WORKING PAPER
ITLS-WP-16-15

Future bus transport contracts under mobility as a service regime in the digital age: are they likely to change?

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August 2016

ISSN 1832-570X

TITLE: Future bus transport contracts under mobility as a service regime in the digital age: are they likely to change?

ABSTRACT: The digital age has opened up new opportunities to improve the customer experience in using public transport. Specifically, we see the role of smart technology in the hands of customers as the new rubric to deliver services that are individualised to the needs and preferences of current and future public transport users. This frontline of service delivery has become known as mobility as a service whereby an individual can book a service delivered through a range of possible modes of transport. At one extreme we have point-to-point car based services such as Uber, Lyft, BlaBla Car and RydHero (for children), with futuristic suggestions of these gravitating to driverless vehicles. Variations around this future are bus-based options that include smart bookable ‘point-via-point-to-point’ services that offer up options on travel times and fares (with the extreme converting to the point-to-point car service, possible also operated by a bus business); as well as the continuation of conventional bus services (with larger buses) where the market for smart mobility as a service is difficult or inappropriate to provide (e.g., contracted school bus services). This paper lays out a number of scenarios that could represent future contexts in which bus services might be offered, recognising that a hybrid multi-modal state of affairs may be the most appealing new contract setting, enabling the design of contracts to be driven by the customer experience and the growing opportunity to focus on mobility as a service. We suggest that the adrenal rush for mobility services, however, may not deliver the full solution that supporters are suggesting.

KEY WORDS: mobility as a service (Maas), public transport contracts, disruption technologies, digital technology intervention

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Acknowledgements: This paper contributes to the research program of the Volvo Research and Education Foundation Bus Rapid Transit Centre of Excellence, as well as the TfNSW program in ITLS associated with the Chair in Public Transport. It was, in part, motivated by presentations and discussions at the Future Transport Summit hosted by Transport for NSW on April 18-19, 2016, where the enthusiasm for smart technology was promoted on a large scale. Comments from Phil Bullock (TfNSW), Corinne Mulley (ITLS), David Brown (Drivenmedia) and Yale Wong (ITLS) are greatly appreciated.

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DATE: August 2016
1. Introduction

A number of transport summits in recent years (e.g., Transport for NSW 2016) have looked to the future of transport as informed by autonomous vehicles, big data analytics, internet of things, disruptive technologies, and customer service in the digital age. Closely connected to these developments is the likely new context in which public transport services might be provided, including driverless vehicles of all types (cars, taxis, buses, trains) in which ‘mobility as a service’ (MaaS) comes to the fore with no need for individuals to own a car, and with regulatory reform (and contracts) that supports a customer-focussed MaaS model in which point-to-point transport can be provided via smart technology.

MaaS as defined in https://en.wikipedia.org/wiki/Mobility_as_a_service_(transport), ‘combines transport services from public and private transport providers through a unified gateway that creates and manages the trip, which users can pay for with a single account’. Users can pay per trip or a monthly fee for a limited distance. The key concept behind MaaS is to offer travellers mobility solutions based on their travel needs.

The opportunities for public transport to match customer expectation under a mobility as a service model are exciting (see Kamargianni et al. 2015), but also disruptive in terms of current practices centred around mode-specific contracts, protected service areas and under-utilised capacity (it being well known how often buses move ‘fresh air’ plus the driver and no passengers). Has the time arrived for the digital age to provide the much needed technological spur for the take off into the new mobility as a service era? In NSW, for example, this is clearly influenced by the Uber experience and the legalisation¹ of their taxi-like services with an emphasis on high quality point-to-point customer service bookable through smart palm-based technology. ‘Uberisation’ of public transport might now be the catch cry to get us all thinking about future states².

So where might we start? The first point is to recognise that the existing model for delivering public transport services (especially the way contracts are designed) may in itself be a constraint on the ability of public transport to fulfil a more useful role in point-to-point mobility as a service. With such a large amount of capacity provided and often with excess under-utilisation, but a recognition that existing assets may not be the best fit in delivering point-to-point mobility as a service (which might benefit by a mix of vehicle types –including cars, small buses, large buses etc.), if there is a desire by

¹ In contrast, the Queensland Government on 21 April 2016 rejected legalisation of Uber styled services. The Katter’s Australian Party’s private member’s Bill, passed by the Queensland Parliament with Opposition support, allows transport inspectors to fine Uber drivers up to $2,356, while administrators can be fined up to $23,560. Paid ridesharing remains illegal in Queensland under current taxi regulations, but the government is reviewing those regulations.

² The word Uber has Germantic heritage and refers to ‘being a superlative example of its kind or class’.
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government to relax the modal regulatory regime to accommodate mixed-mode opportunities offered by one or more service providers, then we are very likely to see a huge change in the services available to customers. The recent move to a multimodal public transport contract offer in Newcastle (NSW) involving conventional timetabled (and some school contracted) buses and trains is a good sign of the willingness of a regulatory setting to accommodate such a plan in Australia, but whether it will relax the mix of modes in the new contract environment is more of a challenge.

Imagine a metropolitan world in which we no longer have geographic contract areas for bus services, but a model in which operators run their business in a way that gives them the flexibility to provide (if they so wish) traditional timetabled services along specific routes (with designated bus stops), but also a bookable system using smart technology that provides point-to-point services, be they from home to a rail station, or even longer distances from home to work (the latter is like the old subscription bus service in some countries before the digital booking era). Operators will use this digital platform to compete for business and develop many ways to incentivise users to stay with them (e.g., loyalty programs, fare discounts for multi-riding, discounts on products from various stores etc.). Prior to the onslaught of digital apps, this would be referred to as an agency approach whereby demand and supply are matched by an informed agency in the middle.

What is exciting is that there are many smart bus operators out there and they can be part of this journey, make profits and take pressure off of the funds currently provided by government (or the tax payer), resulting in significant improvement in value for money to the tax payer, something that has been somewhat alien for many years in this very fragmented and protected sector in a number of jurisdictions throughout the world. While bus operators are encouraged to be innovative and to grow patronage, the contracting regimes in place often have limited incentives to do so, which together with the difficulties in attracting patronage in a market often dominated by the car (which is seen as the preferred mode at present), result in bus operators struggling to build patronage even under attractive incentives. Indeed these new service models are expected to make the need to use a car owned by a traveller significantly reduced, even if the substitute is a point-to-point serviced car operated by the smart multimodal transport mobility as a service provider.

The entrepreneurial zeal may not be something to whet the appetites of all existing bus operators, but many will relish the opportunity while others might just decide to call it a day. New service providers are likely to enter the new mobility as a service space. The same arguments might be put for rail; however the focus is likely to be on rail operators moving into the point-to-point space as a way of gaining patrons for the rail network through a single point-to-point service offered by the refreshed

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3 Under Maas, to be point-to-point the car has to be non-private car.
multimodal (door to door) rail enterprise. Whether the rail enterprise does this through a partnership with other MaaS providers, or themselves, should be entirely up to them.

These introductory comments set a future in which existing uni-modal urban bus services as currently structured and contracted might have reached their useful shelf life. But is this so, under what conditions might such a significantly disruptive future be limited to some aspects of traditional service delivery? We explore this in the remaining sections of the paper, and suggest that the smart technology age, supported by an emphasis on mobility as a service, has much merit, but is unlikely to be a panacea for all bus service provision. There are many features of the new digital age (see Global Mass Transit Report 2014, Zielinski 2011) inspired model of service provision that will not or should not replace the existing ways in which buses are used to service some of the existing user segments – the main change will unambiguously be in the way in which provision of real-time passenger information can improve on the traveller experience.

We are particularly interested in how we might mould a mixture of ‘Uber’ type point-to-point services with existing bus services, to deliver a hybrid multimodal service model, and what this will mean for future bus contracts. ‘Uberisation’/digital technology is about providing more service points in the spectrum between buses and conventional taxis. If conventional regulated taxis are at the far right of the spectrum, Uber X (or similar) would be just to left, Uber pool (or a similar car point-via-point(s) to point) next left, and then there is a large gap with conventional bus services at the other end of spectrum. A key focus of this paper is in speculating about options that fit within that gap. In addition, it is the far left of the spectrum (i.e., mass transit) that is of special interest in terms of its impact on contract design and congestion on the roads.

2. Future Service Delivery Options in the New Digital Age

The starting position is a consideration of how point-to-point mobility as a service supported by smart booking technology can be provided as a substitute for conventional urban bus services, where the latter are typically offered under an areawide contract that is either competitively tendered or negotiated (exceptions being route based tendered contracts as in London, for example) – see Hensher (2016) for an overview of the various procurement models. Existing contracts in many geographical jurisdictions provide regular public transport services (timetabled), contracted school runs (also

4 RydHero is a new initiative in Australia specialising in a bookable system to take children safely to and from school. The cost is $15 for the first child for a distance up to 5 kms ($5 per extra child) and then a cost based on distance ($1/km) and time. See https://rydhero.com.au/. In the USA Tots2Teens was launched in late 2015. Tots2Teens has grown significantly with four vans and drivers, and it transports 43 children to 23 locations in Bettendorf, Davenport and Pleasant Valley, Iowa.

5 We could broaden and generalise this even more in terms of existing bus services which are currently fixed on a number of dimensions, and that disruption and increasing flexibility could be induced in all dimensions to a different degree giving rise to a whole plethora of different outcomes.
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timetabled) and charter services. The question of interest is whether some of these services might be better delivered by point-to-point smart booking transport or whether the nature of transport service required makes the new digital inspired smart mobility as a service an inappropriate substitute?

The majority of the literature on mobility as a service appears to focus on a changing role for the car (see the selected set of URLs in the reference list), becoming a vehicle that is used but not owned, with cars available to be booked for a point-to-point trip, with or without a driver in the future as autonomous vehicle come on stream in volume. Just because the technology is available at present in small scale does not suggest that it can be scalable to dominate all bus market segments. Specifically, we can reasonably see a case for very thin demand contexts such as late evening bus services in suburbia where there are few if any individuals using the buses, to have a point-to-point (or even point-via-point-to-point) bookable service by car that can be offered by any of a number of service providers, including incumbent bus operators. Although subtle, this may risk the point of MaaS which is that the individual demands are met by a service and not that a service exists for an individual to take advantage of.

With a competitive spatially local market for such mobility as a service, the travel times and fares can be structured to win business (including strategies and incentives to retain business for repeat travel), although we anticipate that fares will be higher than those offered by conventional bus services. This initiative could remove the need for some conventional bus services, and whereas it would not necessarily save on buses, it would reduce the labour and maintenance costs. The point (and via point) to point car based service, if managed well, can also provide an opportunity for a bus business to grow patronage that previously used a car (be in park and ride or kiss and ride) or walked from the station to home etc. This then becomes a way of increasing the viability of a bus operator, as well as reducing the amount of money paid by government (maybe not to a great extent) through typically gross cost contracts to a bus operator.

For school bus contracts, it is unlikely, but not impossible, that the smart point-to-point service model would apply, and since in most contexts in Australia school children are the backbone of their patronage, the future of point-to-point services is likely to be focussed primarily on the very small

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6 A commonly heard concern with offering a car without a driver is how it gets to the customer and how it gets back. While it is not such a problem in the inner suburbs, there is a difficulty in outer suburbs where MaaS really holds potential. The hire car proposition on weekends also faces this problem (not an improvement on the existing regime), and is thus unlikely to incentivise people to get rid of their cars. Car club schemes in operation at present also face this problem as they only work with the density in inner suburbs (where fixed route transit works really well anyway).

7 This thinking is not new, and indeed has been considered for many years under various schemes including dial-a-ride, and subsidised taxis (at the equivalent bus fare). What is different is the use of smart technology to improve the ease with which such mobility service can be provided.
segments of the non-school children market. However, as a counter argument, some social aspects may push parents into using smaller bus like vehicles with point-to-point travel provision. Parents are also increasingly strongly driven by safety from ‘stranger danger’ including who they might meet on a bus (although this is not an issue with exclusive school buses). Combined with the growing danger of getting to and from the bus stop, more specific service transport might be tempting, which reinforce a growing preference of parents to have their children only mix with other children that the parents know.

So the question then becomes – which bus-based services could be re-focussed as MaaS with some amount of improved point-to-point servicing? The substitution from bus to car sounds appealing in respect of a point-to-point experience, but it is likely to be at a higher monetary cost to users (even if a quicker journey time and elimination of transfers). The RydHero initiative is one example of an expensive bookable car-based MaaS for school children (to school or other events such as sports activities) (see footnote 4, where we estimate the fare is 4 to 5 times higher than the subsidised bus fare) which needs monitoring, with an opportunity to obtain estimates of fare (price) direct and cross elasticities of demand.

If there is ride sharing (e.g., Uber pool, or RydHero pool), then point-to-point may become ‘point-via-point(s) to point’, which might still be appealing; however it starts to take on the more conventional public transport service feature in contrast to the private vehicle feature promoted by mobility as a service associated with ‘Uberisation as Uber X or RydHero X’. Depending on the number of individuals ride sharing, a small bus may be more appropriate than a car (indeed some commuters prefer the bus since it avoids the imposed intimacy of a fully occupied car with strangers). The consequence of a small bus – large bus mix in a fleet is that while it gives a better fit to market needs, it adds cost in maintenance and is unlikely to reduce the number of large buses needed, which is typically in Australia determined by the peak bus requirement. Furthermore, the fares will definitely be lower than for the car solution (unless government subsidises above the bus fare, which is very unlikely).

One of the most interesting issues that follow under ‘Uberisation’ is the barrier imposed on mobility as a service for the geographically defined contract area, and restrictions associated with cross contract area servicing by an operator. Some jurisdictions already have successful cross regional

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8 Liftshare as a point-to-point activity may well be more successful in the rural setting rather than the urban setting as currently conceived.

9 For example, RydHero that transports 3 children to school over a distance of less than 5km will be $25 per ride or $50 per day. With many private schools in Australia over 5km from home, this will be much greater, and typically an additional $15 per trip per 3 students, or $80 per day or an average of $26.70 per day. This is considerably higher than the bus fare. A 24 km one way trip for 3 students is $44, so $88 per day. This is $440 per week, suggesting that it is unlikely to be used by most households.

10 Such as existing services by coach, multi-hire taxi, and mini-bus from an airport to hotels.
services (e.g., the MetroBus services in Sydney – see Ho and Mulley 2014), and this may be an opportunity to consider the role of smaller buses and ‘Uberised’ cars in delivering improved point-to-point or ‘point-via-point(s) to point’ services that are quicker than conventional bus services. Again, this would have implications on the design of contracts and clearly opens up an element of competition within and between the modes. But if the fares are too high, then this initiative will not attract users out of buses. The literature on point-to-point motorised mobility as a service is, as far as I can find, barren about trip costs to users who currently use conventional public transport.

A mixed or hybrid modal model which can align partially with mobility as a service that are a mix of point-to-point and ‘point-via-point(s) to point’ is worth investigating in some detail, but the decline of conventional bus services is unlikely to occur for many reasons, including those set out above. The implications on the design of bus contracts, however, needs fuller consideration; but we expect the changes to be small and at the margin. The focus on a review would include establishing how might bus contracts allow for the hybrid delivery of mobility as a service (involving a mix of modes tailored to maximising the point-to-point delivery requirement), and the continuing provision of traditional large bus services with timetabled routes?¹¹

3. Links to Reducing Traffic Congestion and Scalability

One of the highlight arguments for the MaaS model associated with point (and via point) to point ‘Uberised’ car services is that it ‘will’ significantly reduce traffic congestion on the roads. Uber has recently been focussing on selling their product as a tool to relieve congestion (as presented at the TfNSW Future Transport Summit (2016). While the arguments may have possible merit if car users switch to using such services, there is a risk that replacement of conventional timetabled or (school contracted) bus services, especially if they occur in peak periods, may have the opposite effect, with the clearest case for substitution at a time of day when congestion is unlikely to be present.

Scalability is one of the critical challenges with the MaaS model linked to ‘Uberised’ styled mobility. Scalability relates to the quantity of services that might be accommodated by a massive shift away from car ownership and bus use towards individualised or group sharing point-to-point or ‘point-via-point(s) to point’ services by smart bookable (driver or driverless) cars or small buses.

The congestion argument rests on very strong assumptions about the replacement of car ownership with third party car use; however while it might have merit under a usage reduction associated with an owned vehicle, it is hard to see how the ownership model can be totally played out. If someone chooses to travel by themselves (and they have the right and option under the model), then we may not see the total elimination of cars owned by households or a significant reduction in congestion

¹¹ In the Sydney context this review can be aided by an analysis of the tap on tap off Opal data available on the public transport network.
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(although it only takes approximately six percent drop in car use to deliver travel times aligned with school holidays which are seen a very acceptable). Where are the cars coming from to service out of town travel, especially at periods of peak demand?12

If households do not own cars, someone has to (even if leased from manufacturers or brokers, the latter as a possible future booming business13), and the volumes will be huge. It is not clear whether Uber-style services have plans to own cars or not14. Uber and the like might not necessarily be the company that owns the car on their own but they might be in with a car company in owning a fleet of vehicles and therefore have direct impact on the policies and procedures that are set in place. Organisations that have shared cars today (e.g., go get cars) are unlikely to be able to handle (or would wish to) such volumes, and hence the proposition may not be scalable. Maybe individuals could retain car ownership but make their personal vehicle available to an Uber-style pool to be driven by a third party, or implement the ‘car next door’ which has overcome the insurance issues (see Truffer 2003)15? This may have some positive effects on traffic congestion; although the main advantage is that the car is not parked under Uber and can be used again by another party from the destination location of a previous user, whereas under private ownership it will be parked. Achieving this outcome is likely to face significant barriers – including an unwillingness to allow someone else to use a private car (damage, cleanliness etc – even if insured), and the inflexibility the owner then has in circumstances that often arise when they need their car. The scalable proposition is challenging and complex and not well thought through but worthy of further consideration.16

4. Conclusions

The adrenal rush for MaaS may not deliver the full solution that supporters are suggesting (or hinting at); however as a caveat it may be premature at this stage in the roll out of new digital-conditioned

12 What about trips out of metropolitan areas – point-to-point? People undertake many spatially disparate activities and can the mobility services model support this? Yes if there is a stock of accessible vehicles on demand that you can hire. But if everyone wants to hire on a long weekend, will there be enough vehicles? If some people retain ownership of a car, maybe they would be willing to offer it up into the Uber style mix but without a driver? However, if you have fewer cars and they do the same kilometres as several cars you have reduced parking requirements but not necessarily VKT. Back running between different drivers may actually increase VKT.

13 This has very serious implications on vehicle insurance – who is liable when the driver does not drive? Is it the car manufacturer, the developer of the on board software that drives the car, or another agent?

14 Uber has talked about buying a lot of cars including a fleet of electric cars - http://www.reuters.com/article/us-daimler-uber-idUSKCN0WK1C8, with at least 100,000 Mercedes S-Class cars, but wanting driverless vehicles. However “another source familiar with the matter said no order had been placed with Mercedes-Benz. Daimler and Uber declined to comment.”

15 BMW (through the Mini brand) had suggested a scheme to do this. Owners would get a kilometre fee for renting out their vehicle and a lower repayment fee.

16 It will be interesting to see, for example, how Blah Blah Car develops – whether it really is rideshare across all walks of life or a way of making it just less expensive travel.
opportunities to suggest a position on the impact that the proposed model/technology could have on the delivery of services and congestion. While, on the arguments developed in this paper, the mobility as a service model may not be a panacea for many of big ticket challenges that government face in delivering an improved customer experience, limited capabilities in the conventional public transport space are still worth looking at, particularly given the likely increase in improved choice for customers (albeit with a wider range of travel times, costs, and risks). For example, we might imagine a future scenario whereby new services appear for people who want to get to the airport at a lower cost but want faster more personalised/comfortable service compared to that offered by conventional ‘point-via-point-to-point’ mini bus service (although this does sound like an existing hire car!). A hybrid model has merit, but its capabilities are currently unclear.

Many of the opportunities offered through the smart technologies available under the digital rubric will work well in supporting existing transport services but may not be a driving force to grow mobility as a service to the detriment of sizeable segments of conventional public transport services. Specifically, the provision of real-time passenger information increasingly is becoming a fundamental element of the service offered by transit agencies (e.g., Cebon and Samson 2011, Nelson and Mulley 2013, Zhang et al. 2011, De Borger and Fosgerau 2012).

A question of particular interest is whether the bus passenger mix today will remain or change in the future under a new MaaS model. If, in the future, the mobility as a service model does change the local ‘public transport’ market, will this service all existing groups of bus users in a way to claim a significant improvement in service delivery, and hence the customer experience. There appears to be many bus settings which are likely to remain as the preferred way of servicing specific market segments. School services, which dominate urban, regional and rural bus service provision in Australia, are likely to have to stay as is, especially dedicated school services and possibly other services that serve a mix of school children and adults (especially the elderly and others without access to a car), unless the preference for transport school children to school by car can be translated into a mobility as a service option with an attractive pricing regime (something that seems limiting if RydHero is an indication of the Maas model). Nevertheless, the challenge remains to explore options where the new technology can make it easier for people to get from home to conventional bus or train services (e.g., imagine a ‘Mytrain’ subscription service like Spotify17 whereby a user pays a set fee for someone to shuttle them to the local train station a few kilometres away for an agreed number of trips or unlimited times a month). This could provide major benefits for people who are living in low density areas and be more cost effective compared to less flexible services that are currently not fully utilised.

While the MaaS model supports ride share by many forms of transport, it appears at present to be very dependent on a revised role for the car. We have to be very careful how we accommodate true point-to-point service with multiple occupancy since it could become ‘point to via point-to-point’ services (like coaches from airports to hotels). These could also be buses deviating to deliver passengers e.g., Telebus in Victoria. For the contribution of a revised role of the bus in the presence of multimodal mobility as a service, will there be a sufficient change in bus patronage to or from the bus that can help in a significant way to relieve traffic congestion on the roads? The issue remains to tame the use of the car, and whether this can be achieved by focussing on who owns the car I a question of great relevance. What seems missing in the debate and discussions on a new mobility as a service era informed by smart technology is the role that road pricing reform must play if we are to make a real difference to congestion on the road and what trade-offs customer are willing to make between travel time gains and the cost associated with obtaining such time benefits (as well as other attributes such as safety, convenience, comfort, transfers etc).

While many of the proposed technology-supported opportunities may not be a game changer in terms of widespread spatial improvements in congestion, they could have some meaningful impact and should be part of suite of responses to the problem. For example, benefits around localised congestion hotspots such as an airport\(^{18}\) could be sizable. Effective congestion management is about applying or enabling incremental improvements and innovation to progressively get more out of the network. Given this, customer benefits and potential savings in procurement of services by government (the latter may not be significant) need to be investigated in more depth.

The arguments presented above suggest an open agenda on whether the new digital age of smart technology will actually be enough to resolve many of the pressing challenges associated with accessibility and mobility. What we may end up with is a large amount of ‘icing on a cake’ that is still barren of new solutions (that the customer is willing to pay for) that will make a non-marginal difference to the overall performance of the transport network and the customer experience.

Finally, there is a need for some fundamental research on many of the issues raised in this paper, including investigating the extent to which individuals would be willing to not own a car, and if they own a car, under what conditions they would be prepared to offer it up to an Uber-styled pool for use by others, and how much are travellers willing to pay to improve the journey experience? Research using stated choice experiments, with alternatives defined by various MaaS packages, is one way to investigate the potential demand for new mobility as a service offers.

\(^{18}\) The airport context is fascinating given that many airports in Australia (and possibly elsewhere) make substantial revenue from parking provision and the MaaS model may make a big dent in this source of revenue?
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