsu	Information Technology	Business Park (Macquarie Park)	Mr L Stewart	Head of Sustainability, Fujitsu Oceania
ANZ	Financials: Banks	CBD (Melbourne)	Ms M Cutler	Head of Environmental Sustainability
IAG	Financials: Insurance	Suburban (Newington)[6]	Mr R McDonald	Director, Research Centre
David Jones	Consumer Discretionary: Retailing	CBD (Sydney)	Ms L Kite	Environment Manager, Social Responsibility and Sustainability
Downer	Industrials: Commercial & Professional Services	Business Park (Macquarie Park)	Ms E O'Brien	Group Manager, Sustainability and Governance

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[6] IAG Research Centre located in the middle suburbs of Western Sydney; headquarters located in Sydney CBD

9. Key Findings

9.1. Mobility Challenges Identified by Business

The interview program revealed relative consistency in terms of the broad mobility issues raised by business. It was in the nuance of these issues and how organisations sought to meet such challenges that findings began to diverge. At the outset, it was heartening to hear from all participants that mobility was an issue of importance to their company both worthy of attention and management. Accessibility was recognised to affect multiple facets of their business and impact all stakeholders including employees, customers, visitors and suppliers. Accessibility was seen as a key determinant affecting business viability by shaping general productivity as well as talent attraction and retention. Specifically, the challenge of congestion was raised repeatedly as the key issue, as opposed to any discussion on absolute journey distances, for instance. This recognition, however, was felt more strongly in some businesses than others, resulting in a divergence in how the challenge was translated into action. Some paid lip service only, whilst others (particularly Macquarie Park businesses) implemented forward-thinking policies on par with international best practice. Accessibility issues for customers and visitors were also identified as important, but primarily for the retail and real estate sectors given the strong linkage between transport infrastructure and location policy. Logistics and supply chain issues did not feature as a major focus in the interviews, perhaps a result of the key informants selected. Whilst there was little evidence of mobility policies impacting firm-supplier relationships, the entry of trucks into loading docks was raised as a safety and efficiency concern by retailers—in particular, challenges associated with congested city environments as well as shopping centres and the need for timed entries determined in conjunction with other businesses and stakeholders.

There was also a recognition of challenges associated with company location, particularly in business park settings. Of the ten organisations interviewed, four were headquartered in Sydney's Macquarie Park, including Connect Macquarie Park + North Ryde, Optus, Fujitsu and Downer (three of these being conventional businesses). The key issues raised were congestion, the forthcoming Epping to Chatswood railway shutdown, and the lack of bus priority in the precinct. There was particular emphasis on the shoulder peak, when service frequencies may have been struggling to meet demand, as well as broader issues relating to parking management, limited land use diversity and poor walkability. The lack of quality pedestrian facilities (namely footpaths and crossings) made employees travelling by public transport feel like that they were "taking their life into their own hands" on their "chicken run" to and from work. All three Macquarie Park businesses selected for interview relocated to the precinct in the last decade on the promise of improved accessibility brought about by the new Epping to Chatswood Rail Link. Whilst they all recognised a shared benefit in locating headquarters in close proximity with other high technology industries, none of those interviewed could speak specifically on the agglomeration benefits derived from this as oft-cited in the literature (Chapter 6.1). Additional commentary on the Macquarie Park experience is provided in Chapter 9.2, as well as in the case studies on Connect Macquarie Park + North Ryde and the Optus Employee Shuttles.

Sub-organisational issues also featured in the discussions, particularly the role that physical infrastructure plays in supporting new models of work, with resulting implications for both travel behaviour and the need for travel. Poor digital infrastructure such as the lack of Wi-Fi access across premises, or outdated technological devices resulting in the need for frequent and extensive printing not only affect staff morale, but also inhibit flexibility and creativity. The design of office spaces can also act to discourage employee collaboration, raised as a major concern by one business. The interview program revealed that few businesses took a company-wide approach to flexible, activity-based work. Instead, flexibility generally varied between teams and one's ability to telecommute was approved ad hoc at the discretion of their immediate line manager. One company even offered a

negative perception towards employee flexibility, citing pressures from Human Resources as well as the need for a human presence given their "relationship-based" business. There was a sense in this business that one "had to be seen in the office to be working".

There was a significant divergence here, however, as a number of companies were also quite enthused by flexible work and the potential benefits it could bring (or are already bringing). In these businesses, flexible work had already enabled many employees to move onto a nine-day fortnight, with the result being one third less staff in the office on Fridays. One participant identified trip degeneration through telecommuting as the "most sustainable" travel policy a company can implement. However, it appears that flexible work practices are rarely driven by transport considerations, but rather by a bid to cut costs or are borne out of necessity (the forthcoming Epping to Chatswood railway shutdown, as one example). Many companies have also redesigned buildings or located to premises built around hot-desking, with less office space than there are staff numbers. There has been a range of commentary on the merits of such move, including that it can foster "good acquaintances, but not good friends". One observation is that these decisions can sometimes be driven by blind adherence to a false ideal, often catalysed by other companies' experiences, with little regard for an organisation's own context nor with adequate consultation with those employees who will be directly affected.

Another issue in premise design is on the provision of employee parking. Parking provision has traditionally been seen as positive and an employee entitlement, and continues to be the thinking from some participants, particularly those situated further from city centre locations. The number of parking spaces has generally been determined by external factors like council regulation, though there are now an increasing recognition of the total life cycle cost of parking provision—again, driven by the economic imperative. In all cases of relocation by those interviewed companies (most to Macquarie Park, incidentally), the number of parking spaces built have been dramatically reduced, and there can now average as few as one parking space per five employees. In these instances, parking spaces are usually allocated by seniority or by those who drive regularly. Given the "use it or lose it" mentality, there is little incentive for these employees to switch to other modes when they can during the course of the week. Additionally, employees who drive are effectively subsidised by the company, as there are no equivalent subsidies or incentives for those who use public transport. Most companies are now moving away from providing company vehicles as fringe benefits, though it was observed in reforming this space that once provided, these vehicles can prove very difficult to withdraw (hefty financial settlements were required in most cases). There is also a broad shift towards greening company fleets, focused on reducing vehicle size, improving fuel efficiency and investing in electric/hybrid technologies. Downsizing the total fleet, however, is not a necessary given, with some companies aggressively expanding their fleet size to reflect changing business practices—for instance, staging more callouts to customers at the expense of shopfront visitations. In terms of business travel, many participants acknowledged rampant excessive travel behaviour, including on the use of taxis, but few had any targeted strategy for moving staff towards more sustainable (and less costly) transport modes. One reform has been the embrace of Uber, with the major benefit being its direct link with business expenses ecosystems, enhancing employee productivity and reducing company overhead.

9.2. Rethinking Outdated Ideology

Three areas of thinking emerged as inadequate in the review of corporate mobility strategy. Firstly, many companies continued to silo their thinking on mobility issues, failing to grasp its impact across the business or on business objectives, and have built up organisational structures which reflect

CASE STUDY: AGL NEW ENERGY BUSINESS

The AGL New Energy division grew out of a previous setback with AGL's entry into the solar energy market. The prevailing view at the time was that any foray into solar with customers being able to generate their own electricity would disrupt AGL's model and cannibalise their business, similar in thinking to other companies which had failed to innovate (Chapter 9.4). Management saw little need for research and development in a company whose core business was to "sell electrons" from a central generation grid. Investment in the solar market was therefore half-hearted, allowing AGL's competitors to take the lead in a growing market driven by cost reductions in photovoltaic panels, increasing government subsidies for household installation and changing consumer tastes and preferences. By the time the company realised it had missed an opportunity to succeed in the solar business, AGL was at a significant price disadvantage, facing high structural costs and needing to price products below competitors to effectively 'purchase' market share.

Learning from this experience, the New Energy business was born in 2014 to grasp the first mover advantage into battery storage, electric vehicles (EVs), and home energy management systems. A new era of thinking had taken hold at AGL, now willing to embrace the unknown and give disruptive new technologies equal footing with its existing retail and wholesale businesses. The electrification of the transport sector represents the last new load to be introduced into the electricity market, and AGL is uniquely placed to capitalise on this from its position of incumbency. The current work for the New Energy team revolves around validating potential business models as well as investigating the design and implementation of future energy resources. Even though the venture will struggle to generate immediate returns, there is strong board support for this foray into the imminent disruption of the energy market, all underpinned by a healthy balance sheet from its existing business strengths.

Some recent initiatives from the New Energy division include a $1/day unlimited charging plan for EV owners, a trial of connected batteries in South Australian homes and businesses (the world's largest virtual power plant), and end-to-end EV charging and infrastructure solutions for corporate fleet customers. These forays also help set up the capability within the business to identify and transact with EV owners, obtaining business insights for those customers who were previously sold energy under homogenous household contracts. AGL also plays an active role through the industry to bring clarity to issues such as EV plug standards. The vision at AGL is to transform the business away from an old central energy distribution retailing model, towards one which embraces all the changes associated with a distributed energy world. Looking to the future, AGL is eyeing merger and acquisition opportunities and seeking to be the energy provider of choice for new mobility propositions (including for mobility as a service brokers). Whilst the focus for the New Energy division and AGL continues to evolve, the genuine attempt to lead and innovate in this future transport space remains unchanged.

this, with implications for governance and leadership (Chapter 9.3). Secondly, there continues to be an obsession with new technology, often at the expense of scalable, proven solutions. Finally, there is a priority placed blindly on physical assets (i.e. infrastructure) as the primary concern for transport provision (note links with Chapter 2.1). Viewing technology and infrastructure as the panacea for transportation challenges is emblematic of the political discourse, driven by the media, interest groups and non-transit professionals.

There was a divergence in where corporate mobility responsibilities were located within the interviewed organisations. Whilst some businesses ran a dedicated Sustainable Transport Team (see Optus Employee Shuttles case study), mobility issues usually fell within the broader scope of Sustainability Divisions, who often lacked the specific directive to manage transportation per se. In these instances, there appeared to the little appetite for mobility management, despite it being a key contributor to carbon emissions. Respondents indicated the absence of capital expenditure and dedicated budget to manage mobility, as well as the notorious difficultly they faced in gaining traction from management. Rather, initiatives directed at energy, water and waste were seen as more important responsible citizenship measures, especially given that they could deliver easily quantifiable monetary returns for the business. Moreover, Sustainability Divisions are usually under resourced (just one person in one instance!), where up to 80 percent of their focus can be on reporting, with little time for strategy and innovation. One company's structure was so complex that there appeared to be no one in charge able to make the decision to join Connect Macquarie Park + North Ryde. Many businesses also identified few linkages between sustainability and mobility, as evidenced by their organisational structures. Decisions on work practices and parking arrangements by Human Resources and Facilities Management respectively, for instance, are often made in isolation with little regard for one another. The lesson here is that isolated, siloed thinking constrains the benefits of any singular decision. The mobility strategy developed in Sustainability Divisions ought to be operationalised through downstream partner departments, to build the best possible synergistic linkages.

Interview participants also exhibited an obsession with new technologies, seemingly keen to draw a headline at the expense of implementing scalable, proven solutions. For instance, there was real interest in implementing electric vehicle charging infrastructure for employees and customers, despite little work done in understanding demand and how they will benefit broader sustainability outcomes. This exemplifies a typical reliance on the "build it and they will come" attitude, rather than a determination to understand and change travel behaviour. The technology-centric view also manifests itself through the push to green company fleet vehicles through hybrids and electrification. In the Macquarie Park setting, interview participants revealed significant interest in the Hyperloop technology, particularly the difference it would make to the commutes of Central Coast employees. A "wow factor" was also expressed with proposals for an autonomous bus shuttle servicing the Macquarie Park precinct, with little focus on the right of way issues (a lack of bus priority) which would inhibit any such service—independent of the choice of technology. When asked to identify priority areas for mobility investment, there was an overwhelming desire to build end-of-trip cycling facilities like lockers and showers. The rationale was that cycling was deemed a "megatrend" and a key part of a company's brand image. This focus on cycling facilities, whilst laudable, appeared somewhat disconnected from how their office locations fit within the broader cycling network—an issue particularly prevalent with Sydney's limited dedicated cycling infrastructure.

This particular focus on facilities is emblematic of the broader thinking in business and the community at large that transport infrastructure is directly linked to service and accessibility. Whilst this is true for road infrastructure where the primary cost is that of construction (capital), it is a false analogy when applied on public transport, where operating expenditure constitutes the majority of

CASE STUDY: CONNECT MACQUARIE PARK + NORTH RYDE

Connect Macquarie Park + North Ryde is the first Transport Management Association (TMA) of its type in New South Wales (NSW), and only the second to be established in Australia. The organisation was formed in 2013 out of a recognition that transport issues were capping productivity and the Gross Domestic Product (GDP) output of the precinct. Initially driven by Optus, BOC and Johnson & Johnson, Connect has grown into a unique public-private partnership jointly funded by membership fees from member companies, as well as grants from the City of Ryde and the NSW Government (through Transport for NSW). Connect Macquarie Park + North Ryde manages the travel of employees, shopper and students (some 55 000 commuters in total) and effectively 'connects' people, organisations and government (local, state and federal). Underlying this work is its key objective in raising public transport mode share across the precinct from 15 to 40 percent.

A large part of Connect's work is its member services in terms of surveying employee journey-to-work, helping devise communication plans and assisting staff in understanding the broad suite of transport options available. Whilst the focus is not primarily on hard infrastructure (barring end-of-trip facilities), Connect seeks to understand and change travel behaviour through demand management initiatives. This is heavily driven by data—its most valuable commodity, collected and shared with member organisations, as well as with government agencies, allowing benchmarking between both member and non-member companies. Some recent initiatives which have come out of this include the Co-Hop ridesharing platform promoting carpooling, and a remote work pilot in Rouse Hill and the CBD, already being trialled by two member businesses. Campaigns around information design and wayfinding also help guide commuters onto more sustainable transport options.

Connect also conducts stakeholder engagement through workshops to put forward a coordinated business response on a range of mobility issues for Transport for NSW. This includes consulting on urban activation and residential developments in the precinct (Macquarie Park Village, Lachlan's Line, Herring and Delhi Road redevelopments), to "facilitate and synthesise" community views for feedback to the government. The next challenge for Macquarie Park surrounds the Epping to Chatswood railway conversion works as part of Sydney Metro Northwest—including running workshops with members on the Temporary Transport Plan (involving very senior people in many companies), as well as playing an active role through the Transport Working Group, modelled off the Travel Choices campaign run in the CBD for light rail construction (see Chapter 6.2). Thanks to the thought leadership provided by Connect, Macquarie Park is already the second largest contributor to GDP in NSW (ahead of North Sydney and Parramatta), and the eight largest in the nation, outstripping some states/territories. With the economic output of employees currently $168 per hour and rising, the TMA looks to be a successful model worthy of replication in other localities.
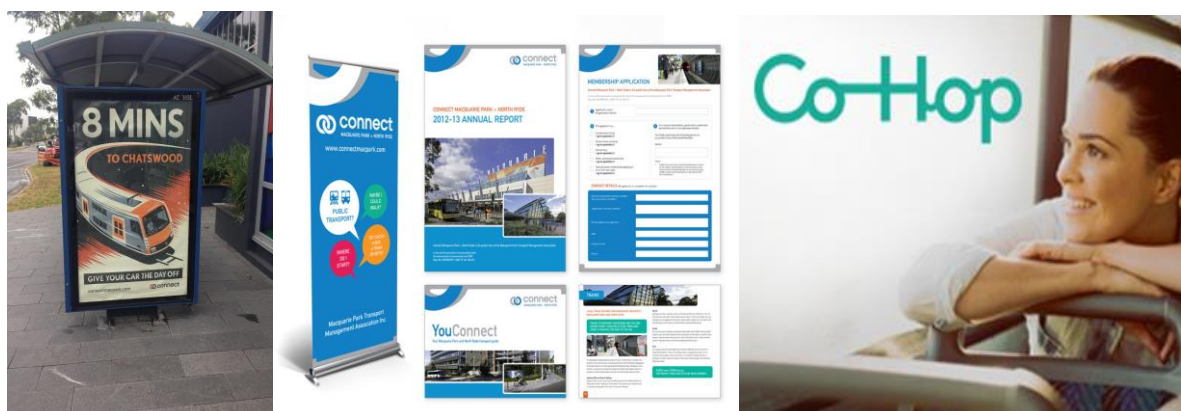
whole-of-life costs. A topical example of this false dichotomy can be linked with the Epping to Chatswood Rail Link introduction—the impetus for many businesses (and certainly all those interviewed) relocating to Macquarie Park. Whilst the station infrastructure was warmly welcomed, service levels on the new railway failed to meet the expectations of customers. The line initially operated as a shuttle between Chatswood and Epping, with only four trains per hour[7] during peak and inter-peak periods (excluding evenings). CityRail (now Sydney Trains) even offered free travel on the link as a bonus incentive to attract patronage. Although the railway was shortly integrated with upper Northern and lower North Shore Line trains, it still fails to compete with buses on travel time despite congestion and limited bus priority. The major issues in play include:

- **Steep gradient**—The original alignment between North Ryde (Delhi Road) and Chatswood was to incorporate a station at the (former) University of Technology, Sydney (UTS) Kuring-gai site. Political pressure from green groups forced a steep dive under the Lane Cove River as opposed to the previously favoured bridge crossing, a cancellation of UTS Kuring-gai station, delays in the railway's opening and rolling stock restrictions on the link (namely for Tangara sets).
- **Circuitous rail alignment**—The legacy track at Waverton and Wollstonecraft are speed limited to 40 km/h.
- **Lack of express services**—The lower North Shore and upper Northern are the only major lines in Sydney without peak express stopping patterns. As a result, it takes 40 minutes to travel 12 kilometres from Central to Macquarie Park station, whereas in the west or south, a 40-minute trip can take one to Blacktown (30 km away), Glenfield (31 km) and Engadine (29 km).

Whilst Sydney Metro City and Southwest will change this paradigm and shrink journey times significantly, the immediate focus ought to be on improving bus priority in the precinct. Bus lanes and queue jumps offer the greatest benefits per unit road space allocated away from cars (Stanley and Wong, 2016). Indeed, research has shown that minor initiatives to clear bottlenecks and pinch points offer a far higher benefit-cost ratio (BCR often up to 20-30) than new infrastructure which seek to add capacity to a road or rail network (BCR around 1-2) (Eddington, 2006). Unfortunately, there is little attention paid to these projects as political leaders are fixated on big ticket infrastructure items. Business leaders ought to transcend this myopic approach and not make location decisions based on transport *infrastructure* alone, nor indeed, any particular mode in isolation. The thinking that "trains are sexy and buses are boring", and other misconceptions (e.g. on speed, capacity, cost, patronage and land use impacts) held by advocates of bus and rail exemplifies the choice versus blind commitment analogy explored in Hensher (1999). This highlights the need to be mode agnostic, and for decision-making to be made rationally based on the key determinants of transit service quality—not the particular propulsion system (diesel or electric) or wheel technology (steel or rubber-tyred) proposed, as much as their important links to environmental outcomes—but on right of way, and in particular, the 'invisible' attributes of frequency and span (Walker, 2012a). Such integrative, nuanced approach enables holistic decision-making that best captures true accessibility and mobility potential.

9.3. Leadership and Communication

The role of leadership, both internal and external, were raised by interview participants as key determinants of behavioural change and mobility innovation. It is important that management leads by example, with one participant noting that once a board member started cycling to work, "everything fell into place", catalysing a large number of staff to do the same. Female leadership was

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[7] This has since been upgraded to eight trains an hour towards Macquarie Park in the AM peak and towards the City in the PM peak—the only instance on the Sydney Trains network where service frequencies are higher in the counter-peak direction

CASE STUDY: IAG RESEARCH CENTRE

The IAG Research Centre was established in 1989 with a focus on car security, against the backdrop of 1980s Sydney—then considered the car theft capital of the world. The rating system developed for anti-theft security, shared with manufacturers and consumers, has since become a well-recognised international standard. This shared value approach has underpinned the Research Centre's work over subsequent decades, encompassing physical driver and vehicle safety research on popular cars, motorcycles and building materials. The Research Centre also has active involvement in setting repair standards, disseminating repair best practice and operating an assessor and repairer help facility with the view of ensuring that repaired vehicles retain their crash safety performance. As members of RCAR, an international body of automotive research centres, and ANCAP, the Australasian New Car Assessment Program, IAG remains the only Australian insurer which operates a vehicle crash test facility. Their team of engineers pull apart and crash vehicles and building products to analyse collision performance, with the end goal of reducing the cost of insurance claims, generating shared value for both the insurer (through its many insurance brands) and their customers.

Although the Research Centre has had an operational base in car safety research, there is an increasing focus on the range of emerging transport technologies entering the market. IAG is actively considering how autonomous vehicles will redefine liability and impact insurance risk. As a core partner in the Australian Driverless Vehicle Initiative (ADVI), IAG through the Research Centre helps explore the potential of automation technologies in the Australian context and makes recommendations on their safe and successful implementation. Another avenue of involvement is through participation in the industry-led iMOVE co-operative research centre which investigates the commercialisation of intelligent transport systems. In considering the future of insurance, IAG has also engaged with collaborative consumption models through discussions with Uber, new insurance products (ShareCover) for Airbnb and Stayz hosts, as well as a partnership with GoGet to insure their vehicles (which includes the finding that carshare drivers tend to be less risk averse).

Whilst many in the community believe that vehicle manufacturers are the key drivers behind safety standard improvements in the industry, it is rather first-tier suppliers who lead this innovation—target partners for the IAG Research Centre as they attempt to make these products as attractive as possible. The Research Centre's success as it approaches its forth decade stems from the team's ability to "keep shooting goals", ensuring a degree of freedom and the ability to use its generated income stream autonomously. Bold moves to create "proactive media"—for instance, through recent dog harness testing—brought prominent media coverage for IAG, ensuring that the Research Centre and company continues to moves from strength to strength.

also cited as an important force, as their more varied familial responsibilities and frequent trip chaining led them to be more open to new work practices. There is also a role for leadership from industry associations to make mobility an issue within their sector, to aggregate the business voice and offer a coordinated approach to lobbying government. Such partnerships can also be a driving force for businesses to generate a critical mass to launch initiatives which would otherwise not be viable implemented in isolation. Connect Macquarie Park + North Ryde is doing innovative work in this space by bringing together businesses to pilot remote work hubs (see case study).

Naturally, there was also a range of views on mobility leadership provided by government. Whilst some companies took a "wait-and-see" approach, awaiting direction from the government, particularly on issues of future transportation, others saw this as an opportunity to be proactive and fill this void. One observer noted that government is increasingly unsure of its role in this emerging transport paradigm (Chapter 7.1), and needs to hear a united voice from business to carve out a space and provide clarity on what roles business and government can expect to play. A key example of this state of limbo is on determining electric vehicle charge point standards—namely, the debate between Type 1 and Type 2 plugs. Industry insiders suggest that vehicle manufactures and infrastructure providers are reluctant to invest without certainty from government, who themselves are awaiting signals from the market (both Australian and overseas).

Strong and open lines of communication between management and staff are also necessary to affect change. Many transport challenges are discussed in private between employees, greatly influencing morale. This anecdotal discontent is difficult to quantify and can all too often escape the gaze of management. Hence arises the need to periodically survey staff on journey-to-work mode shares, satisfaction levels, amongst other mobility issues. The majority of companies interviewed have never undertaken such systematic surveys on mobility, bringing to mind the age-old adage "you can't manage what you don't measure". A small number of businesses have run journey-to-work surveys on an ad hoc basis, usually in anticipation for an office relocation. Issues cited included privacy and the difficulty in distributing travel surveys to staff without emails (primarily blue collar deskless workers).

9.4. Key Conditions for Innovation in Business

Given the large-scale changes to be expected in the mobility system over the next few years (Chapter 7), there is a need to investigate, as part of the research agenda, business thinking and their potential involvement in such developments. One of the key concepts introduced in the literature review is the notion of mobility as a service, which in bringing together a range of digital disruptors, has the integrative power to become a viable alternative to vehicle ownership. The interview program presented itself as a unique opportunity to ascertain across sectors what interest there is in the business community to be brokers or suppliers for such a service. Somewhat disappointingly, the clear majority of participants revealed a virtually non-existent understanding of the concept mobility as a service. This being said, however, there was broad-based knowledge of the "as a service" or on demand concept and its potential implications. However, many participants' thinking on future mobility issues were informed by the media and it was clear that most companies did not have a strategy to evaluate the opportunities and realities that this future transport paradigm will bring. Of the participants who have heard of mobility as a service, their understanding and visions of transport futures were most satisfactory. These companies had transportation already as part of their core business or were foraying into transport as new opportunities arose. Despite this understanding, these businesses demonstrated a reluctance to become mobility *brokers*, though they did see themselves as partners offering (usually) a technology-based solution for the service provider. It is appropriate to consider the key conditions which distinguish these forward-thinking companies. These revolve

CASE STUDY: OPTUS EMPLOYEE SHUTTLES

The story of Optus employee shuttles began with the company's relocation to Macquarie Park in 2007, centralising operations which were previously based in North Sydney, Chatswood and Gordon. This move was predicated on the new Epping to Chatswood Rail Link which would improve accessibility to the precinct, but multiple delays with its opening led to a need to introduce temporary employee shuttles to the City (Wynyard) and other major centres in the area (Chatswood, St Leonards and Epping). The new railway competed poorly (see Chapter 9.2) in terms of service frequencies, travel times and journey directness, and so these buses proved difficult to withdraw. Although there has been some rationalisation of service in the years since, Optus shuttles remain a key component of the employee package, and contributes to the impressive 41 percent public transport mode share for journey-to-work at the campus. The current service offering includes the following routes:

- **993 City Express:** AM peak free, PM peak $4 contribution; 6-8 buses/hour
- **994 Epping Connect:** free; 4-6 buses/hour
- **998 Macquarie Centre Connect:** free; 6 buses/hour lunchtime shuttle

The shuttle services are supported by high quality end/start-of-trip facilities complete with a waiting lounge and passenger information displays (images below) for both shuttle bus services as well as trains from Macquarie Park station. A transport kiosk is located near this lounge, providing excellent passenger information including printed route maps and timetables on both the Optus service and regular bus routes in Macquarie Park. There is even a focus on business travel, with prominent displays of directions to the airport in "under 50 minutes". The complete package of public transport initiatives also includes the GoOptus mobile application and Optus Bus Alert service which provide real time passenger information for employees.

The Optus employee shuttles and related initiatives are coupled with subsidies encouraging ridesharing (through parking discounts) and extensive cycling facilities located on campus. These include 300 bicycle lockers and 300 bicycle racks, ironing facilities, drying cabinets, clothes lines, over 80 showers on campus, and even vending machines selling tyre tubes and other cycling products. The employee shuttles and range of active transport initiatives are all funded from campus parking charges, providing a secure and reliable funding mechanism for the program. Managed by a dedicated Sustainable Transport Team, their work also includes regular engagement with Connect Macquarie Park + North Ryde, and lobbying the local council for improvements to pedestrian facilities (namely footpaths and crossings) to Macquarie Park station and Macquarie Centre.
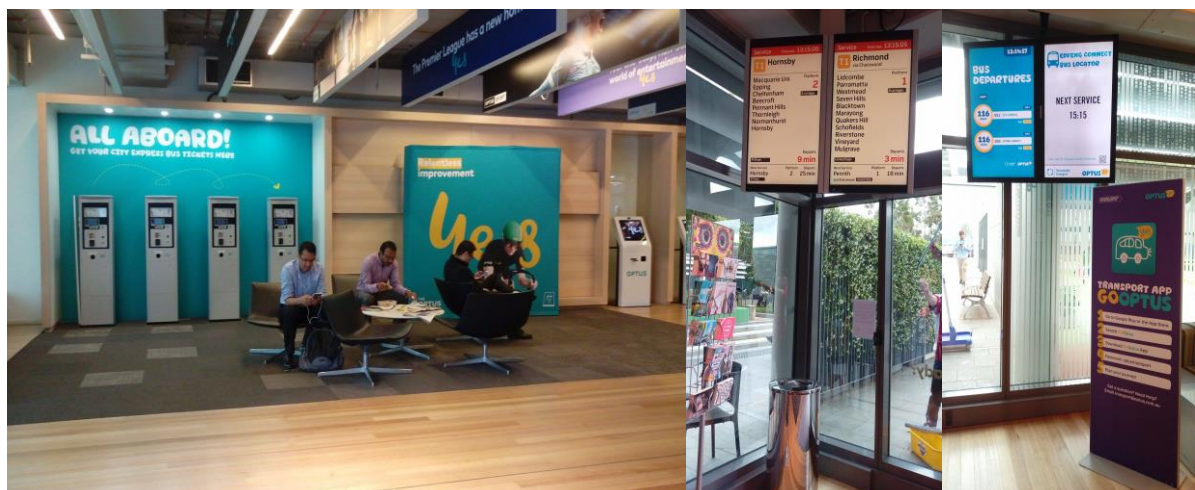
around their risk attitude, the competitive environment in which they operate and visionary thinking from their leadership.

The willingness to take bold risks can often be traced to a previous setback such as the failure to enter a market or to predict consumer trends. The result is greater appetite from management to be more proactive with the "the next big thing". In extreme cases, companies may stake their entire future on this, but usually, it takes the form of a venture into a product or innovation where it is difficult to demonstrate an immediate monetary return. Sub-organisational issues were mentioned in these forays with one interviewee noting that "pockets of innovation" were identified in various sections of their business. The complex corporate structure, however, meant that these innovators were disconnected (some even working on similar projects) and not able to generate shared value through collaboration. Consolidating company operations help but so too does changing company culture and using technology to infiltrate these silos. A corporate approach to risk and innovation is through pilots and sandpits—namely, by establishing a research and development subsidiary like those of the AGL New Energy Business and IAG Research Centre (see included case studies). One challenge is justifying these activities to shareholders seeking a quick financial return who are more focused on present rather than future earnings. A secure funding stream that offers financial certainty across budget cycles is therefore necessary, together with a degree of autonomy for the venture away from the everyday pressures of the business.

The competitive environment around which a business operates is also an important determinant of innovation in business. The culture of innovation in the technology industry, or of research and development in Japan, for instance, ensures that businesses compete on continual improvement. Whilst competition in the marketplace is important, so too is establishing an environment in which businesses can collaborate to create critical mass and generate shared value. One interview participant noted that their company's strategic move to form a joint venture with a business which would otherwise have been its competitor has been a resounding success, helping it secure government contracts. MaaS-Global and MaaS-Alliance are also key examples of cross-sector industry collaboration, recognising that in innovation and product development, the whole is greater than the sum of its parts. The growth of public-private partnerships also epitomises this notion, as well as recognising increasing budgetary pressures for government. Businesses once contractors or suppliers to government are now capitalising on this development by developing into "smart business"—not only meeting government stipulations, but also providing ideas and input as equal partners to generate shared benefit. Indeed, "the client may tell you what they think they want, but it may not necessarily be the right answer".

Visionary thinking and leadership are also key drivers of forward-thinking businesses. The most innovative organisations set long term visions and targets—up until the end of the 21st century was the furthest of the ten companies surveyed. Innovation is also driven by outstanding individuals, with the strong, top-down leadership provided by Elon Musk and Henry Ford cited as worthy examples. The lessons from this review of corporate mobility innovation highlighted the need for all companies to stay agile and innovative, as the mobility sector (and the world at large) changes faster than ever. Numerous companies over the years have ignored disruptive technologies, seeing no business case for innovation and have since slid into irrelevance. Prominent examples include Blockbuster in video streaming, Nokia in smartphones, Kodak in digital photograph and Borders in online distribution channels. Innovation is indeed a necessary (but not sufficient) condition for business to thrive and survive. Its greatest threat is internal politics and a complacent company culture. Many felt foraying into these new technologies would hurt its own business, but in the words of one contributor, "it is far better to cannibalise [one's] own business than to be consumed by a competitor".

10. Conclusions and Recommendations

The research revealed divergent findings on business involvement in mobility. Some companies had a coherent strategy in place operationalised through initiatives covering all modes of travel, as well as progressive work practices and a conducive company culture. They undertook travel surveys which allowed management to garner the needs of employees and to track progress. In implementing these, the research revealed some noteworthy challenges, many of which were contextual and either firm- or sector-specific. Many other companies only paid lip service to mobility issues and failed to translate the challenges they identified into action. There were organisational issues such as siloed departments and an unclear allocation of responsibilities which hindered decision-making. These companies ought to review their practices not only to compete effectively in the market, but also for sustainable, responsible citizenship. The research also identified some exceptional, forward-thinking businesses here in Australia innovating to enter the future mobility marketplace with visions and targets set until the end of the century. Their research and development subsidiaries placed them in good stead to lead in the emerging transportation paradigm.

Based on this analysis, four broad-based recommendations have been developed for business across sectors looking to improve their mobility involvement. These recommendations should not be treated as a panacea for solving all mobility challenges, but rather as a catalyst for dialogue and debate amongst the business community. Ultimately, it is important that businesses feel a sense of ownership, with mobility solutions developed by business, for business—the subject of subsequent phases of the *Sustainable Mobility Project*. The recommendations of this report include:

1. **Collaborate across three dimensions**—This includes vertically within one's own value chain with suppliers and customers, horizontally with competitors and other sectors, and orthogonally with government and industry associations. Vertical partnerships open up the role for a broker, and can help create product and service offerings out of reach for a single business. Horizontal collaboration can help generate a critical mass for implementing mobility initiatives, whilst joint ventures can create shared value which better helps partner businesses compete in the marketplace. The role that Connect Macquarie Park + North Ryde, for instance, plays in bringing businesses together exemplify these benefits and confirm that the whole is greater than the sum of its parts. Businesses coming together as a united voice also helps government survey the landscape and display strong leadership to set the rules of the marketplace which in turn guides business decision-making. As the world becomes increasingly interconnected, business—and by extension all sections of the community—exist in a symbiotic relationship and can no longer operate in isolation. MaaS-Global and MaaS-Alliance, in bringing together different stakeholders including industries across multiple sectors, suppliers, brokers and government, are an excellent case in point which showcase the benefits of partnerships across all three dimensions in driving innovation and opening up the shared opportunity of mobility as a service.

2. **Challenge the status quo**—Work practices, company culture and mobility solutions which have dominated for years ought to be challenged where appropriate, including by senior leadership. New models of work made possible by digital technologies can enhance employee productivity and improve mobility outcomes. Businesses need to welcome outsider thinking and continually evaluate whether company culture or organisational structure may be stifling innovation. A need has been identified for integrative thinking, infiltrating silos within organisations to develop broad strategies such that decisions made in isolation in one department (e.g. location policy) do not result in unintended consequences for other stakeholders. Business leaders who challenge preconceptions with mobility solutions can help transcend the obsession with new technologies and infrastructure solutions, and rather focus

on scalability and transport *service*. These conversations not only lead to improved mobility outcomes, but also help influence the at times myopic dialogue in government and the community.

3. **Devise a mobility management plan** based on regular surveys across the business — The oft-cited maxim "you can't manage what you don't measure" could not hold more true. Businesses need to survey a range of stakeholders (employees, customers, visitors and suppliers) on journey-to-work mode shares and other indicators, conducted regularly to ensure that progress can be tracked. Fostering strong and open lines of communication between management and staff can also help capture anecdotal commentary on mobility issues which greatly influence employee morale. Stakeholder consultation builds broad support whilst evidence-based program development helps set up the mobility management plan for success. Precinct-level travel managers like Connect Macquarie Park + North Ryde can assist not only with running travel surveys and devising mobility plans, but also in undertaking staff and customer engagement to help build this two-way communication dialogue.

4. **Innovate to compete** in the new mobility paradigm—Sustainability Divisions are generally better equipped as risk managers than opportunity seekers, as evidenced by their usual focus on reporting. Businesses need to build capacity in other ways to innovate and compete in the future marketplace, where emerging transport technologies will create new industries and decimate others. Establishing a research and development subsidiary, supported by financial certainty and autonomy is one approach for embracing innovation. Businesses need to take bold risks, and market test new products and services as they investigate future business models brought about by new transport technologies. The notion of mobility as a service holds promise for businesses across sectors to participate as mobility brokers. It is up to forward-thinking leaders to seize this space and dream up new opportunities as the world becomes increasingly competitive.

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