Institutional reform in the bus and coach sector for a new decade

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Abstract

The bus and coach sector plays a vital, but often underappreciated, role in the Australian public transport task. This role has traditionally been dominated by large public operators in the major capital cities and a plethora of family-based bus operators who own their own vehicles and depots in the outer suburbs and across the rest of the country. Reforms in the past few decades have led to the contracting out of many public operators, and a major consolidation of urban operators whose licence to operate are subsequently based on a competitive tender or negotiated basis (Hensher 2020). In light of the changing institutional context and increasing pressures on cost efficiency and service quality, there exists a continual need to evaluate the efficacy of the reform agenda, draw on global best practice and experiences, and chart a path forward for the future of the sector and the vital role it plays in serving our communities. This paper draws on the latest edition of the *International Conference Series on Competition and Ownership in Land Passenger Transport* (known as the Thredbo series), held in Singapore in August 2019, to offer a broad snapshot of institutional reform developments and to offer practical reform recommendations for the bus and coach sector in the unique Australian political and regulatory environment. The report identifies the broad range of strategic issues which emerged as key defining issues in Thredbo 16, charting the state of the art and evolving global debate on topics as diverse as contract specifications, business models, the role of technology and the appraisal of infrastructure and service investment. Commentary on the impacts of COVID-19 on the bus and coach sector is also provided.

Key Words: Buses, institutional setting, competitive tendering, negotiated contracts, strategic future directions, Australia

1. Moving people in a new decade

The public transport industry faces new challenges as we enter the new decade of the 2020s. We are witnessing unprecedented population growth in Australian cities, leading to ever greater transport demand and traffic congestion. Technologies have enabled new players like Uber to enter the market, bringing with it challenges for their governance, and higher expectations of service from customers. The bus and coach sector continues to play a vital role in moving Australia, with the overwhelming majority of route and school services being operated by private companies under contract to government. However, increasing demands on the taxpayer's purse are seeing governments seek greater value for money, placing increasing pressure on service quality and the viability of the private bus and coach industry.

The relationship between government and operators is one of the most powerful mechanisms for delivering strategic government objectives. Nurturing competition, reducing cost, increasing service (quality or quantity), enhancing modal integration, and embracing technological innovation are all objectives which can be realised (or otherwise) through the design and specification of contracts and the broader institutional framework. Whilst the overarching objectives government sets for the bus and coach industry are usually clear (though this is not always the case), how these are operationalised through the procurement mechanism (including how contracts are designed, let-out and managed) remains a topic of contentious debate. More can be done to fine-turn government's relationship with operators to ensure that the industry continues to thrive and our communities continue to benefit.

The purpose of this paper is to offer some practical recommendations for a reform agenda for the next decade. The report outlines the latest developments and evolving debate on a range of competition and ownership issues. Before doing so, it is necessary to revisit some oft-neglected, but fundamental realities about the state of the bus and coach industry in Australia.

Fact 1: Buses are the most important mode of public transport

Buses and coaches represent the most important mode of public transport. Every day, far more Australians are transported by bus and coach on the nation's road network than are moved by rail, even in our largest capital cities (Wong and Hensher, 2019). This is indeed the case around the world in passenger trip terms, because of the sheer spatial availability of bus networks, and the need for many rail users to use bus as a first/last mile mode to access rail stations. Even in cities with extensive rail systems like London or Hong Kong, buses still dominate in terms of the sheer number of people carried.

As the 'workhorse' of the city, it is concerning that buses are not sufficiently appreciated by the political elite and general public (often in contrast to rail, which are almost universally preferred). In amidst the COVID-19 pandemic, we have seen a large amount of media coverage and political commentary on financial support for the aviation industry. However, none has been forthcoming for the bus and coach sector which plays just as important a function in serving the nation, particularly in connecting regional towns and communities. This is particularly relevant for the economically deregulated long-distance market and charter operators, who have seen their revenue streams virtually disappear overnight (Wong, 2020a).

Part of the challenge is for the sector to ensure that its voice can be heard, and that the importance of the industry is made clear in any interaction with sceptics or naysayers. *This paper hopes to assist by offering an evidence basis for generating the traction that is needed.*

Fact 2: Buses are the most cost-effective mode of transportation

The age-old adage that "buses are boring, trains are sexy" (Hensher, 1999) is often exhibited in the emotionally-charged debates around the relative merits of bus rapid transit (BRT) and light rail transit (LRT). It is well established that buses perform far better in terms of cost per passenger carrying capacity, as compared to rail (ATAP, 2017). Often, project appraisal is clouded by wider economic benefits and warped methodologies in terms of what are defined as project boundaries leading to questionable evaluations and results (favouring LRT). In the future, new technologies like optical and magnetic guidance systems (trackless trams) and branded bus service (BBS) concepts offer themselves as opportunities to transcend people's emotional attachment to rail-based modes (Hensher et al., 2019).

This is notwithstanding bigger picture thinking in terms of the public transport cost advantage compared to private car. Road-based infrastructure investments benefitting private car users are attractive to governments because they are accompanied by minimal operating costs. This compares to public transport projects where the majority of whole-of-life costs are operations-related rather than upfront capital costs (the choice of discount rate applied also plays a major role in favouring road projects). However, the negative externalities related to private car transport like traffic congestion, urban sprawl, social exclusion and health costs are often not considered adequately. Conversely, public transport brings positive externalities like economies of agglomeration, amenity and liveability improvements. On balance of total societal (internal plus external) costs, we see that buses are the most cost-effective amongst both public and private modes of transportation.

The need to take a broader view (to appreciate this reality, amongst other things) is one of the most important recurring themes and a fundamental recommendation stemming from this paper.

Fact 3: Technology is placing increasing headwinds on the business model of operators and manufacturers

Bus and coach industry titans say that there has been more change in the past 2-5 years than there has been over the last 60 years. The idea that one has to "run just to stand still" is evident from the pace of technological change which has enabled a plethora of new players like ridesharing, carsharing and bikesharing to enter the market. On-demand, autonomous and electric technologies are coming online (Stanley et al., 2019), which can bring pressure to the existing business model of bus and coach operators and manufacturers (more in Section 4).

Many technology evangelists promote every alleged advance as a positive. The ability for incumbents to deliver better services for less cost is certainly encouraging (although there may be enormous disruption for the workforce in the transition period). Other commentators have suggested how autonomous technologies might result in the wholescale demise of the public transport sector (Enoch, 2015). Whilst some suggestions may be overblown (Currie, 2018), the risks of change are certainly palpable, and there is a major role for government to ensure that technological disruption is societally advantageous (Wong et al., 2020). What is required is not complacency or denial, but a recognition of the challenges amongst the elite and top echelons of the industry. It is important that the sector is agile and future ready, including being open minded to how existing businesses and the transport ecosystem may need to be transformed in the future.

This paper explores some of the challenges associated with technology on the governance interface, as well as the value proposition of incumbent players in the bus and coach sector.

2. Thredbo lands in the Lion City

This paper explores the critical relationship between operators and regulators, drawing on the unique local political and regulatory environment of the bus and coach sector, and the changing role of government in Australia. We draw on recent developments globally as captured by the *International Conference on Competition and Ownership in Land Passenger Transport* (known as the Thredbo series). Since its inception, the Thredbo conference series has documented best practice in public transport institutional reform, contract design and implementation, growing to encompass all topics in transport planning, policy, financing, data and funding (Wong and Hensher, 2018), with a wide range of market settings, modes and geographies represented (Bray et al., 2018). The conference is unique in bridging the divide between research and practice, with a roughly even split of delegates from academia and industry/government.

The objective of the Thredbo conference series is to provide an international forum to examine passenger transport competition and ownership issues, reporting on recent research and experience and developing conclusions on key issues. The focus is on determining the effects of different forms of competition, ownership and organisation for land-based passenger transport on operators, users, governments/funders and society as a whole. The conference series is directed towards a broad audience of policymakers, planners, government and political decision makers, infrastructure and service operators, consultants, researchers, academics and students, and is recognised as one of the most important international forums for the analysis and debate of competition and ownership issues in land passenger transport.

Thredbo 16, was held at the Nanyang Technological University (NTU) in Singapore in August 2019. In total, 162 delegates from 30 countries gathered in what was Thredbo's first foray into Asia. The conference featured the usual plenary sessions, industry roundtables, keynote speakers and technical tours. The highlight of the conference, however, remained the in-depth workshops examining a curated series of key topics in detail—a unique feature of the Thredbo series (and seldom found in academic conference settings). A total of eight workshops were held in parallel streams over three days, featuring a total of 97 technical presentations plus co-creation sessions to design policy and research recommendations. These workshops are listed below, with each accompanying workshop report (developed by the workshop chair and rapporteur) provided in parenthesise:

- **Workshop 1:** Models of mainstream public transport provision (Preston and Walters, 2020)
- **Workshop 2:** Practical considerations in implementing different institutional regimes (van de Velde and Alexandersson, 2020)
- **Workshop 3:** Emerging business models and implications for the transport ecosystem (Merkert and Wong, 2020)
- **Workshop 4:** Realising the potential benefits of demand-responsive travel (Currie and Wong, 2020)
- **Workshop 5:** How much regulation should disruptive transportation technologies be subject to? (Smith and Theseira, 2020)
- **Workshop 6:** Better service delivery through modal integration (Mulley and Yen, 2020)
- **Workshop 7:** Assessing the wider benefits of public transport projects (Stanley and Stanley, 2020)
- **Workshop 8:** Beyond the farebox: Sustainable funding of public transport by better understanding service values (Poon and Vickerman, 2020)

This paper synthesises and builds on the broad range of strategic issues which emerged in Thredbo 16 and to reflect on the learnings in terms of a reform agenda for the Australian bus and coach industry. The remainder of this report details a selection of cross-cutting themes identified from the conference, developed through an assessment of each workshop report, workshop presentation and selected technical papers presented during the conference. A special case study of what COVID-19 could mean for the future of the bus and coach sector is also included. The report concludes with a series of reflections and recommendations for what the bus and coach industry and its stakeholders (including government) can take forward in the new decade.

3. Continuing debate on asset ownership

One of the recurring themes of the Thredbo 16 conference was the role of ownership, which was explored in a number of workshops, as exhibited by the workshop reports and presentations. The issue was first sparked by the Managing Director of Go-Ahead Singapore who, in the opening plenary, remarked how fantastic it was to operate in the asset light bus contracting model (BCM) of Singapore

(Sections 5 and 6 consider contract design and their practical realities). One is reminded of many other asset light business structures which have prospered in recent years (e.g., ridesourcing, discussed in Section 8)—many built on the peer-to-peer model of the collaborative economy (the "everything as a service" mentality). Thredbo 16 workshops discussed how in the railway and airline markets, vertical separation has brought about new business opportunities for rolling stock leasing companies (ROSCOs) and aircraft leasing companies (some of which have even ventured into operations through 'wet leasing'—e.g., HiFly). Holding companies (e.g., MTRC, International Airlines Group) are another product of recent trends and developments in ownership and business structures and are a way of managing risk and maximising returns (Merkert et al., 2020).

The merits of the government ownership of bricks and mortar and vehicle assets in the public transport sector (particularly buses) caused great contention and debate at Thredbo 16. The impetus for government asset ownership is often driven by the desire to lower the barrier of entry and to maximise the available number of interested bidders in a competitive tender. This has certainly been the motivation for the BCM in Singapore (Goh and Swee, 2017). Sometimes, the desire for greater standardisation and integration also comes into play (c.f., Section 9). A key question is whether it is desirable for government to hold such assets on its balance sheet. The contrary view was made that businesses are not just built on financial returns but return on capital as well—the latter of which cannot be extracted under government asset ownership.

Linking back to the Singapore case, there exists the classic case of correlation versus causation in terms of how much of the success of the BCM may be linked to its particular asset ownership model. Thredbo 16 concluded that the Singaporean context is very different to other locales with its very forward-looking authority which had adequate money, resources and capability. This compares with Australia where cost efficiency is very much the overriding focus. Government ownership of assets allows quicker technological adoption (with links to asset life) which other jurisdictions simply do not have the appetite for. The average age of Australia's bus fleet (public and private) was 11.4 years in 2017 (Wong and Hensher, 2019), for instance. As such, it is clear that the particular objectives and underlying context comes into play in terms of determining what asset ownership approach is most appropriate. What is required is not a myopic, blind pursuit of a *process* goal (of a contract specification) often driven by dogma and ideologism, but a better appreciation of nuance in ensuring that context-specific institutional structures are put in place, guided by clear *end* goals. The need to take a broader view is a recurring theme and considered again in the context of economic appraisal and funding challenges in Sections 10 and 11.

4. The end of bus operators?

Another cross-cutting theme relates to risk, value and the business ecosystem. The allocation of risk is a core Thredbo topic which influences the choice of market arbitration and contract design. One of the classic Thredbo recommendations on appropriate risk sharing between the authority and operator is that risks should be allocated to the party that can best manage the risk. This is often difficult to determine, and Thredbo 16 concluded that inadequate risk allocation in the past may have triggered a revolving re-allocation of (arguably unmanageable) risks. This is akin to the idea of regulatory cycles, an important Thredbo cornerstone initially proposed in Gwilliam (2008).

Many industry participants at Thredbo are bus operators—and indeed the bus industry were major players in the establishment of Thredbo and continues to be a major market for the conference series. One of the workshops at Thredbo 16 (on business models) considered a case study involving bus operators, arguing that the ability to carry risk serves as a central value proposition for a business and, by extension, determines the viability of its business model. The present trend has seen de-risking

on both sides of the operator in the value chain: on the manufacturer side with vehicles-as-a-service and the ever advancing (digital) capabilities of buses with many defects/maintenance requiring the expertise of the original equipment manufacturer (with links to new technologies like autonomous and electric); and on the government side with the government ownership of assets and management contracts. In some markets (e.g., Singapore, which modelled itself on Perth and London), government manages the hiring and training of bus captains (through the Ministry of Manpower and Singapore Bus Academy). In Darwin, the government even undertakes crew scheduling and development of rosters for their contracted bus operators. Bus operators therefore become nothing more than an organiser of labour and are vulnerable to being squeezed out of the transport ecosystem (e.g., think a bus manufacturer putting drivers on their products and suddenly being able to take the role of a bus operator).

There are many parallels of such developments in other sectors where such intermediaries have failed to adapt and hence been disrupted out of the sector—e.g., Blockbuster, Borders, Kodak. There is hence value in bus operators maintaining some risk (those they are best placed to take up) and the ownership of assets like depots and buses is critical to this mission. Otherwise, there is a risk that an entire layer may be removed from the public transport ecosystem.

Diversifying revenue streams might involve moving from a business-to-government model (where existing contracted operators serve one customer—that being the government, an effective monopsony) to a business-to-consumer model. This will mean that any contract termination will less likely threaten the fundamental existence of a company. The loss of contracts (for single contract operators) is a narrative which has played out often in Australia, forcing previous route operators to resort to charter operations as a means for their survival. Whilst the charter market may be lucrative (though not during COVID-19), there are also non-fare revenue opportunities in property and the provision of multimodal offerings. There is a role for bus associations to play in helping their members diversify revenue streams.[1]

One possible opportunity is for bus operators to diversify their customer base and revenue streams by becoming a broker or aggregator of mobility as a service (MaaS). MaaS is a popular business ecosystem being touted to provide a one-stop shop experience for customers across a range of different modes (Wong et al., 2019). It embodies the ideals of modal integration (c.f., Section 9), but also brings with it, governance challenges (Section 8) in terms of how such a service will be delivered and regulated. The MaaS vision is already being embraced by a number of state governments (e.g., NSW, Queensland) and private-sector actors (e.g., MaaS Global, RACV, SkedGo) in Australia. See Hensher et al. (2020) for a comprehensive update and assessment of MaaS.

5. Best practices in contract design

The operator/regulator relationship is complex and lies on a spectrum which may be marked by the extreme notions of economic deregulation and public monopoly. Early Thredbo conferences (in the 1990s) identified the weaknesses of these extremes in great detail (Wong and Hensher, 2018), and so successive conferences over the past two decades have been devoted to refining the 'middle ground' of contracted and franchised regimes (which are the prevailing modus operandi for the urban bus market in Australia). Thredbo 16 continued to explore this flagship Thredbo theme in reviewing developments in the contracting-out of public transport services through two dedicated workshops.

[1] As an example, Bus Association Victoria (BAV) has led the development of an on-demand application named *d@rt* (formerly *Get There*) which member operators can 'plug in' to offer demand-responsive service offerings.

One of these workshops made several recommendations around oft-neglected dimensions of contract design. The first relates to the need to consider not only the relationship between the operator and the authority, but also that between the workforce (especially frontline employees) and the operator. In many settings, the tender scenarios offer transfer arrangements for operating staff during contract transitions. This is immensely important to achieve buy-in for institutional change from the workforce and their representing union, especially when transitioning from a public operator for the very first time (e.g., State Transit Authority in Sydney). Beyond this, there is scope to consider what role workforce incentives might play in the design and specification of public transport contracts. This is perhaps an avenue for operators to demonstrate their value proposition in an increasingly homogenised market (c.f., Section 4).

Thredbo 16 identified that there is a global move away from contract incentives—indeed, Singapore's BCM has no such patronage incentive. This is consistent with the growth of gross cost and management contracts discussed in Section 6. However, network-level incentives to enhance integration should be further researched and pursued. There exists an important interface between network design and contract design, including around the definition of contract boundaries (both geographic and modal), as well as more operational specifications around the design of the service offering (routes and timetables). The idea here is linked to how future business models (Section 4) and multimodal contract offerings might help in endogenising modal integration (Section 9).

Thredbo 16 also looked to the future for how contract design might evolve. One of the workshops offered the following view around the increasing blur in boundaries over who constitutes the tendering authority, as well as greater hybridity in the design of contracts and the award mechanism (Preston and Walters, 2020):

> *"With respect to governance, we might expect devolution, regionalism and localism to continue to impact on public transport provision, with new forms of combined authorities emerging. We might also expect the boundaries between competitive and negotiated contracts to be more blurred and continued experimentation with hybrid contractual arrangements. Our assessment is that in effective mature markets the balance between operators and authorities is finely tensioned. In less effective, less mature markets, authorities are often ineffectual and inconsistent. In some mature markets, there are dangers of cartelisation, where the dominant operators have effectively captured the authority."*

A major recommendation from this workshop is to develop a Thredbo knowledge compendium as a one-stop shop for accessing best practice design principles and assessment frameworks on institutional reform and contracting-out options in the public transport sector. Whilst past Thredbo conferences, the Thredbo website and published papers (as *Research in Transportation Economics* special issues) are indeed a valuable resource, these materials may be less accessible to transport practitioners like policymakers and consultancies.

Rather, what is suggested is a contract design guidebook co-developed by the Thredbo community (and perhaps with the support of BIC) aimed specifically at practitioners. This can be similar to *The BRT Standards* produced by the Institute for Transportation and Development Policy (ITDP, 2014) and other guidance documents developed by non-profits like the Transit Centre and the Eno Center for Transportation, as well as supranational organisations like the World Bank (which themselves often rely on Thredbo contributions as empirical evidence). A Thredbo-developed guidebook would constitute a way for people to get information "from the horse's mouth", and its initial development can be modelled off review-type papers like Hensher and Stanley (2010) and

Hensher et al. (2008) (which introduces the idea of the 'ideal contract'). Examples of useful content to include (and how they could be structured/segmented) are listed in Table 1. Specifically, the document will need to outline the range of reform options available, including different award mechanisms, contract designs and specifications, and in what mode, geographic and market maturity settings each option is most ideally suited for.

ITLS will look to ascertain what interest there is from the Australian bus and coach sector in terms of moving forward with such a document proposal.

Table 1: Key issues in the contracting cycle (Preston and Walters, 2020)

Market geography and maturity	Setting up the competition	Contract specification	Contract award	Contract review and enforcement
Less mature urban market - Unimodal (bus) (after Walters)	CfEoI. Briefing. RfP. Clear commitment. Sufficient time. Sufficient & accurate data. Funding.	Institutional maturity Keep it simple. Small batches, up to depot scale. Market development. Elements of environmental specifications.	Gross costs with unreliability penalties.	Cost escalators. Demand & Supply data.
Mature urban market - Multimodal (bus and rail) (after van Oort et al.)		More advanced. Depot scale (100 buses). Environmental specifications.	Gross costs with quality incentives.	
Mature inter-urban market - Unimodal (rail) (after Preston)		Route scale.	Net subsidy with quality incentives.	Cost escalators. Revenue modifiers. Demand & Supply data.

6. The regulator/operator dynamic

Thredbo is characterised by intellectual debates on key issues of contention which transcend individual conferences. Two such issues are the relative merits of tendering versus negotiation (Wallis et al., 2010), and gross cost versus net cost in terms of revenue allocation (to the regulator in the former and operator in the latter) (Stanley and van de Velde, 2008). These two usual topics of debate appeared to have subsided somewhat in Thredbo 16. One of the workshops was unique in exploring the *practical* aspects of implementing reform and maintaining the tension between the operator and the regulator. The workshop also explored the benefits and challenges of encouraging or regulating foreign public transport operators to participate in the bidding process. The increasing role of international players is of particular interest in the Australian context.

A major recommendation out of Thredbo 16 was to increase the strength of the public transport authority and to opt for gross cost contracts wherever possible (already the norm in many markets including Australia). Part of this is influenced by the local operating regime in Singapore. The

view was offered that the "authority is given more authority in Singapore" (echoed in a number of workshops), and hence able to transcend the practical realities of the political process (to the envy of people in other countries). With regard to revenue allocation, the workshop considered that passenger growth through net cost contracts appeared, on balance, to be illusionary. It was recognised that most influencers of patronage, at least in the urban setting, were not under the control of the operator. Gross cost contracts have also been proven to be much simpler to administer, and easier to transition to a net cost regime when required (rather than vice versa from gross cost to net cost).

Thredbo 16 found that the role of the political context and political leadership were often disregarded in research on alternative institutional regimes. Often, any change or reform requires a 'trigger', which might include the arrival of a new administration, presence of a concrete crisis (e.g., COVID-19), or changes in national/supranational (e.g., European Union) laws. Further, it is important to avoid the temptation to think that change is always for the better (and indeed, what is better?) and to recognise that it is far easier to diagnose the problems, than to find their solutions.

Thredbo 16 also offered a range of helpful advice with respect to running contract tenders. Firstly, standardisation is helpful to enhance the predictability and confidence in the tendering process, although too much emphasis may mean rigidity and be an obsessive and illusory target. Paying attention to properly devising the evaluation procedure, including using double valuation teams, helps to build confidence in the system amongst bidders, by helping to prevent the cross-pollination of bias, errors and other issues between evaluators. The full and public publication of bidders and bid prices will also help ensure transparency—a measure which has faced resistance so far in Australia. In terms of quality criteria, it needs to adequately capture what is relevant, but too many criteria can add excess complexity and result in difficulties in the awarding model. In the case of a tender not having enough bidders, then one approach may be to consider unbundling parts of the production chain to be awarded separately (thereby reducing the barrier to entry). One of the workshops also called against aiming for a 'dubious' perfection, noting that it is "better to inherit a bad structure with good people than a good structure with bad people" (van de Velde and Alexandersson, 2020).

A major diagnosis of Thredbo 16 relates to how tools like contracts and competition fit within a set of wider policy objectives (a similar lesson to Sections 10 and 11). Rather than fixating on the 'tool' of contracting-out, it is better to align the broad goals between stakeholders, find the level of agreement and allow it to act as a reference point for the development of reform plans and options. Too often, the reality is inversed and contracting-out is seen through a myopic lens as a panacea for all sorts of challenges (van de Velde and Alexandersson, 2020):

> *It was argued that contracting cannot be viewed only in technical/efficiency terms and that competition cannot be viewed only as an administrative/regulatory mechanism in mature markets.*

Thredbo 16 took the view that we may be (re)developing greater public sector involvement in the public transport sector. The external shock of COVID-19 certainly supports this observation as many net cost operators seek emergency funding support and gross cost operators seek to invoke 'force majeure' clauses in their contracts (more in Section 12). The exhibition of yet another phase of the 'regulatory cycle' necessitates that experiences and lessons with public production in past decades are heeded to. Challenges will ensue in ensuring that public entities are competent and efficient, as much as they can be as compared with their private sector counterparts.

7. Demand-responsive transport: Hype or reality?

For the first time in a Thredbo conference, a dedicated workshop was devoted to the service design and management of demand-responsive transport (DRT). In recent years, a lot of the debate has been driven by hype and technological determinism—the idea that "on demand is good, fixed route is bad"; a mentality that has exhibited itself in Australia. Thredbo 16 sought to bring a more measured approach to the analysis of DRT issues.

Early Thredbo conferences in the 1990s saw a number of contributions on "unconventional modes", describing essentially what has evolved today in a digitally enabled form as DRT or microtransit. Thredbo 16's DRT workshop considered the development challenges, user perspectives, and the design/planning experiences of DRT. As a point of context, the workshop was held against a backdrop of an at times dogmatic desire to 'uberise' mainstream public transport (Mulley and Kronsell, 2018), often led by transportation network companies (like Via and Uber) who are at the forefront of developing new business and funding models (Section 4). The stark reality, however, is that more than half of all DRT schemes introduced in the world have failed, as indicated by the Thredbo 16 paper Currie and Fournier (2019). Thredbo 16 hence sought to break down the promise and realities of DRT, and to determine whether it is desirable that they be mainstreamed.

One of the key constraints of DRT relates to clarity—both in terms of purpose and the cost of providing the service. The DRT workshop questioned whether DRT was trying to reinvent the wheel, especially in the context of the many trials where the purpose of implementation is often unclear (some commentators call these "trials for trials' sake"). The workshop argued for the need to begin with the objective, rather than the solution (that being DRT) (Currie and Wong, 2020):

> *"Policymakers embarking on any DRT project should begin with clearly defined objectives and sufficient resources to be able to achieve those objectives."*

To help with identifying the policy objective and assessing whether DRT is suitable, there is a need to better quantify the benefits of DRT services. This involves ex-post evaluation of DRT schemes so as to avoid lessons not being learned or wheels being reinvented. To aid in this, there is a need to better develop DRT key performance indicators, including looking at employing minimum vehicle occupancy targets and caps in vehicle kilometres travelled.

Clarity around the benefits of DRT services is also important, as it pertains to the costs of providing DRT (or more accurately, its relative cost as compared with an established baseline). One of the greatest difficulties is in defining what is this baseline subsidy rate (the counterfactual). Usually, this is a fixed route bus service that the DRT replaces, or more bespoke community transport or special needs services which often have an independent funding stream/mechanism (e.g., what is provided for under the Americans with Disabilities Act in the US). This requires clarity in the rationale/objectives of the DRT service, which would likely vary according to different spatial contexts (rural/suburban/urban) and end user markets (commuters, elderly, etc.). As a normative determination, this is often easy to get politicised, leading to criticism and can result in government being apprehensive in the use of public funds. Again, the role of politics is under-researched amongst Thredbo contributions.

8. Technology, regulation and governance

New technologies bring a number of implications for the transport ecosystem, including on physical service offerings, as well as the regulatory/governance interface (for instance, with new data generators which enable far more sophisticated contract management capabilities to be realised). The cross-cutting nature of these implications meant that technology was considered within the remit of

a number of Thredbo 16 workshops. Workshops considered the role of regulatory sandboxes to test new technologies and regulations, how technology drove emerging business models, as well as the governance requirements of new technologies and services.

This governance interface was the focus of one particular workshop, which looked at the challenges of regulating emerging, disruptive technologies. The scope of this workshop included how policies and regulations were drafted, negotiated, ratified, implemented and analysed, as well as the impacts of policies and regulations (both intended and unintended). One of the major sources of tension for government is in finding the right balance between enabling new services, practices and entrants to emerge, whilst also ensuring adequate and equitable service delivery, a fair and competitive landscape and fulfilment of policy objectives. Again, the lack of clarity around the stated/unstated objectives of regulation is a shortcoming, especially given that these are highly contextual and situational.

This governance workshop, through the presented papers, explored the regulatory experience of three topical technologies—ridesourcing, autonomous vehicles and MaaS. The workshop noted that ridesourcing generally succeeded in cases where it had been legalised, although questions remain around government oversight, effects on travel behavior, work conditions and job security, as well as the compensation of incumbents (taxis). The present regulatory pressures affect these existing stakeholders, whereas for autonomous vehicles and MaaS, the focus is more on enabling experimentation and innovation (Smith and Hensher, 2019). Indeed, governments may even be said to be competing over creating the most conducive conditions for experimentation with autonomous technologies (again a reference to "trials for trials' sake"). Australia has witnessed some elements of state (and even council) rivalries with respect to attracting innovation in the transport sector.

The role of the 'governed', or private enterprise actors, is also an important consideration. The governance workshop noted that MaaS had far weaker lobbying power than the autonomous technologies industry, since they are led primarily by startups and the odd non-profit association (like the MaaS-Alliance), rather than established technology companies and automotive incumbents with far greater lobbying power and deep pockets. In terms of ridesourcing, the workshop saw how possible adverse impacts on taxi incumbents (and the perceived popularity of the taxi industry) influenced government positioning on new ridesourcing entrants (Smith and Theseira, 2020):

> *"Significant lobbying elements from both proponent and adversary actors were moreover identified as to influence how governments approached ridesourcing. The governments' choices to either pave the way or block ridesourcing (or something in between) seemed to, at least in part, come down to the reputation of the incumbent taxi industry and whether it was organized enough to fight off ridesourcing."*

The governance workshop concluded with a series of very comprehensive and systematic policy recommendation insights. These policy recommendations and accompanying descriptions are presented in Table 2.

Table 2: Key recommendations from Workshop 5 on regulating disruptive transport technologies (Smith and Theseira, 2020)

Recommendation	Description
Establish the baseline	Establish the current social purpose/role(s) of the markets that might be disrupted
Set the ambition	Pin down and disseminate inspiring visions and realistic societal goals to align activities

Investigate institutional fit	Consider how the service fits with current regulatory frameworks and ongoing agreements
Open up for dialogue	Involve both incumbent and emerging actors when shaping policy (including possible losers)
Cater for flexibility	Design broad legislative frameworks addressing pressing issues, but with flexibility for local variations and evolvement over time
Use light but firm touch	Allow some initial leeway but shape markets through proactive policies and investments
Engage in exploration	Participate in collaborative experimentation in order to share local and domain knowledge
Prepare for data sharing	Ensure that information is standardised, reliable and available as well as shared (both ways between operators and regulators)
Analyse societal effects	Implement mechanisms for following up on direct and indirect as well as the short- and long-term effects of technology/policy
Be curious but cautious	Have an open mind but evaluate how tax dollars are best spent

9. Endogenising modal integration

Whilst modal integration was the explicit focus of a dedicated Thredbo 16 workshop, the integration objective also manifested itself in other workshops on multimodal business models (like MaaS), as well as how contract design needed to account for network objectives. The workshop on DRT also cited the complexity of the service offering and the technology proficiency of the public as key constraint in the successful implementation of DRT. The possibility to integrate such services under a multimodal MaaS platform (incorporating the vital role of bus operators) was heralded as a major future opportunity.

The modal integration workshop sought to bring these discussions together by investigating the tension between ensuring integration and meeting governance objectives, including in the context of maximising competition. The workshop revealed a critical lack of depth in terms of the motivation for, and the many facets of modal integration, amongst the research and practitioner communities. For instance, there has traditionally been a myopic focus on integrating specific modes in a physical sense, as opposed to considering the organisation, data integration, and even land use factors which are equally important. Integration also needs to be adapted to apply to both transfer dependent systems (feeder to trunk routes) and less transfer dependent systems (open rather than closed BRT systems).

A schema was hence developed (Figure 1) to better communicate the many layers of integration, inspired by van de Velde (1997)'s STO (strategic, tactical, operational) framework—another Thredbo cornerstone. At the centre of the diagram is what integration is ultimately operationalised as an end-to-end user experience (making seamless from the decision to travel, to the conclusion of the trip/activity). A number of tactical factors help to make this possible, including information and fares integration, as well as contractual and network elements helping to enable integration. The provision of integrated information (in green), for instance through journey planning applications, is arguably more advanced at present than the level of integration demanded contractually. On the outside of the diagram are research activities (of which Thredbo is part) and regulatory measures which help to enable those tactical-level functions.

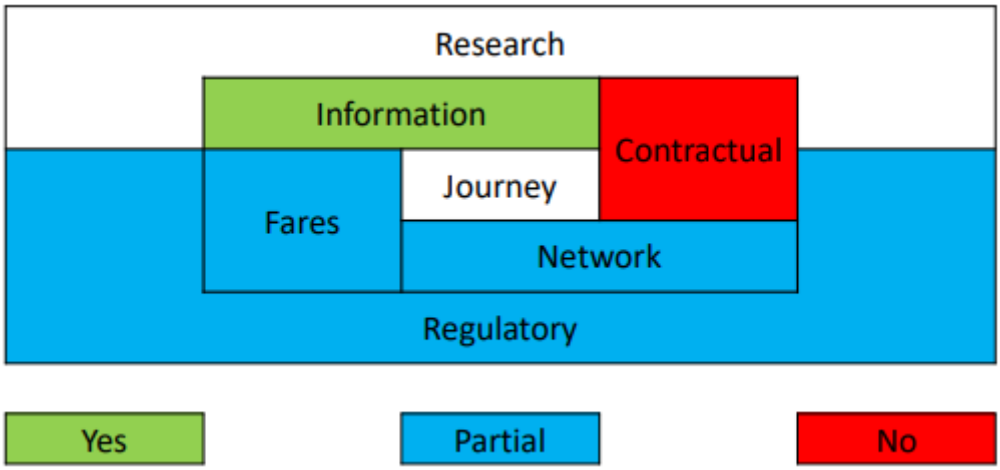

Figure 1: Integration consists of many layers. The provision of an integrated end-to-end journey is dependent on a number of tactical factors (middle ring) and strategic influencers (outer ring). The colours show how well each factor was assessed to be in enabling integration (Mulley and Yen, 2020)

On the issue of contractual challenges, the modal integration workshop pointed to several challenges herein. Firstly, levels of responsibility and access to finance continues to vary greatly between and across different levels of government. A siloed mentality may arise even within a single level of government. In these instances, passengers need to understand the institutional set up to benefit from any form of integration (particularly the case for fares). Secondly, integration is seen as a cost, due to a poor understanding of the benefits of different integration options. A classification framework was suggested that can allow policymakers to see how adding an extra 'layer' of integration would add to efficiency, particularly in first/last mile contexts.

The modal integration workshop made the important point that integration is only as good as its 'weakest link', showing the crucial role of the first and last mile. This also relates to how policy formulation and operator viewpoints linked to key performance indicators (like on-time running) might conflict with integration objectives (such as waiting for a late-running connecting service). The aim, therefore, is to 'design in' multimodal integration, aided by a set of a best practice governance arrangement. The potential role of multimodal mobility contracts (linked to the idea of MaaS) can help to endogenise this integration problem (Mulley and Yen, 2020):

> *Papers on holistic approaches to journey integration would be topical for Thredbo 17. These could include the potential role of mobility contract which could be seen as endogenising integration and the role of MaaS in an integrative framework.*

10. Perspectives on economic appraisal

Two Thredbo 16 workshops both argued for an inversion of typical processes in the contexts of appraising the capital costs of projects and infrastructure (Section 10), as well as operating costs in terms of public transport subsidies outlaid (Section 11). The traditional analytical setting for a project impact assessment is rather narrowly focused on just user benefits/costs (e.g., travel time savings). Better analyses also take into account system internal benefits/costs, such as network benefits. The most comprehensive methodologies also incorporate system external benefits/costs, such as externalities and agglomeration economies. These are often termed 'wider' economic benefits.

Such a designation is inherently problematic because it varies according to context or the assessment framework. Wider benefits cease to be wider if the planning/policy process is framed around a societal goal-oriented setting. This is an important distinction because it shifts the focus away from a project or initiative impact assessment to project definition through needs identification, founded on societal values. The wider benefits workshop hence noted (Stanley and Stanley, 2020):

> *Participants argued that a preferred approach is to concentrate on identifying (triple bottom line) societal goals and identifying initiatives to achieve those goals, in which case 'wider benefits' become core rather than add-ons. This shifts the planning/policy cycle focus to the starting point: need identification and initiative definition, as distinct from narrowly based impact assessment of initiatives conceived elsewhere.*

The societal objective may be defined as an integrated land use, transport, housing and governance strategy. The wider benefits workshop noted that Vancouver, Canada, was often hailed for being a model of a compact polycentric development pattern most likely to be appropriate for larger cities (and as a pattern for regional development), including Australian capitals. All cities and regions should publish and implement a vision and long-term development strategy to deliver triple bottom line benefits for residents and visitors. More specific measures like minimum service levels for social inclusion and greenhouse gas emission reduction targets can also be defined as *absolute constraints* within these strategies.

The wider benefits workshop also shared a number of broader perspectives. There remains a fixation on large, big ticket items, often due to their political popularity. Packages of smaller initiatives (which often perform better in cost-benefit analyses) should receive equal recognition. An example are 'pinch point' programs delivering bus or cycle priority, as compared with railway lines which encourage linear sprawl and where most of the cost is in constructing or purchasing the new right-of-way. Secondly, the discount rate in social and environmental disciplines need research, especially in light of the present unprecedently low global interest rate environment.

11. A broader view on finance and funding

The wider benefits workshop closely aligned with the Thredbo 16 workshop on finance and funding. This workshop argued that policymakers' focus ought not to be on intermediate (output) objectives like cost efficiency or subsidy reduction, but rather final (outcome) goals like better accessibility/mobility for the end user.

In most cities around the world, funding via the farebox is usually quite limited, often accounting for just 30-80% of public transport operating costs (Australia is on the lower end of this spectrum). This leads to pressure on the exchequer and a desire to contract-out (amongst other measures) as ways to reduce the subsidies outlaid. The finance/funding workshop argued that there should rather be a focus on delivering "optimal mobility" across all modes (bringing into mind modal

integration objectives in Section 9), rather than exclusively focusing on the provision of sustainable funding to public transport. This involves allowing for a level of cross-subsidisation, both between transport modes and across market sectors. For instance, road pricing could be developed as a revenue earner to help support public transport (London is a proven success story). This will require a level of political commitment, and the transparent hypothecation of revenues to reinforce trust, but in doing so can help create shared societal value. Land value capture is another strategy which integrates the property sector with transportation (popular in Japan and Hong Kong). Other workshops also noted the role of new market entrants in the mobility sector (i.e., technology players who have previously not ventured into transport operations) whose entire business model is predicated on cross-sector harmonisation and the blurring of traditional sector boundaries. These constitute innovative new ways of conceptualising finance and funding.

In taking a broader view from a policy perspective, Figure 2 was developed to illustrate the need to move away from a myopic concern with sectoral and linear relationships, to recognising a more all-encompassing complex set of multi-directional interactions. With sustainable transport (or optimal mobility) at the centre, the middle ring outlines a set of policy instruments which can be used to attain this objective. The outer ring then offers the various set of factors, or inputs which will determine the appropriate mix of policies and policy instruments, categorised by technological, governance and behavioural. In closing, this important reflection was made (Poon and Vickerman, 2020):

> *"Formulating policy is thus not a straightforward set of linkages between instruments and objectives but a more nuanced understanding of a matrix of factors and their impact not just on the direct transport outcomes but also on the way people understand and value aspects of the transport services available."*

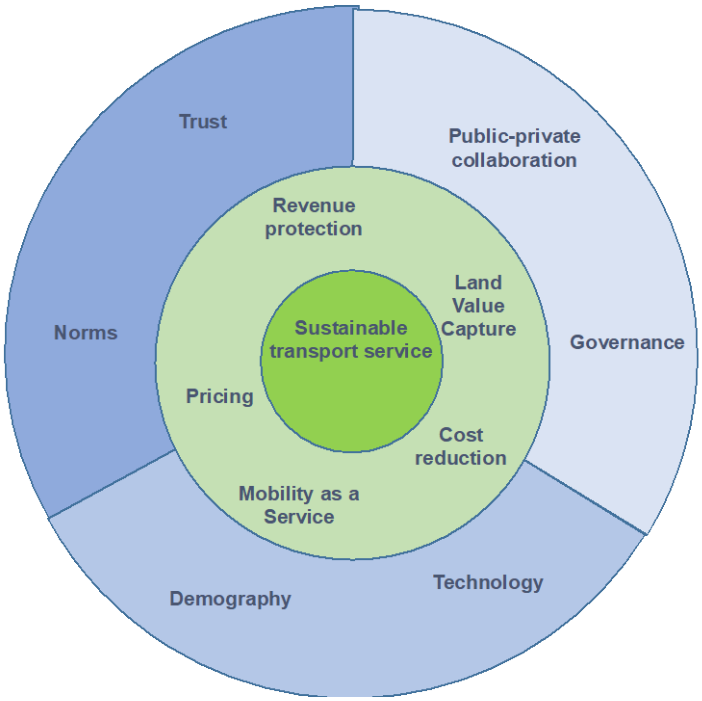

Figure 2: Conceptualisation of elements in a sustainable transport system (Poon and Vickerman, 2020)

12. What is likely to happen post-COVID-19?

A significant global challenge which has emerged since Thredbo 16 is the COVID-19 pandemic, with major ramifications for the transport sector, its funding and governance. To consider the range

of implications, it is necessary to distinguish between the immediate short term operational impacts from longer term strategic consequences.

In the **short term**, there is a huge focus on increased sanitation and distancing measures (Wong, 2020b), especially during the return-to-work phase when 'second wave' infections might be expected. Enhanced sanitation initiatives will need to be continued, with the possible opportunity to explore how the use of technologies like ultraviolet, ozone, ioniser, nano-product and bleach robotic cleaning can make sanitation less reliant on manual labour. One of the major weaknesses is that present cleaning staff are depot-based, meaning that buses cannot be cleaned en-route. One possibility is that cleaning crew can be arranged by the authority and stationed at major interchanges, who sanitise buses from any contracted operator during extended dwells and layover time. A major question is how the financial cost of these enhanced sanitation measures will be borne, including how the additional cost burden is being shared between the authority and contracted operators.

Whilst sanitation helps to avoid the spreading of the virus via hard surfaces, better adherence to social distancing guidelines and the protection of frontline employees ensures that the virus is less likely to be spread via airborne particles. Distancing measures may be voluntary as well as physical. In the return-to-work phase, vehicles may need to be limited to 50% maximum passenger loading, with particular seats cordoned from use and standing banned (WSP, 2020). Sneeze guards can be installed to protect drivers. Active network monitoring will need to ensure the ability to 'insert' additional services as required to maintain these loads. One of the key issues is the impact on contracted operators where patronage incentives are a part of their revenue stream. Whilst this is minor in most urban settings (although for light and heavy rail, patronage plays a greater role), there are instances in the regions (e.g. Queensland) where operators have had to receive government support. Operators in the charter and long-distance markets who operate on a commercial basis have also struggled in the face of a severe reduction in their patronage. These realities call for urgent reform to ensure these operators survive and that their essential services (a lifeline for regional communities) can continue to be provided.

One of the major unknowns is how COVID-19 will change the nature of travel under a 'new normal'. Remote working may continue to be prevalent amongst white collar workers, who typically exhibit *nine-to-five* working patterns. Employers may be asked to continue supporting risk management initiatives initially, and if there is no evidence of voluntary commitment then they may be mandated by government (e.g., to work in alternating A and B teams). Any remote work will mean a likely flattening of commuting peaks, reducing crowding and capacity pressures on the public transport system. This is very positive for maintaining physical distancing, and will also have operational impacts on future transport planning and policy. Rather than catering for the peaks exclusively, public transport systems can be better tailored to service *all-day* demand. This will have impacts on reducing vehicle requirements as well as the number of frontline staff required (White, 2016). Less travel demand will also have traffic ramifications on the road network, on which buses and coaches run.

However, the extent to which traffic congestion will ease is dependent on any possible modal shifts in travel behaviour. A likely outcome is that biosecurity becomes a new attribute in mode choice, and with private car travel perceived to be safer, it may lead to pressure on the road network and travel speeds. Governments will need to manage this through the taxation system and user-pays schemes (e.g., on CBD access and parking). Shorter trips might see a shift towards active mode like cycling and e-scooters (as has been exhibited during the lock down period). These travel behaviour shifts will place pressure on public transport authorities and operators as they seek to attract users back on to the system.

In the **longer term**, key questions need to be asked around how well the public transport industry is prepared to weather these 'black swan' events, and how the network may be called upon to perform crucial functions during periods of emergency. The COVID-19 pandemic has exposed some critical realities in the bus and coach industry. The continual focus on cost efficiency has meant that there is now less capability to 'scale up' in times of crisis—such as to implement rigorous sanitation regimes or to run an emergency network at short notice. Authorities worldwide and the Thredbo 'narrative' have encouraged the build-up of very successful and 'lean' operators, which are a point of credit but also a source of potential policy conflict and tension going forward.

As an example, most Australian capital cities (Perth being the main exception) have maintained a full public transport service and the same schedules and rosters throughout the lockdown period. The result is far too much dwell time for trains and running time for buses, which is operationally inefficient and frustrating for customers. Operators need to be more resilient and agile in responding to these changes in demand and traffic. Future tender requirements might call for the development of pandemic management plans and reduced service offerings based on the weekend timetable with Friday/Saturday night supplements, a curtailing of all peak express routes but with the addition of route augments to service medical facilities. Driver shifts might be shortened (to better distribute work amongst the full workforce), thereby reducing the need for breaks which put drivers at risk by being out and about in the community.

COVID-19 has also brought lessons in terms of multi-agency coordination and pandemic preparedness. What is evident is that there continues to be poor operational integration between operators and modes. Individual operators have contributed buses and drivers to be used in higher risk operations, such as for quarantining international arrivals and to assist hospitals and the aged-care community. However, there is no infrastructure in place to enable efficient communication during these pooled operations (the same may be said for rail replacement services). There is a need to develop centralised control capabilities shared between operators in a city (e.g., as occurs through CentreComm in London), complete with pooled spare drivers and the capacity for immediate service insertion to aid in ensuring agile and resilient operations. There needs to be plans in place for the urgent procurement of personal protective equipment for all frontline staff, as well as education on their safe and proper use. The Six Sigma doctrine should be incorporated as part of standard operating procedures for risk management and quality control purposes.

The COVID-19 experience will also bring questions in terms of asset and infrastructure spend. In the bus and coach sector, the pandemic experience will likely affect fleet/asset procurement in the future in terms of the Australian Design Rules (ADRs) which specify vehicle design, the use of materials and requirements for driver protection. Large-scale infrastructure needs may need to be reviewed and put on hold, in light of budgetary pressures, the changing nature of work, a decline in tourism and possible reduced population growth. There may be a reprioritisation of projects towards a focus on packages of smaller investments. The next edition of Thredbo will make for interesting case studies on the issue and bring clarity as to what is required to ensure that the land passenger transport sector can be more resilient and adaptable in times of crises.

13. Recommendations: A reform agenda for the new decade

Thredbo 16 proved to be very well received by both Thredbo 'regulars' and new attendees. The conference continued the Thredbo story to document the latest global experiences in the Thredbo competition and ownership journey. This report reflected on a number of cross-cutting themes which emerged across different workshops during the conference. Important lessons were learnt around the role of ownership, new technologies and business models and how these will need to be regulated

and governed, including via new contract designs and specifications. The important role of context, politics and other practical realities resonated across virtually all workshops.

The discussed issues will form a key component in motivating workshop themes and plenary topics in the next iteration of the conference—Thredbo 17 in Kobe, Japan (2021). The material in this report also offer immense practical learnings for the bus and coach industry in Australia. This final section offers reflections and commentary on the state of the industry and need for reform, concluding with a series of recommended agenda items to guide the industry through the next decade.

A recurring motif in Thredbo 16 relates to the need to take a broader view across a number of policy facets. The way in which issues are defined and framed can severely limit the scope of what is considered, thereby affecting public policy outcomes. Government, industry and academics alike need to reorient their thinking into more holistic perspectives. Several suggestions in terms of how present ideas may be better aligned include:

- Move from 'regulation' to **'governance'**, to open up for a broader understanding of government activities
- Move from 'disruptive technologies' to **'emerging mobility'**, thereby not seeing the future mobility landscape through the lens of the existing paradigm
- Move from 'transport' to **'mobility'**, to focus on accessibility impacts on end users rather than physical service delivery
- Move from 'technology' to **'service'**, to focus on the value of technology, rather than the technology itself
- Move from 'business models' to the **'mobility ecosystem'**, recognising that many challenges are beyond the realm of traditional firm boundaries, but rather affect a broader network of actors and agents
- Move from 'process goals' to **'end goals'**, thereby internalising wider economic benefits
- Move from 'finance' to **'optimal mobility'**, to enable a more complete funding model for the transportation sector

The need to "see the forest for the trees" also manifests itself in more direct ways amongst bus and coach operators. Bus operators are known to "fight in their little corner" to protect what has traditionally been their own turf. In contracted markets, the competitor is seen as a neighbouring operator, or a multinational incumbent. During contract negotiations, a lot of focus is placed on remuneration where unit payments in the order of cents form the key 'battleground'.

One of the key lessons out of the Thredbo series is that by focusing on optimising a particular aspect of the agenda, one can neglect the bigger picture, and even lead to a suboptimal overall outcome. In the bus and coach sector, operators need to consider as competitors other modes of transportation, including the present influx of shared mobility modes like ridesharing, carsharing and bikesharing. Rather than dismissing them as 'other', it is wiser to engage and consider what sorts of partnerships and collaboration opportunities might lead to mutual benefits. The ultimate competitor is the private car, and if bus and coach operators are able to see that as a growth market (perhaps by participating in MaaS schemes), then they will have some 80% of the market (the average private car mode share) to play with.

As more general commentary, the public transport sector and its workforce, especially that of bus and coach operators, has long failed to be representative of its customers. Frontline employees like bus drivers, and workshop/operations staff often enter management roles resulting in a large proportion of a particular 'breed' of people. The workforce is male-dominated, and lacks diversity in

terms of age, ethnicity and the technical background of the employees. This can bring a myopic perspective on a range of issues. Ensuring diverse governance, including injecting talent from other industries (including from academia) is an ongoing challenge for the sector. Participating in the Thredbo series is one way the industry can gain broader insights and perspectives which might not otherwise be available.

This policy paper has offered a snapshot of competition and ownership issues relevant to the Australian bus and coach industry. The report has drawn on key Thredbo cornerstone topics, as well as the latest developments as captured through the Thredbo 16 conference in Singapore (August 2019). By combining this knowledge, plus other commentary, eight strategic priorities have been developed as part of a recommended reform agenda to take the Australian bus and coach industry into the next decade:

1. For the Australian bus and coach industry, through BIC, to develop a **coordinated voice** to bring to government in terms of the industry's preferences for contract design and management specifications. This involves questions of patronage incentives, ownership of assets like buses and depots, contract length, contract size and the award mechanism. This preference might vary by different markets of operation—e.g., urban, rural, interstate, school.
2. For government to provide **certainty and transparency** in how the contracting model will run and tenders evaluated, including how these may likely evolve in the future. Too often, changes occur on an ad-hoc basis and are too heavily influenced by the political cycle.
3. Ensure the **value proposition** of bus and coach operators are maintained in an increasingly homogenised marketplace. This means advocating for the retention of key assets and the control of key risks (which may mean operators will need to accept greater variation in their range of financial returns). Operators also need to think beyond their contracted 'remit' (in compliance terms) and turn towards how they can go 'above and beyond' to showcase their value as compared to a competitor.
4. Encourage bus operators to **diversify their business models**, including exploring new revenue streams and growth opportunities. Opportunities in other modes (e.g., through mobility as a service) and other sectors (e.g., property) are possible avenues of growth. Government must play a vital role through regulatory reform to help enable and nurture this innovation.
5. **Clarity of purpose** when it comes to trials of new technologies like on-demand, electric and autonomous buses. Trial objectives need to be defined and communicated, as well as transparency around what level of subsidy is acceptable to government.
6. Encourage **bigger picture** thinking amongst policymakers. This involves a shift from mode-specific procurement to a whole-of-mobility approach which incorporates private car. In infrastructure terms, it involves moving from narrowly defined projects to programs of work, where the desired societal objective is placed at the centre of the evaluation process.
7. **Ensure resilience** of the service offering and financial viability of bus and coach operators during 'black swan' events like pandemics and external shocks. This is especially important for commercial (non-contracted) operators.
8. Nurture **diverse governance** of the workforce, in terms of the age, ethnicity, gender and technical background of people (especially management) in the industry. This ensures a wider range of perspectives can be represented in what is traditionally a very family-oriented and male-dominated profession.

About the authors

Yale Z Wong, PhD, is Research Associate at the Institute of Transport and Logistics Studies (ITLS): Australian Key Centre in Transport Management at the University of Sydney Business School, where he completed his PhD. Yale's research focus encompasses three core facets in future mobility, transport contracts and bus operations. A major area of work for Yale is to market test the mobility as a service (MaaS) proposition with the aim to understand what the community demands and businesses are willing to provide. Yale won the David Willis Prize (2018), ITLS Research Prize (2018), and was selected by Intelligent Transport Systems (ITS) Australia as Youth Ambassador to the World Congress (2019), and as recipient of the Young Professional Award (2019). In addition, Yale undertakes a number of advisory and consultancy projects with clients ranging from bus operators to industry associations, vehicle suppliers and local government. Having previously worked in bus operations with experience in network planning and service development, Yale continues to be called upon regularly by the bus industry in his now strategic capacity looking to the future of the industry in an era of disruption and change.

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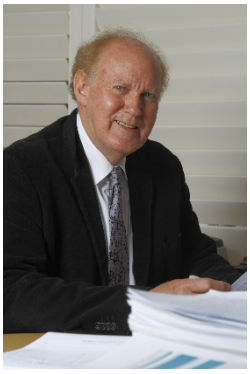

For more information

The 17th International Conference on Competition and Ownership in Land Passenger Transport (Thredbo 17) will continue the discussion on the future of the bus and coach sector in the context of technological disruption and the institutional reform of public transport. Thredbo 17 is being held 5-10th September 2021 in Kobe, Japan, jointly organised by Kobe University and the Institute of Transport and Logistics Studies (ITLS) at the University of Sydney.

For more information, please visit: ***https://thredbo-conference-series.org***. See also the interview (on the web) with the Executive Director of Bus NSW (Matt Threlkeld) on the value of the Thredbo Series for Bus Operators for Bus Operators.

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