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Thinking Outside the Box 2022 Thought Pieces

The Institute of Transport and Logistics Studies (ITLS) at the University of Sydney Business School started a commentary series in 2015, adding it to its portfolio of engagement with the broader community of interests in the space of Infrastructure, Transport, Logistics and Supply Chain Management.

While academic publications and reports are a very important outlet for high quality research including debates on themes with a rich policy and strategic value beyond theory, methods and evidence, there is room for a series of short pungent commentaries on themes that are of broad community interest. These are short pieces so they can be digested through the many social media platforms and focus on topics of currency that are also likely to be challenging and controversial – hence the titling of the series ‘Thinking Outside the Box’. It has all the elements of critical thinking and the ‘challenge of change’.

Each piece is published monthly since April 2015, and this collection covers the 2022 contributions together in one monograph. We hope it will be useful to researchers, consultants, government and industry agencies and associations as well as in the classroom for debate and discussion.

David A. Hensher
Founding Director, ITLS

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COVID-19 research

ITLS is undertaking essential research into the unprecedented impacts that the COVID-19 crisis is having on transport and logistics, both here in Australia and overseas. Our experts are creating thought pieces on a range of pertinent issues including the implications of working from home and the impact on public transport and traffic congestion as well as lessons to be learnt from overseas. We are also regularly being called upon for media comments. You can view all this work on our research projects page at: <https://www.sydney.edu.au/business/our-research/institute-of-transport-and-logistics-studies/research-activity/projects.html>

Contents

1. Walking to Work from Home: Can we reframe Working from Home as a potential boom for active travel? 10 January 2022	3
2. Tendering zero emissions bus contracts with large mammals in the room 7 February 2022	5
3. Stop calling it Mobility as a Service (MaaS): It actually is an Enhanced Journey Planner (EJP) or an Enhanced Travel Information Service (ETIS) 7 March 2022	8
4. Carbon neutral shipping – it all comes down to green hydrogen, and lots of it 4 April 2022	10
5. How sustainable is it to have your groceries delivered? Or can we do better? 2 May 2022	12
6. What is the value of additional trips? 6 June 2022	14
7. The reason MaaS is such a challenge 4 July 2022	17
8. New economic measurement: A value-based approach 1 August 2022	20
9. The growing importance of equity in planning cities: recognising the value of improved mobility for those at exclusion risk 5 September 2022	23
10. Aiming small with infrastructure spending 4 October 2022	26
11. Circularising the Port of Newcastle – can we learn from the Port of Amsterdam 7 November 2022	29
12. Mobility as a Feature (MaaS): Rethinking the focus of MaaS 1 December 2022	31

1. Walking to Work from Home: Can we reframe Working from Home as a potential boon for active travel?

Matthew J. Beck explores how active travel can be incentivised and reintroduced into the work from home environment in order to counter the effects of increased sedentary behaviour.

10 January 2022

The restrictions on movement designed to limit the spread of COVID-19 has resulted in large numbers of people working from home. With a consistent finding being that work has been completed with productivity equal to that of the regular workplace for the duration of the pandemic thus far, and that the benefits of working from home (chiefly not having to commute, a more flexible schedule) outweigh the challenges (namely effective collaboration with colleagues and disruptions from family), there is a strong desire for increased levels of work flexibility.

Business sees the benefit that can be harnessed from allowing more flexible work, with many moving towards the adoption of a hybrid work model where staff work a mix of days each week from home and from an office environment, according to a schedule that works best for the employee and/or employer. With a better mix of home and office-based work, offered this hybrid approach it is likely that for many, there will be a significant reduction in the number of commuting trips made per week.

There are, however, darker elements that still need to be resolved when it comes to working from home; gendered effects in particular ranging from unequal distribution of household tasks between females and males to the potential for greater risk of domestic violence while working from home. From a transport perspective, working from home has the potential to entrench the car as the norm when engaging in commuting.

We see that public transport use remains suppressed (the key ingredient in a rebound in use, aside from the effectiveness of the vaccine, could ironically reduce number of passengers and thus lower levels of crowding making the mode a more attractive proposition when people do need to commute) but car use has all but returned to 2019 levels: a rapid rebound also observed in 2020 when restrictions were eased. Typically, the more expensive option, the car might become an even more popular for commuters if people are using money saved from not commuting to spend on the trips when they do.

This could be problematic from a road congestion perspective, but perhaps more pressingly from a health perspective. Policy makers have long been trying to increase the attractiveness of active travel, given the significant health benefits that arise if people simply move more. A large part of this has been allied with increasing the use of public transport as part of a more sustainable set of travel patterns. Increased working from home could potentially undermine gains in active travel by strengthening the attractiveness of the car and with people leaving the house less for work, potentially reducing the opportunity for people to be active as part of their travel to work.

A potential for reduced active travel could also be compounded by increased sedentary behaviour that might also arise with working from home. There is litany of evidence that points to the detrimental health consequences of sedentary behaviour. In a recent work currently being completed have found that the amount of time spent sitting by those working from home during the pandemic is high. However, those people who made a conscious effort to increase physical activity report lower relative

levels of stress and anxiousness. Unfortunately, this group of people is relatively small. A much larger group has been identified, who are not only sitting longer, but have relatively less physical activity, and report worse levels of stress, anxiety, and a lower quality of life.

Rather than reject active travel in the context of working from home, it could be argued that working from home provides an opportunity to reframe active travel choices, and potentially embed them as a habitual part of the experience. Something that is important now more than ever given that more work from home could lead to more sitting.

Innovative organisations see the danger in this, but also the value of healthier staff. I am aware of several businesses that run ongoing competitions designed to encourage staff to be active. These initiatives should be encouraged and there should be research to identify which interventions work best: the physical and social nature of the workplace is an important moderator of active travel choices. The transport community needs to act as swiftly as possible to capitalise on this momentum. The built environment is a crucial facilitator to active travel choices and a radical rethink about suburban based infrastructure investment may be needed.

Recent research indicates that 60-75 minutes per day of moderate physical activity seems to eliminate the increased risk of death associated with high sitting time, aligning well with the chestnut that is, Marchetti's Constant. More new research has found that a more achievable step-count of 7000 per day could lead to a 60% lower risk of early death from any cause. Just 120 total minutes outside in nature over the space of a week has significant benefits.

Rather than the 3 metre walk from the bedroom or kitchen to begin the work day from home, we could encourage people to still engage in an active "commute": starting the day by walking from home to the local railway station, the closest bus stop, and back again to "work"; and finishing the day by walking from "work" back home in the same way. This can also have the added benefit of creating a clear distinction between when someone is at work and when someone is at home.

People can still walk up the street (and back to the kitchen) for lunch and for those inclined to drink coffee, to the neighbourhood café. Why couldn't a business reward their employ with a coffee from their local café if they walk for it? With the right approach, gamification could potentially lead to positive outcomes if systematically implemented by workplaces or policy makers.

While home has always been where the heart is, it is now the home of work as well, so here lies the rub. Rather than being a potential detriment to active travel, working from home should be seen as a possible boon. Given that the significant benefits of active travel may well be found in locations as close as our local neighbourhood, we should be doing all we can to encourage people to continue to walk to work from home **before** working from home becomes an issue for our hearts.

2. Tendering zero emissions bus contracts with large mammals in the room

7 February 2022

Large scale bus franchising and tendering arrangements are further complicated when introducing zero emissions buses (ZEB) to the fleet. David Ashmore (TSA Advisory) and David Hensher argue that this is an issue to face head on as soon as possible, in order to promote a competitive supply chain cycle.

The term 'ignoring an elephant in the room' pertains to a situation when there's a problem of such a significant nature, that it's easier for one's sense of immediate well-being to just pretend it isn't there. After all, when one is ticking along, managing life's stresses and strains, who wants to acknowledge that there's a colossal and often feisty mammal in close proximity, one that could at any moment explode and smash everything within reach to pieces? Best look the other way, act like an ostrich and pop on the emperor's new clothes.

It's ironic that such potent analogies, metaphors, and allegories, have been used within the context of the somewhat cosy and unglamorous field of bus transportation. In 2007, David Ashmore presented a paper which flagged that tendering huge bus area contracts was not likely to achieve the best outcome for the public purse because, when the existing operator owns the buses and the depots, in situations where land values are high, most other operators won't bother bidding as they are unlikely to be as price competitive as the incumbent (Myers and Ashmore, 2007). To press ahead with tendering under such circumstances would likely lead to the undesirable outcome of a single bid (Ashmore and Mellor, 2010). To ignore this would be discounting the elephant in the room – the asset ownership question. Pragmatic negotiations with asset acquisition over time was the sound call, and the New South Wales government opted for this procurement model.

David Hensher (2021), only this year, began speaking of 'gorillas in the room', again in the context of large-scale bus franchising. Elephants and gorillas may well be different animals, but you don't want to be next to one of them when they become enraged. The gorilla in the room in this instance was once again related to capital assets, but well over a decade had passed and the problem had morphed. Ambitious targets for the introduction of both battery-powered electric and hydrogen fleet were in train, and now the issue wasn't just asset ownership, but mass asset conversion. Out with petrol pumps and in with massive volumes of charging equipment. Out with volatile fuel prices and in with huge electricity contracts. Out with diesel mechanics and spanners and in with electric and hydrogen maintenance with all its safety complications. And perhaps the biggest gorilla of all – out with unlimited range afforded by 'filling up' and in, with capped range afforded by battery capacity – what might this mean for the timetable (Ashmore et al, 2021)?

The problem isn't the technology and migration per se, but the limitations of the current bus franchising and tendering arrangements. It's ironic that having spent many years to obtain control of strategic assets so as to successfully tender service to the market, the regulators are now facing the conundrum of 'how does one tender something with such huge cost and risk uncertainty and compare bids?' On what basis does one 'buy'? Who wins the competition when the end-game has been articulated, but the middle game is fraught with hurdles, which if not cleared will cost the state literally billions? What happens if someone 'predatory bids' – put in a low bid hoping for future risks to be sorted out over time, but they can't be, and the contract collapses (Alexandersson and Hultén, 2006). Tendering really only works when the specification and risks are cleared. Otherwise, risk has to be shared along the journey. That points to partnerships. But this is theoretically a contestable market? By what right does

someone get the right to negotiate and lock other suppliers out? And, surely if one was an operator, the smart move would be to get as much electric and hydrogen equipment into the depots before tender point to make the prospects of value for money tendering almost impossible? This is a catch 22 – better turn away from both the gorilla and the elephant.

The snag is that operating franchises weren't built for dramatic change. They are service contracts, where the suppliers are paid to run something to a certain standard, and in turn are paid for service kilometres, labour hours, and annual fleet costs. Very often the assets sit with the state and all the operators do is keep the assets fit for purpose and supply high level services to the public. They take moderate flex – a few kilometres here and there, a few more buses of standard design, but they aren't supposed to have a large mammal rampage through them, be that an enormous capital programme, or significant technological change.

Realistically it's time to go back to basics and ask what outcome is being sought, not stick rigidly to the current way of buying things. These franchises are now a combination of massive infrastructure procurement and service delivery. The supply chains have shifted, the risk borne across the parties need to accommodate new players. In support of partnership, Collier et al. (20231) state that "Far from being an inferior computer, the human brain has evolved to be well-suited to decisions under uncertainty, and decisions devolved to teams within which people naturally cooperate enable rapid learning through experimentation and copying." This is the basis of Hensher (2021 a) where he argues for an increased role for energy suppliers, bus manufacturers and network infrastructure specialists in particular who stand to benefit significantly, a paradigm shift from traditional contracting i.e., contracts between government and operator, to contracts or management agreements between government and consortiums that account for the entire supply chain i.e., energy, OEM, asset owners, and operators, to give the government certainty of service continuance in a ZEB era, might be more appropriate. It is not unusual for all parties benefiting from an action to be party to the contract. A supply chain procurement model shares the risk and benefits and promotes a competitive process spread over the supply chain (Figure 1).

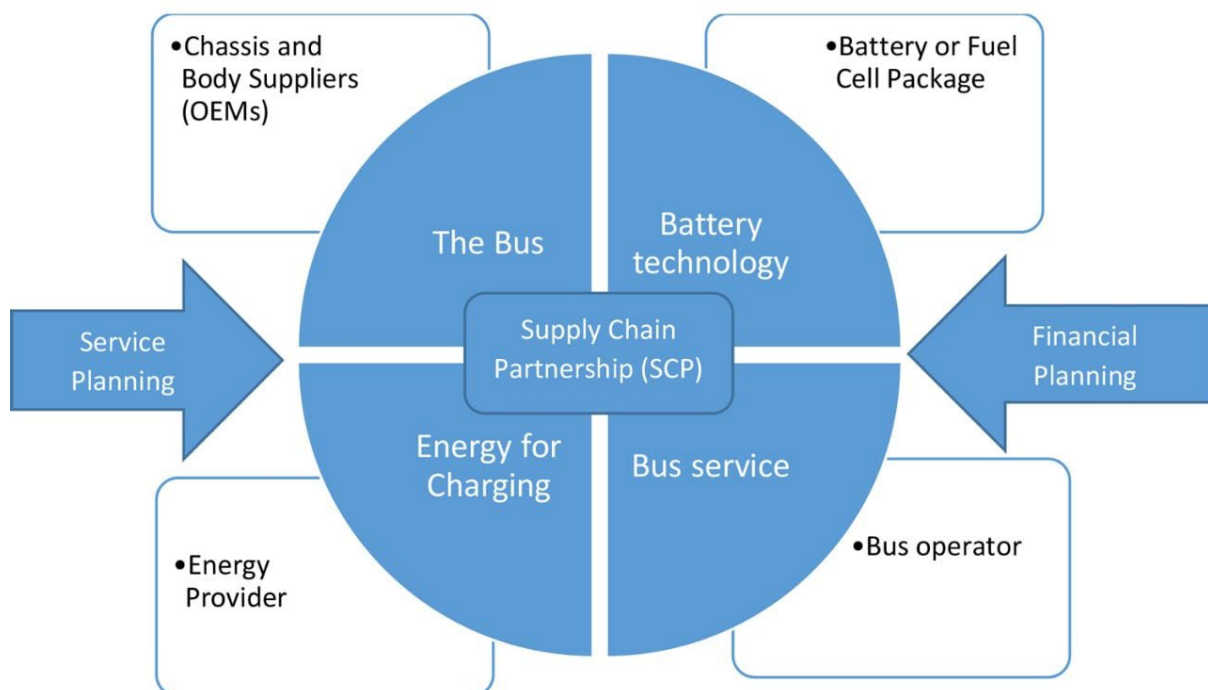


Figure 1: Supply Chain Partnership Contract Procurement Model (Hensher 2021 a)

We're dealing with something akin to a PPP for a power station and a bus contract (Hensher 2021 a). And a lot more. Let's turn and face the elephant and the gorilla and work with them.

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3. Stop calling it Mobility as a Service (Maas): It actually is an Enhanced Journey Planner (EJP) or an Enhanced Travel Information Service (ETIS)

7 March 2022

Mobility as a Service (MaaS) remains a trending term for media platforms and app developers to use. However, David Hensher, Chinh Ho and John Nelson suggest the term should be used more appropriately to describe a fully integrated and sustainable system, rather than just an enhanced travel planning app.

Almost without exception, many media platforms post a growing amount of news items under the heading of Mobility as a Service or MaaS. LinkedIn, for example, is replete with such material (including webinars) promoted in the name of MaaS. But how much of this news is really about MaaS? We had previously tried to clarify what MaaS is and what MaaS is not with a benchmark definition, but it still seems as if the app developers (or more accurately the travel planner folks) and many transport operators, continue to promote their new tools as MaaS. A most recent one (there are too many to mention) is [Scottish MaaS trial goes live](#) (launched on 21 June). It is not MaaS. It is a multi-modal journey planner. The [promo video](#) states that it is “travel made simple” and a ‘travel companion’. While this is a nice idea and potentially represents a step-forward in terms of meeting traveller needs with an integrated ticketing and payment function, overly promoting such an app as MaaS suggests that many MaaS promoters on social media don’t get, or refuse to get, what constitutes MaaS and the four levels of MaaS integration.

To clarify what MaaS is, and is not, ITLS researchers, together with MaaS pioneers and advocates, have put forward a benchmark definition as follows^[1]:

‘MaaS is a framework for delivering a portfolio of multi-modal mobility services that places the user at the centre of the offer. MaaS frameworks are ideally designed to achieve sustainable policy goals and objectives. MaaS is an integrated transport service brokered by an integrator through a digital platform. A digital platform provides information, booking, ticketing, payment (as PAYG and/or subscription plans), and feedback that improves the travel experience. The MaaS framework can operate at any spatial scale (i.e., urban or regional or global) and cover any combination of multi-modal and non-transport-related multi-service offerings, including the private car and parking, whether subsidised or not by the public sector. MaaS is not simply a digital version of a travel planner, nor a flexible transport service (such as Mobility on Demand), nor a single shared transport offering (such as car sharing). ‘Emerging MaaS’ best describes MaaS offered on a niche foundation. This relates to situations where MaaS is offered on a limited spatial scale, to a limited segment of society or focused on limited modes of transport. The MaaS framework becomes mainstream when the usage by travellers dominates a spatial scale and the framework encompasses a majority of the modes of transport. All the other variants that do not meet our definition might be referred to as ‘Aspiring MaaS’ given the normal usage of ‘aspiring’ having ‘hope’ or ‘ambitions’. (Hensher et al. 2021)

Let us try and simplify this position in a way that may be more persuasive in ensuring that MaaS is properly ascribed to, since if we continue to promote any mobility idea as MaaS, particularly the

growth industry of travel planning apps, then the real fear is that we enter into a downward spiral of time wasted on debate and effort that amounts to nothing more than confusion, frustration and lack of progress on what can really make a difference to delivering sustainable (and commercially attractive) solutions and improved traveller satisfaction.

Critically, MaaS needs to show value in both *sustainability* and *profitability* to have buy-in from both government/society and business. Without these two critical value propositions and buy-in from critical stakeholders in the MaaS eco-system, MaaS will likely develop as a niche service, and techno/app developers can (and will) lead the debates which may not deliver real long-term value for society. How exactly we achieve buy-in from both business and government is yet unknown, but the evidence we have amassed so far suggests that it is difficult and requires a lot of collaboration and trust between stakeholders, which is far from assured. Unless MaaS brokers/aggregators can negotiate with transportation network companies (TNCs), and government, to use a cross-subsidy strategy to fund MaaS services that deliver both socially acceptable sustainability and commercial goals, MaaS is unlikely to ever be profitable or societally sustainable. In most markets in general, any unprofitable products and services would likely receive no significant investment from businesses to obtain scalability unless there is a high level of confidence in turning the corner in the (foreseeable) future. MaaS is no different. Without the possibility of scalability, MaaS becomes 'another' initiative in the government's list of initiatives to prioritise. The path to scalability currently seems to suffer from a dominant focus on the next enhanced digital platform and very little else.

So, what is the value proposition likely to be that we should support? If it is agreed that MaaS is unlikely to be commercial and thus is only of value if it delivers on sustainability goals, then it is doubtful it will go beyond what we can achieve already through the existing ways of delivering transport. This is the big question. How can MaaS really make a difference? It may be that an App developer offering better and timely information remains relevant and convenient for some, but we ask the promoters to stop calling this MaaS since it only improves travel information, although this improvement is still valuable (and the addition of other contextual / points of interest information is also useful). But does it change travel behaviour enough to claim an impact on sustainable goals? Collective evidence, we have to date, suggests that a MaaS app will not change travel behaviour to deliver sustainability outcomes, but a fully integrated MaaS system can in time (Ho et al. 2021). Without the need to show complicated modelling evidence, this early finding is easy to comprehend.

It remains a challenge to get key players in the intelligent mobility space to recognise that offering a mixture of modes with the exact same levels of services such as travel times, reliability, and frequency (which are the real drivers of traveller behaviour) already offered outside of a MaaS eco-system, with PAYG financial discounts associated with some journey planning Apps, can hardly be claimed as added-value for travellers. This is why we would prefer if the great majority of App developers and transport suppliers and their advisers start talking about 'Enhanced Travel Information Service' or ETIS and not MaaS!

Reference

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Footnote

[1] This definition below was initiated by David Hensher (Institute of Transport and Logistics Studies (ITLS), University of Sydney) with extensive input from Natasha J Hinrichsen (TMR Qld), Sampo Hietanen (MaaS Global), Corinne Mulley (ITLS, University of Sydney), John Nelson (ITLS, University of Sydney) and Andy Taylor (Cubic). We consider it important to move towards a benchmark definition of MaaS since the concept of MaaS has been hampered by the lack of an agreed working definition (Hensher, Mulley and Nelson, 2021).

4. Carbon neutral shipping – it all comes down to green hydrogen, and lots of it

4 April 2022

Professor Michael Bell discusses why, out of the most popular options for carbon neutral fuels for shipping, green hydrogen is the most viable option being both economically and environmentally sound.

With decarbonisation much in the public eye, shipping is currently and perhaps belatedly trying to find the best pathway to carbon neutral fuels. Shipping greenhouse gas (GHG) emissions as a proportion of global GHG anthropogenic emissions increased from 2.76% in 2012 to 2.89% in 2018, according to the Fourth IMO GHG Study 2020[1]. To put this into proportion, if shipping were a country it would rank as the sixth largest GHG emitter between Japan in fifth place and Germany, according to the World Economic Forum in 2018[2]. As an industry, it should therefore be giving GHG emissions as much attention as given to it by these two countries.

A feature of ships is their relative longevity. A ship ordered today will be delivered two to three years later and then be operating for twenty to thirty years – potentially past the generally accepted deadline of 2050 for achieving carbon neutrality. There is therefore urgency in deciding on the best pathway to carbon neutrality as retrofitting ships can be exorbitantly costly or infeasible. Critical to the choice of pathway are fuel cost and availability. For ocean shipping, there are three principal pathways.

The most popular pathway at the moment, if measured in terms of new ship orders, appears to be liquefied natural gas (LNG) with the fossil fuel version being replaced by bio-LNG or synthetic LNG. However, this pathway to carbon neutrality is also the most problematic. Firstly, the primary ingredient of natural gas is methane, a particularly potent GHG. Although switching from conventional LNG to bio- or synthesised LNG leads theoretically to carbon neutrality, the potential for methane leakage 'from well to wake' is such that GHG emissions are only reduced by two-thirds, according to Shipping Australia[3]. Some of the leakage arises in the LNG supply chain and some escapes unburnt from dual fuel engines of the kind being installed in new ships. Second, LNG requires a cryogenic infrastructure for its storage and delivery, which is expensive to construct and maintain. Natural gas only remains a liquid at -160C under atmospheric pressure, which requires special steels to avoid cracking and extensive insulation. As a consequence, the World Bank has strongly advised against the LNG pathway[4], to the annoyance of the fossil fuel industry who argue that LNG is cleaner than heavy oil and available now.

The second most popular route to carbon neutral fuels is methanol, a form of alcohol. Methanol is already produced in large quantities and has the advantage of being a liquid at room temperature, obviating the need for a cryogenic infrastructure for its storage and delivery. It can also be blended with fuel oil as an intermediate solution (E10 used in cars is an example of this). Like biomethane, methanol can be produced from biomass or can be synthesised by chemically combining 'green' hydrogen (hydrogen produced from water by electrolysis) with carbon dioxide either captured from the atmosphere or emitted by an industrial process. One problem for methanol is that it has about a quarter of the volumetric energy density of conventional fuel oil, so the fuel tanks would have to be correspondingly larger (or the range of ships reduced). LNG has a volumetric energy density about half that of conventional fuel oil, but because of the need for cryogenic tanks and pipes, the extra volume for storage increases by about factor three, so this is a problem shared with methanol. Maersk, the largest container shipping line, has opted for methanol and recently ordered eight ocean going 16,000 TEU container carriers to add to two smaller feeder vessels operating in the Baltic.

The third pathway is hydrogen or ammonia. Hydrogen is 'green' (or carbon neutral) if produced by electrolysis using electricity generated by wind turbines or solar panels. As a fuel, it can be burnt in an internal combustion engine or passed through a fuel cell to generate electricity, the latter technology being more energy efficient, in both cases emitting only water. However, hydrogen has very low volumetric energy density so it must be liquified, compressed or chemically combined with nitrogen to form ammonia. To liquify hydrogen, it should be cooled to -253C, which is only 20C above absolute zero, consuming about a third of the gas to drive the liquefaction plant. It also requires costly cryogenic infrastructure for storage and handling. Compression up to 700 bar is used for vehicles and hydrogen in this form has been found to be a practical fuel for buses. Ammonia is regarded as a more practical fuel for ships, as it can in theory be burnt in an internal combustion engine (suitable engines are currently under development) or broken down into hydrogen and nitrogen (so far only demonstrated in a laboratory) and the hydrogen passed through fuel cells to generate electricity. Ammonia, although toxic, is already produced (but not in a carbon neutral way) and shipped on a large scale as a key fertilizer ingredient, so the infrastructure for storage and handling it already exists.

Of the three principal pathways for ocean shipping, LNG and methanol are the current contenders as the technology for hydrogen as a fuel for ships is not yet mature. Nonetheless, the World Bank is strongly advising the ammonia pathway, in terms of both cost and environmental impact [4]. As fossil fuels are gradually replaced, and their production and consumption fall unevenly, their price will become increasingly volatile. This will apply also to LNG, reducing its attraction as a ship fuel. Methanol offers the possibility to go carbon neutral in one step and does not risk methane leakage. The challenges at present are methanol supply and the lower volumetric energy density. Maersk, by ordering methanol fuelled ships, is attempting to create demand certainty and thus stimulate investment in production. Production of methanol from biomass, however, will not suffice without interfering with food production. An industry that synthesises methanol by chemically combining green hydrogen with carbon dioxide, a known but energy intensive process, will therefore be required. Hence it all comes down to green hydrogen and lots of it.

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5. How sustainable is it to have your groceries delivered? Or can we do better?

2 May 2022

Mark Raadsen looks at the environmental impacts of an activity many of us have embraced since the pandemic started – online grocery shopping.

In the past two years we have all become familiar with online shopping, whether we intended to or not. For some of us this has been a revelation while for others this has been an experience out of necessity rather than preference. As a consumer myself, I found myself ordering my groceries online for the better part of 2021. While hesitant about this change in the beginning, our household has now fully embraced this new approach. While it requires a bit more planning, this is easily offset by the amount of time and effort it saves. However, one lingering sense of guilt has plagued us throughout this “indulgence” and that is the now omnipresent fleet of (diesel) trucks driving around the city. This is now reality rather than me doing my grocery shopping either by bicycle (yes, I did do that, maybe it is because I am Dutch), public transport, or car. So, how sustainable is it to have your groceries delivered?

It turns out – as always – that it depends, but in Australia, in a capital city, having your groceries delivered turns out to be a reasonably “green” thing to do. It is not hard to see why. A dedicated delivery truck optimises its route to visit as many customers in the shortest possible time without returning to the depot (this is called chaining), whereas as regular humans create trips from our house to the shop and back, which is as inefficient as the delivery truck picking up only our groceries, deliver them, drive back, pick up the next customer’s groceries, deliver them, etc. etc. So, as long as you do not order every toothpick separately you might be inclined to think you can put your conscience at ease. Further, not having groceries displayed in your local supermarket but arriving from a warehouse directly saves energy, which is of course also great news for the planet.

Despite these benefits, there are some important caveats (guard, n.d.). Often, the packaging used in online (grocery) shopping is still atrocious and generates a lot of unnecessary waste. In the early days of our online grocery endeavours, we often found our cupboard spilling over with plastic bags from our most recent deliveries. Fortunately, in Australia, most grocers will take back your plastic bags with the next delivery and the bags used are no longer single use, so that is a step forward. Do note that improvement here is possible, in European countries, often you pay a small bond for your first delivery and get sturdy crates instead of plastic bags, these are more durable, carry more items, and are stackable, so this would benefit both customer and retailer. When you return the crates, you receive your bond back. A simple yet efficient system.

Another issue here is the – typically - much lower standards regarding emissions and fuel efficiency for trucks in comparison with cars, as recently pointed out by the US environmental protection agency (EPA, n.d.). This can remove a significant portion, if not all, of the discussed benefits depending on the context. To date, we as consumers have no way of knowing how (non-)polluting the used truck fleets are. In addition, in the not so near future, most of us will own a very fuel-efficient car, a hybrid, or fully electric vehicle (maybe you already do). In this case, most of the discussed benefits disappear. In most commercial sectors customers have the option to “go green”. When you purchase your energy, you often can pay a little bit more but are guaranteed that energy is generated using sustainable sources. When you fly, you can buy off your carbon footprint. In those situations, the cost of the sustainable option is typically a bit more expensive than the default, so you pay a little bit extra. In this situation, I doubt the cost would be much higher in the long term. For example, if (online) grocers were to operate

a fleet of electric trucks, they would save on maintenance, fuel, and possibly tax (although Australia is no front-runner in this regard). Still, if it would not (yet) be cost-effective, there would be an indirect benefit of a free marketing campaign because every electric truck would advertise its sustainable origins for every passer-by: "Look at me, I am 100% emission free". If that still does not outweigh the costs, we - the customers – could be given the option to pay a little bit extra to have our delivery mileage offset by electric kms for example, similar to our energy, or flight purchases (clearly this can be another truck, as you also do not receive "your" green energy that you buy either). This could be a win-win situation: uninterested customers are none the worse off, sustainably oriented customers would be better off, while the grocer improves their brand image in a cost neutral way. So, I am hopeful that for my next order – in the not-too-distant future - a have a new box to tick to support a more sustainable online shopping experience.

(Epa, n.d.) : <https://www.epa.gov/greenvehicles/what-if-more-people-bought-groceries-online-instead-driving-store>

(guard, n.d.) : <https://www.theguardian.com/news/shortcuts/2020/feb/17/hidden-costs-of-online-delivery-environment>

6. What is the value of additional trips?

6 June 2022

John Stanley and Professor Hensher discuss how transport opportunities can be made more equitable by taking a more socially focussed approach when calculating additional trip values.

Traditional cost benefit analysis of transport improvements that generate additional travel assume that the benefit from such additional travel is worth half as much, per unit of travel, as the benefit to those who travelled both before and after the improvement. This is known as the 'rule-of-a-half'. Research by ITLS and colleagues on connections between mobility and social inclusion questions the validity of this long-standing convention.

The main paper in this research stream (Stanley, Hensher et al. 2011a) has been cited nearly 200 times, suggesting that it has considerable credibility with the academic community. However, the research has rarely been applied to project appraisal, a recent study by KPMG (2021) being a notable exception. Wider application would considerably enhance opportunities for greater transport equity.

The ITLS research in question extends back over a decade (see references) and was focussed on trying to monetise the benefits of additional trip making by people at risk of mobility-related social exclusion. Detailed travel survey information, together with information on a range of other factors thought likely to influence risk of social exclusion, was collected by in-depth personal interview, including information about various forms of social capital, connectedness to community, subjective wellbeing, psychological well-being, personality, demographics and household composition.

Risk of social exclusion was measured by five indicators, building on earlier work by London School of Economics (Burchardt et al. 2002). Those five indicators were:

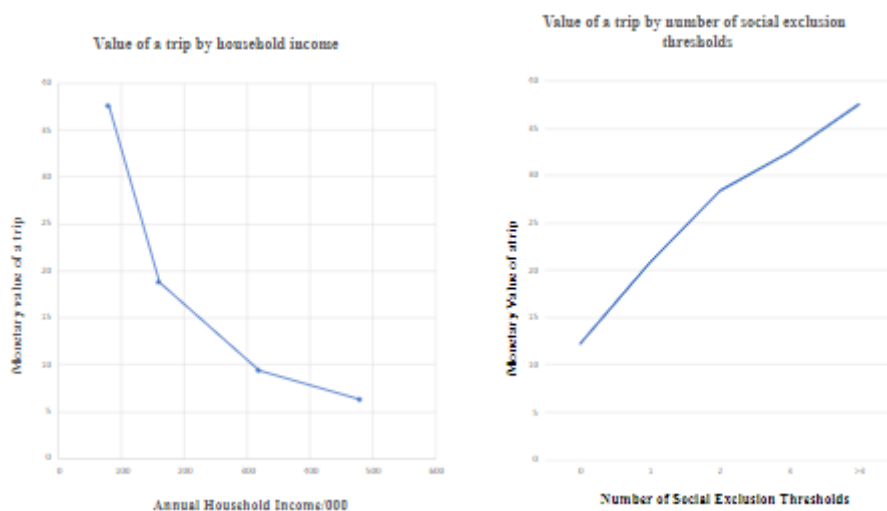
- Household income (less than \$A500 gross per week, in 2008 prices) (this was the rate of aged pension in Australia at the time of the original research interviews)
- Employment status (not employed, retired, in education or training, undertaking care duties or doing voluntary work)
- Social support (not able to get needed help from close or extended family, friends or neighbours)
- Participation (did not attend a library, sport [participant or spectator] hobby or arts event in the past month)
- Political activity (not contributing to, or participating in, a political party, campaign or action group to improve social/environmental conditions, or to a local community committee/group, in the past 12 months).

The first two are economic indicators and the other three are more about social capital and community connection, reflecting the idea that social exclusion is about capacity, or lack thereof, to participate in the opportunities available in your society. The more thresholds present, the greater the risk of social exclusion.

Various modelling analyses we have undertaken over the past decade, drawing on data from the 700+ respondents from Metro Melbourne or from the 200+ respondents from the regional Victoria survey, have consistently shown that an additional trip is worth between around \$15-24 in 2008

prices, for someone from a household with mean sample household income. The value is modally agnostic: it applies to an additional trip by any mode by someone from a household with the same mean household income as our sample (in 2008 prices).

Our latest work (Stanley et al. 2022) enables estimation of the relevant trip value as a function of the number of risk thresholds confronting the trip maker, or as a function of their income level, as shown in the figure below. \$20.40 was the value (2008 prices) for someone on average household income from the most recent analysis, very close to our initial estimates from 2011. For someone with no risks of exclusion, the value of an additional trip is just over \$12, which is 2-3 times higher than what would be derived from the rule-of-a-half (around \$4-5). For someone with 3 risk factors (high exclusion risk), our value for an additional trip is over \$30, many times the value that would result from the rule-of-a-half. Why are our values for an additional trip so much higher than would result from application of the traditional 'rule-of-a-half'?



In pondering this question, it should be remembered that people are typically making only 4 or so trips a day, so one additional trip is a 25 per cent (or so) increase. This is not a marginal change; it represents a significant increase in implied activity levels and the benefits associated therewith, which may play an important role in promoting social inclusion.

Societal arrangements and socio-economic structures influence individual opportunities and associated societal outcomes, as they relate to risk of exclusion, the dependent variable in our analysis. People who undertake additional trips are not necessarily consciously trading-off trips for inclusion (really disadvantaged people do not often have this luxury!), in the same way they might trade off travel time savings for money. Hence, we do not suggest that our work is estimating individual Willingness to Pay for additional trips by the trip maker(s).

If trips by people at risk of mobility-related social exclusion increase, our models consistently say that people will benefit in terms of lower exclusion risk, which means (for example) fewer people in poverty, fewer unemployed and higher levels of social capital and/or community involvement. A critical point is that fewer people socially excluded has societal value beyond the value to the at-risk person(s). We argue that **our trip values are a measure of Societal Willingness to Pay (SWTP) for an additional trip by someone at risk of mobility-related social exclusion and that this exceeds the personal WTP of the trip maker.** Why?

We suggest that this is because there are external costs associated with social exclusion, beyond the costs to the excluded person. For example, reduced exclusion often means better health outcomes and associated reductions in health system costs, lower crime rates with associated reductions in costs for the

justice system, etc. There are thus both personal benefits to the at-risk person and wider societal benefits from more trips and the associated reduction in social exclusion risk. Our risk indicators reflect the idea that a rising tide (i.e., reduced exclusion of some people) lifts all (most) boats (better outcomes for society more broadly) on our 5 indicators, as demonstrated (for example) by Wilkinson and Pickett (2009), *The Spirit Level: Why Equality is Better for Everyone*. We believe that our trip values include some (unspecified) part of the wider societal flow-on external benefits of reduced exclusion (hence the apparently high value). This external component might be argued to be equal to the difference between the rule-of-a-half value for additional trips and our value.

Our values are an expression of the value to society, or to the common good, from increased trips and associated reduction in risk of social exclusion. We see this as a **merit good**, where the value to society exceeds that to the individual directly gaining the benefit. As noted, we interpret this benefit as Societal WTP: it is how society values the benefit from reducing mobility-related social exclusion risks. Professor Chris Nash from ITS Leeds first drew this interpretation to our attention.

In applying our benefits, we would use our values for every extra trip, as adjusted for number of risk factors or income levels of the various groups making additional trips, and then deduct the user benefits estimated by the rule-of-a-half. Counting them too would be double counting.

Application of these ITLS derived values for additional trips, as a function of the exclusion risk level or household income level of the trip maker, would lead to a step change in the merits of transport initiatives whose major purpose is to achieve a more equitable distribution of transport opportunities. This has become a major policy direction in cities such as London and Vancouver, as expressed in their most recent long term land use strategies. The values for additional trips discussed herein, when used, can make a significant contribution to more equitable cities and regions.

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7.The reason MaaS is such a challenge

4 July 2022

Why are the current Mobility as a Service (MaaS) offerings not enough to change the public's travel behaviour? Professor David Hensher explores what could be done to make MaaS a more attractive prospect.

Think about it; Mobility as a Service (MaaS) is essentially the same service levels of each mode separately and currently offered; and as separate offers based on the same service levels, why would the offer of telling someone they can use particular modes at the same service levels through a digital platform (App)^[1] (if no relevant incentives – not necessarily financial) be of sufficient difference to change travel behaviour?

Think of MaaS as adding another attribute (maybe more than one attribute) to an already unchanged set of attribute levels on unpackaged modes? This latter feature may explain why it appears to not be attractive enough for most people. Also, we know that many people are (sufficiently) familiar with travel options and know how to combine them without having to use an App? We should give the public more credit about knowing than is typically claimed in the MaaS deliberations. I call this the framing of MaaS.

Let us use an example. This is the situation today: assume a person uses the car and the car trip is 39 mins, parking cost is \$20, tolls \$10 but door to door. A multimodal trip without any discounts to what is on offer as separate modal services is a 10 minute walk to the train, a 5-minute wait for the train, 50 minutes on the train, a \$5 fare and a 10-minute walk to the destination. What does MaaS do? We could tell you about this non-car trip if you did not already know!

But knowing about an often inferior good (in terms of attributes that matter) is not enough to change travel behaviour, a reason why someone does not use it at present (Hensher et al. 2021). So what else needs to be on offer? For a start, we need to make the private car less attractive (something many of us have been promoting for years^[2]), which seems to not be possible^[3], and/or make the modal components of the alternative more attractive. But this latter initiative can happen outside of MaaS (planners and service providers have been doing this for years); so if the additional attribute(s) associated with MaaS that is (are) claimed to represent the appeal of MaaS is (are) not significant, MaaS may add no utility at all^[4]. So what is this missing attribute(s)? That is the crucial question. This comes down to what I refer to as differential effort and seamlessness beyond what is already known and available being the missing ingredient (Hensher and Xi 2022). Is the effort of engaging in a multimodal interrogation via a digital app a sufficient investment in return for an expected utility gain?

Hensher and Xi (2022) suggest that effort relates to both the outlay of effort required to find the best or acceptable way of moving around and once decided, the actual human effort required to undertake such movement; and seamlessness refers to the supplied service opportunities that enable a frictionless movement from beginning (origin) to end (destination) of a movement activity. To quantify the “user effort and seamlessness” of a multimodal trip is a serious empirical challenge; for example, each travel mode might be assigned an inconvenience cost per unit of time, and users set preferences on their maximum acceptable inconvenience cost, referred to as user *inconvenience tolerance*, an idea proposed by Hainong Xi in her PhD thesis^[5]. Intuitively, the inconvenience cost of travel modes aims to capture discomfort in shared and public transport modes and transfer among different modes (Xi et al. 2020)^[6]. The inconvenience cost per unit of time can be assumed to be mode-specific and based on vehicle occupancy (the number of shared riders in a vehicle). The broadening that comes with subscribing to a package of modes as a package of modal and non-modal services with attractive

incentives (Hensher and Mulley 2021) may be a significant source of gained utility in which inconvenience tolerance is cushioned by the benefits offered through services outside of modal supply.

The inability to change the levels of service associated with available modes is often the biggest stumbling block, since we are not aware of how one might differentiate this within a MaaS offer compared to purchasing each mode outside of a MaaS offer, apart from sharing information. This is where financial and non-financial incentives will be important, but to date we have not found the ones that will really make a sufficiently noticeable difference to enable MaaS to change travel behaviour in ways aligned with achieving societal sustainability goals. The eco-system of MaaS appears to have many challenges to face and resolve before we can see a pathway to scalability, and even a business case that might have commercial legs (Hensher et al. 2020).

It is time to start taking co-design or co-creation much more seriously and broaden the potential sources of positive utility, since the testing and/or introduction of a limited number of MaaS packages (as well as pay-as-you-go (PAYG) options) may be at the centre of a misplacement with the essential conditions associated with effort and seamlessness that matter across a very heterogeneous population of travellers. To achieve scalability with this approach, we will have to create a platform that allows a significant number of users to mix and match relevant services (defined inside and outside of the modal offerings), and package them to a bundle. Persona are interesting as initial market segment guides but are insufficient in guiding the design of an appealing set of MaaS offers.

An important, and final, comment is that many of the points raised are written from an individual traveller perspective. Looking from a household (or group) position with the ability to share / donate mobility resource to each other may be more attractive as a way forward.

Acknowledgment: I thank John Nelson, Chinh Ho, Corinne Mulley, Aitan Militão, Hainong, Xi (ITLS) and Andy Taylor (Cubic) for their comments and feedback. I have, with permission, included a number of quotes in footnotes from these colleagues as a way of recognising their views and comments. We also recognise that there is an extensive and growing literature on MaaS with Hensher et al. (2020) covering many of the contributions, but it is not appropriate to include a literature review in this paper which is designed to summarise a lot of lessons learned as I and colleagues have investigated in detail elsewhere MaaS over the last 7 years.

[1] In discussions with Chinh Ho (23 February 2022), he comments that “[An] App is just a digital platform to interact with users, and whether we realise the benefits of MaaS or not will depend on what we build into that app. If it is just a multimodal platform, no doubt the benefit would be very marginal. Hence the need to distinguish different levels of integration.” Corinne Mulley adds “...a superior (or not so superior) journey planning app masquerading as MaaS is likely to do little to change travel behaviour.... We have known that there is a soft benefit for having everything in one place, and this applies to journey planners too, but the evidence is that the willingness to pay, where it is positive, is small. So this is unlikely to encourage too much take up. Putting this in a choice context, as you have, makes it starkly clear.” Chinaei et al. (2022) show how distributed architecture can be developed to realise a MaaS digital network using blockchain technology; and while this is a very appealing way to “...offer benefits to the government, users and industries by enhancing their access to everybody else’s assets in a secure way” (page 7), it is still not clear how this will change travel behaviour in a non-marginal and societally sustainable compliant way, which is the ultimate reason for MaaS.

[2] And when electric cars appear at a scalable level under the current road pricing model, they will be an attractive purchase, with a lower price to purchase and also to use, making the challenge of MaaS even more demanding (Hensher 2020). While this action may appeal to those who want to do good things for the physical environment (a ‘tinge of guilt’ removed), it will not assist growing levels of traffic congestion, or getting people out of their private cars.

[3] Unless we can fold it into a MaaS offer as a corporate car choice, as set out in Hensher et al. (2022) in what we refer to as Electric Car Sharing as a Service (ECSaaS). To date, most MaaS

products have focussed in particular on public transport, but sadly in many jurisdictions the adage 'to make public transport more attractive we have to make the private car less attractive' still applies.

[4] Furthermore, multi-modal offerings may be desirable through a digital platform if payment is required in advance of travel. Historically in NSW for example, the Travel10 public transport ticket had critiques, with single-ticket users questioning why Transport for NSW receive their \$20 payment in advance (i.e., prepaid for 10 single tickets). All else being equal, including the level of service and no discount, packaged services might reduce rather than increase utility, at least for some people, because the subscription fee, pre-paid, could stay in an offset account / bank account to gain interest by others (just like pre-paid tolling does).

[5] Andy Taylor in correspondence (22 February 2022) says that "I like the concept of inconvenience tolerance. I think the applicability of this across all modes, including private car usage, would be an exciting methodology that could provide insights into how far we have to nudge someone's behaviours to get them to change mode. As a baseline, though, it can help explain the reluctance of 'MaaS' adoption of multimodal mobility."

[6] John Nelson in correspondence (24 February 2022) makes the point that "... I like the focus on effort and seamlessness. This highlights the inconvenience typically associated with public transport and other shared modes as well as the penalty of transfer among different modes. But the easiest way to ease this is by enhanced information provision which takes us back to the good journey planner."

8. New economic measurement: A value-based approach

1 August 2022

Christopher Day explores how measuring economic growth and societal wellbeing is a complex process that cannot be evaluated solely by quantitative calculations like GDP.

COVID-19 placed the Australian economy into recession for the first time in nearly three decades. Despite the headlines of a devastated economy and, more recently, the speed of the economy's 'rebound' following the Nation's 'reopening', little thought is given to what actually constitutes a recession.

Success can be all manner of things. In the context of this article, I will outline how economic measurement can be adjusted to deliver improved social, environmental and economic outcomes. While perfect measurement is unachievable, as we must trade off the costs of collecting and analysing more data with the benefit of improved data, drastic improvements can and should be made.

Since the 1930s, economic growth and societal wellbeing have been largely measured through a single metric, gross domestic product or GDP. The goal of GDP is quite straightforward, it is simply an estimate of the value of goods and services produced within an economy over a specific period of time. While GDP is exceptionally good as a compilation of certain material factors, it has little regard for quality. Production, irrespective of the environmental and social cost, is viewed favourably while unpaid and volunteer activities are overlooked entirely. Many service activities connected to a modern digital economy are omitted from national accounts whilst rising levels of inequality, both spatially and between households, are ignored. Concurrently, low interest rates have fuelled rapid asset price inflation in equity and property. This feeds into higher imputed rents, suggesting that we are better off despite increasing wealth inequality and cost of living. On the other hand, productivity, a key determinant of living standards, has flatlined in most of the developed world.

Although the term GDP frequents the media and political speeches, the manner in which it is calculated is both imprecise and subject to a multitude of choices. GDP can be estimated using three approaches that examine either production, income or expenditure. Technically speaking, each approach should result in the same answer but in practice the adoption of asymmetric assumptions results in disparities.

Before even going into the shortcomings of GDP, the fact that we emphasise an aggregate, as opposed to a per capita, measure is egregious. This enables GDP and economic growth to be positive alongside declines in average living standards. Australia averted technical economic recession for nearly three decades despite experiencing falls in per capita GDP since around 2010.

The emphasis on aggregate GDP is largely due to the fact that GDP can only be lifted by growing the size of the economy, either by:

- (i) Having more people (notably by shifting previously unpaid groups of individuals such as women into paid employment or promoting in-migration) or;
- (ii) Raising the productivity of existing workers.

Of these two techniques, option one is far easier. Interestingly enough, Australia's record low unemployment rate and rising wage growth in the first half of 2022 is largely the result of reduced in migration during the COVID-19 pandemic!

Although GDP provides a useful benchmark, its emphasis on consumption results in a measure that rewards higher prices. This creates a perverse situation where a government that ends up paying a premium, as a result of flooding the market with infrastructure projects, lifts GDP more than a government which managed to build the same infrastructure for a lower price by better managing demand. The New South Wales Government has recently suffered from infrastructure cost escalation amidst a hot market. Another excellent example lies in healthcare spending. According to data from the World Bank (2017), for a comparable level of healthcare, the United States spends 17 percent of its GDP on healthcare compared to just over 9 percent in the United Kingdom and Australia. This suggests that people in the United States are better off because the nation has a more inefficient healthcare system! Furthermore, rapid house price growth that has generated ridiculously high price to income ratios in cities such as New York, San Francisco, London, Hong Kong and Sydney, are to be encouraged due to their positive impact on a nation's GDP! As of March 2022, Australia's property increased in value to nearly \$10 trillion, up \$2 trillion in a single year (Cary, 2022).

Concern with GDP in isolation is problematic. We need to ask ourselves whether a policy focus on maximising GDP is really making us better off. Since the 1990s, Japan has often been branded an economic backwater despite the nation's low unemployment, rising standards of living, strong industrial and research base, low crime rates and high life expectancy. Was the nation really better off in the heights of an asset bubble when the Imperial Palace in Tokyo was worth more than the entire state of California? On the other hand, Australia's multi-decade streak of GDP growth has been applauded despite the nation's growing levels of inequality, weak industrial base, unaffordable housing and slow productivity growth.

There is an old adage that 'what gets measured gets done'; this makes it critically important that our measurement and performance incentive structures are designed to guide decisions towards those that benefit society. Before diving into any proposals for how this might be achieved, it is important to note that making adjustments to measures of economic success are likely to entail unintended consequences. What may sound intuitive or fair does not necessarily result in desirable outcomes. For example, measuring unpaid housework would likely have a larger impact on poorer households, thereby leading to a perceived fall in inequality!

Essentially, GDP's failure to measure quality is the root cause behind the disconnect between higher spending/growth and improved economic outcomes. Going forward, economic growth must be underpinned by an emphasis on value, not expenditure. Measures of success must look at social mobility, inequality, educational attainment, life expectancy, environmental sustainability, commute times, housing affordability, work-life balance, unemployment and employment quality. Though these measures only scratch the surface and are themselves subject to significant shortcomings, they illustrate the requirement for a syndicate of measures to be employed when assessing economic success.

An enhanced framework for economic measurement must be less concerned about an economy's size/growth and more interested in the quality of life enjoyed by its citizens. This is vital if we are to escape a system which generates aggregate measures that have little bearing on lived experience.

Moving towards a holistic set of measures that emphasise 'value' and 'wellbeing' will unlock government spending for policies that improve societal outcomes (such as protecting the environment), reduce the incentive for firms to conduct business in a manner that deteriorates standards of living (environmental destruction, unethical practices), and enable superior responses to major shocks such as the COVID-19 pandemic which are not about falls in headline GDP and 'recession' but about their impact on people's livelihoods.

On a final point, the implementation of a revised economic measurement framework does not negate the importance of maintaining a balanced budget over the long-term. We cannot always maximise

outcomes to the desired extent, what a syndicated measurement model achieves is the delivery of greater spending efficiency or value that reduces economic wastage. Knowing what we want to measure, as opposed to following a system which promotes activities that undermine societal welfare, such as higher expenditures resulting from inefficiency, inflated asset prices and pollution, is an enormous step in the right direction.

Economics is not a natural phenomenon. Economics is about people. What we measure and the policies we enact must reflect this mentality. Without change, we risk stimulus being directed towards policies that exacerbate inequalities by lifting components of GDP that have little, or even a negative, influence on the nation's standard of living

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9. The growing importance of equity in planning cities: recognising the value of improved mobility for those at exclusion risk

5 September 2022

Social equity is an essential factor in transport and infrastructure planning. Professor John Stanley explains how ITLS research on mobility can be used in planning to achieve more equitable outcomes for all.

Perusal of strategic land use transport plans for a number of major developed cities reveals striking commonality between the high-level goals that cities set for themselves, reflecting the triple bottom line (economic, social and environmental) goal thinking often associated with the Brundtland Commission (WCED 1987). Interestingly, however, recent updates of these plans in several major developed cities reveal a notable shift in emphasis in policy priorities as between the three main outcome goal areas. The economic goal has typically been dominant over the past couple of decades, but this is now changing, with much greater policy focus being attached to ensuring that all residents are better able to share in the benefits of urban living and growth and that the city is able to play its part in reducing global greenhouse gas (GHG) emissions. This reflects a similar trend in the corporate world, where there is a rapidly growing focus on societal ESG outcomes (environment, social, governance), beyond a corporation just seeking to maximise profits for its corporate shareholders.

We focus here on the equity goal area. While COVID was not the main factor in driving the relative change in priority accorded to more equitable cities, in many places it has served to emphasise existing socio-economic disparities, which commonly have a spatial outcome. COVID has thus tended to reinforce the importance of planning for greater social and spatial equity in cities.

This change in relative priorities towards a stronger and fairer *equity focus* is apparent, for example, in both London and Vancouver. The Mayor's Vision for *The London Plan 2021* is that it is 'about creating a city for all Londoners, where no-one is left behind' (Mayor of London 2021, p. 11). In similar vein, drafts of Vancouver's updated Regional Growth Strategy (Metro Vancouver 2021) and Regional Transportation Strategy (Translink 2021) talk about equitably sharing the benefits of the city, the draft Transportation Strategy explicitly stating that each of its five goals applies to everybody.

The focus of debate about cities being for everyone can have a different focus in different places. Groups such as Partnership for Southern Equity in Atlanta draw attention to linkages between race and space. In Malmö, Sweden, as in London, the idea of 'leaving no-one behind' encompasses policy directions such as reducing spatial disparities in living standards and public health and extending (for example) to recognition of the need for a gender focus and age focus in such planning and to creating opportunities for citizen participation across all segments of the population (Malmö stad 2018).

A lack of *affordable housing* is one major driver of increasing dissatisfaction with urban equity outcomes in many cities. For example, Demographia's 2021 rankings of cities by housing affordability rated Vancouver as Canada's least affordable market and the 90th least affordable market from among the 92 analysed, having a median multiple of 13.3, having increased from 10.3 in 2013 (median house price divided by the gross median pre-tax household income) (Urban Reform Institute and Frontier Centre for Public Policy 2022). Metro Vancouver, the regional planning authority, acknowledges that such affordability issues have been partly exacerbated by an urban development focus on transit-oriented development, which has accentuated gentrification (Metro Vancouver 2021).

The heightened policy focus on equity demands more integrated land use transport planning at city level, supported by appraisal tools that are sensitive to equity issues. ITLS research on mobility and

social exclusion is ideally placed in this regard. That research has consistently demonstrated the importance of mobility for social inclusion, the high value of additional trip making by those at risk of mobility-related social exclusion and also the high value of bridging social capital (see, for example, Stanley et al. 2011 a, b; 2021 a, b; 2022). Bridging social capital is basically about social networks that allow people to 'get ahead', by accessing resources and opportunities through contacts with work colleagues and people associated with wider groups, such as local government, schools and sporting clubs. Trip making is, in turn, supportive of building bridging capital.

Transport cost benefit analyses (CBAs), however, currently value small time savings for car drivers but fail to recognise potential social inclusion benefits, even when studies show that the economic benefits from the latter can dwarf the former (Stanley et al. 2021b). If CBA is to be supportive of more informed decision-making in relation to equity issues such as transport disadvantage, current CBA procedures need to be revised to better reflect such equity concerns. The ITLS research on the value of mobility for social inclusion, provides one means of achieving much greater assessment relevance in this regard. It is encouraging to note, therefore, that the recent KPMG (2021) evaluation of Victoria's Suburban Rail Loop project used social inclusion benefits values derived by Stanley et al. (2011 a), the first such application of which we are aware, even though those values are now over a decade old. We have applied these values in our own research on Sydney (Stanley et al. 2021b), demonstrating the huge benefit potential of well-targeted transport measures.

Mainstreaming the ITLS values of additional trip making by those at exclusion risk will advance the consideration of more equitable social outcomes in transport and infrastructure appraisals and should improve transport decision-making, helping to make our cities more equitable. Those who are at risk of mobility-related social exclusion could do with the support.

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10. Aiming smaller with infrastructure spending

4 October 2022

The aftermath of the COVID-19 pandemic presents a unique opportunity for governments to rethink major infrastructure spending and consider other avenues for investment to build towards a future we want, writes Matthew Beck.

While the NSW Government will continue to build selected large infrastructure projects (which may now take longer to complete), the recent pivot by Infrastructure NSW to recommend the suspension of investment in large scale infrastructure projects in favour of smaller more immediately impactful spending^[1] is an eminently sensible course of action given the uncertainty coming out of the pandemic, and the “new normal” still very much in the formative stages of being established.

There is a long history of large infrastructure projects being problematic, given their scope of ambition, complexity, and the generally long lead times to bring such projects to completion. NSW is not immune from those problems, with the recent light rail projects being a prime example of how big infrastructure projects can cause big headaches.

That is not to say that all large infrastructure projects are undesirable. To move a city (or any other system) to a future state that can sustain economic, social, and environmental activity, a degree of uncertainty is inherent in decision making. There does need to be an element of taking a plunge now, to invest in the future that we want for tomorrow and taking the hits that may occur with trying to reach such a vision.

Moreover, building towards the future we want can be a difficult balance for decision makers trapped in the now. Often large infrastructure investment for a long-term benefit can often be distorted for short term gain at the ballot box (commuter car parks and sporting fields aside). The temptation is real and for that reason many have argued that big infrastructure projects should be insulated against the short-term vagaries of political cycles.

Nonetheless, even with the best of intentions, futures are notoriously difficult to predict even without the advent of a global pandemic. In a very simple example, the impact of autonomous vehicles on transport activity is yet unknown. Will it erode use of public transport given that people will not have to drive themselves? Will it induce more car travel, but will that car travel be more efficient due to gains from autonomy meaning less road space is needed per vehicle^[2]? There is uncertainty in the future quantum of road-based revenue as fuel excise is diminished as electric vehicles gain market share^[3].

It seems likely that COVID-19 has created a structural break in the economy with regards to where work is completed. Many more people are now happily and productively working from home to a much larger extent than prior to the pandemic. While some future trends are emergent, it is uncertain what this might mean for transport investment. With a lower volume of commuting activity, there may be less need to invest in new public transport infrastructure^[4] and motorways. Deferring spending on these expensive projects is eminently sensible while the new future of work is still forming.

Importantly, we have seen that car use has rebounded strongly out of the pandemic as people maintain biosecurity concerns about using public transport, and due to travelling less given they are working from home more, the otherwise more expensive private vehicle (and associated fuel and parking costs) becomes relatively more affordable. The last thing that is needed now is any investment

in infrastructure that further embeds the car as the predominant form of transport, given the litany of evidence that shows the ills that doing so continues to have on our urban environments.

With more work being completed in the home, governments are presented with a unique opportunity for revitalisation of suburbia. These locational adjustments of WFH align well with promoting the 15 or 20 minute city, which remains a challenge given a strong radial and CBS focussed strategy in many cities throughout the world. We need to promote “be local and buy local” to help capture the redistributive effect of increased WFH where small business in suburban areas can benefit from increased economic activity that they would otherwise not participate in.

Local infrastructure investment is typically the remit of local councils, who have less ability to raise funds for expensive capital improvements as compared to state or Federal authorities, and many councils are still reeling from losing investment funds during the Global Financial Crisis.

With a greater focus on local activity, there may be a need to reprioritise improvements in local public transport, safer pedestrian walkways and precincts, and bicycle lanes, serving short distant trips throughout the day, with the added benefit of improving first and last mile connectivity^[5] to PT and (hopefully) contributing to improved health outcomes. Local road amenity and safety may also need to be revisited, with a greater focus on localised maintenance and traffic control measures to cope with a potential change to localised traffic flow^[6].

Given the large amounts of rain across vast parts of New South Wales, there are easy gains to local amenity through State government assisted schemes. For example, repairing widespread potholes, conduct repairs to local parks and sporting fields while ensuring proper drainage is created in these local green spaces and/or wetlands, improving lightening in suburban and regional streets.

All these investments to help create safer and more resilient local environments where we are spending more of our time. There are likely many gains to be had in smaller cheaper projects that better connect towns and people in regional communities, such as the active travel plan in Wagga Wagga.

We should not neglect the importance of large motorways to economic activity, but there are ways to improve the performance of that network without necessarily building more of it. There is investment in existing technology that can help create a more streamlined traffic flow to ensure less stop-start traffic and sudden braking at congestion points by controlling and coordinating entry ramps along the route, and better use of variable message signs and travel time information for road users, gained from the traffic management system in real-time.

We also need to think about how to make incremental investments to the existing transport infrastructure to get it ready for future technology. For example, how can we transition to dedicated lanes on main urban roads to support travel via a pod-systems where energy is delivered to “vehicles” from the road itself. Irrespective of such long-range futures, in the short term we do need to think about how we can elegantly support the introduction of Avs to the road-space in a similar way.

Generally, we need a rethink where infrastructure funding should go, including deferring major infrastructure spend. We might even find that active travel strategies can become embedded within investment in key public infrastructure. This is particularly true in the context of rising input costs driving increases in inflation, which in turn will cause the often significantly overrun budgets of these large projects to be some order of magnitude higher again.

The decision to defer spending on large infrastructure projects at the present point in time, is a sound one. Overall, there are many small wins out there waiting to be found for the innovative and forward-thinking policy maker, where projects can be completed quickly, and thus improve our lives quickly. The totality of these smaller wins will help show the value of infrastructure and thus the need to continue to invest in it, and maintain it, for the betterment of our desired futures.

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[1] <https://www.theguardian.com/australia-news/2022/may/31/infrastructure-nsw-calls-on-government-to-reconsider-timing-of-megaprojects>

[2] AVs are still likely a long way away given the pristine nature of the infrastructure needed for this technology to work well, let alone at all.

[3] Hensher, D.A. (2020) Electric cars – they may in time increase car use without effective road pricing reform and risk lifecycle carbon emission increases, *Transport Reviews Editorial Series*, 40 (3), 265-266 DOI: <http://dx.doi.org/10.1080/01441647.2020.1709273>

[4] In particular for longer distance commuting, though there exist opportunities to improve accessibility for localised public transport options.

[5] Though not from rideshare which has proven unattractive and unsustainable thus far given high fares, so more through active transport infrastructure, the legalisation of electric bicycles and scooters with dedicated pathways or rights of access.

[6] Beck, M., Hensher, D. (2021). What might the changing incidence of Working from Home (WFH) tell us about future transport and land use agendas. *Transport Reviews*, 41(3), 257-261.

11. Circularising the Port of Newcastle – Can we learn from the Port of Amsterdam?

7 November 2022

The Port of Newcastle is the world's largest coal port, yet Australia has not managed to future-proof its operations and move away from fossil fuels. Veronica Schulz compares it with the Port of Amsterdam and the steps they have taken to work towards a more sustainable circular economy.

Most know the Port of Amsterdam as the world's largest petrol port. As fossil fuels expectedly decline, the longevity of the Port of Amsterdam becomes threatened. Parallel to the Port of Amsterdam is the Port of Newcastle, the world's largest coal port, which is facing a similar threat. Nowadays, the Port of Amsterdam is future-proofing their operations by redefining themselves to become, what they call, a bio-based and circular port. Alongside the Port of Amsterdam, the Netherlands are driving Europe towards the circular economy. Just as the Port of Amsterdam serves as a gateway to Europe, the Port of Newcastle serves as a major gateway to Australia. Yet, while the Netherlands welcomes the transition towards the circular economy, Australia runs from it. What can the Port of Newcastle learn from the Port of Amsterdam to lead Australia towards a sustainable future?

A circular economy is a paradigm shift away from the linear 'take-make-waste' model, towards reusing, recycling, and recovering waste flows into new value streams. For the Port of Amsterdam, the shift towards the circular economy did not come without its challenges; it is almost certain that the Port of Newcastle will face similar challenges.

In their 2016 Annual Report, the Port of Amsterdam announced their goal to allocate 25 hectares of port land to the circular economy by 2020 (Port of Amsterdam, 2016). While they made extensive strides to increase the number of circular activities in the precinct, the major challenge with achieving this is the scarcity of port space (Port of Amsterdam, 2020). The Port of Amsterdam is maximising the available space by building up and carefully considering where to place new activities around existing activities (Port of Amsterdam, 2020). In its current state, the Port of Newcastle has ample space but minimal circular activities in the precinct giving it what the Port of Amsterdam does not have: A clean slate. To maximise productive use of port space, the Port of Newcastle should carefully plan industrial synergies, logistics, and transport as it builds a circular port ecosystem.

Infrastructure and transport that facilitate circular activities and material flows assists in accelerating the transition to a circular port. However, building the necessary infrastructure to upscale existing circular activities and introduce new circular activities has been challenging for the Port of Amsterdam (Port of Amsterdam, 2020). The Port of Amsterdam has found success in collaborating with partners in the construction industry to build the infrastructure. For the Port of Newcastle, ensuring that partnerships with the construction industry are forged in early stages will accelerate their circular transition.

The Port of Amsterdam has a strong preference to collaborate with start-ups to test new and innovative processes and technologies (Port of Amsterdam, 2016). This, however, means that many of the circular activities were introduced to the Port of Amsterdam on a smaller scale and thus, meeting the increased energy demands from companies in the port has proven difficult (Port of Amsterdam, 2020). To combat this, the Port of Amsterdam launched their Shared Energy Platform to facilitate the exchange of energy between different circular companies, and Online Circular Network to connect companies in the port area to share knowledge (Port of Amsterdam, 2019). The Port of Newcastle can learn from this by establishing themselves as a circular port ecosystem, where the inputs of certain circular activities can feed off the outputs from other circular activities to maximise energy efficiency

and profitability. They must facilitate the collaboration between different companies, as sharing of knowledge, waste and energy is essential.

The Port of Amsterdam understands the benefits in engaging with the community, knowledge institutions and research partners. With the coal industry's prominence in Newcastle, it is vital that the local community are given a voice during the transition. The Port of Newcastle has the advantage of being within easy reach of a number of universities and research partners interested in the port and the Hunter region. As is the case for Port of Amsterdam, leveraging these connections will enable the advancement of the circular economy.

Scaling up and reducing costs of circular activities are necessary to maintain and grow the Port of Amsterdam's circular economy. However, their current business model is not profitable on its own and is therefore dependent on subsidies. The Port of Amsterdam highlights three conditions to reduce the need for subsidies: Setting clear objectives, fair policy instruments and targeted investments (Port of Amsterdam, 2021). These conditions would also apply to the Port of Newcastle. The move to circularity should be driven by the strategy, stakeholders, and a clear vision for the port. The current environmental sustainability objectives of the Port of Newcastle do not encompass a strategy or vision for a circular port ecosystem and therefore risk the port missing a major (the only feasible?) diversification opportunity.

Shifting port operations away from fossil fuels towards circular activities is complex and comes with numerous challenges. Fortunately, there is much that can be learnt from the Port of Amsterdam and other ports, principally in Europe, to assist with this transition.

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12. Mobility as a Feature (MaaF): Rethinking the focus of Mobility as a Service (MaaS)

1 December 2022

David Hensher and Sampo Heitanen suggest that a paradigm change is required when it comes to Mobility as a Service (MaaS). They encourage a move towards transport services as part of a wider activity-focussed product mix driven by the private sector that is also financially sustainable.

Since its inception, Mobility as a Service (MaaS) has attracted significant interest throughout the transport fraternity, with numerous initiatives designed to unite 'silo transport services' through a digital platform (Hensher et al. 2020). A key focus has been on promoting the ideals of sustainable outcomes with a particular emphasis on reducing private car use and promoting sustainable transport, especially public transport and micro-mobility. Since the 'birth of MaaS' almost 10 years ago, we have seen very limited evidence of meaningful changes in users' travel behaviour resulting from the many MaaS products, whether they are true MaaS or an enhanced trip planner^[1]. Why is this? We suggest that this has a lot to do with a focus on transport modes, transport suppliers and transport regulators where the real opportunity may have been stifled and missed. There is also an absence of any real effort to find ways of bringing the private car into the mix despite its dominant role in the mobility landscape (Hensher et al. 2022)^[2].

Hensher (2020, 2022) suggested that a multi-service perspective may turn the tide as well as a recognition that the convenience of the private car needs to be embedded in a MaaS solution. Working with large insurance companies led both authors to realise that this multi-service idea can blossom when we engage with significant private enterprises outside of the transport sector whose focus is on what the customer really wants in a broad sense, unconstrained by the limitations or even ideologies of agencies that primarily focus on delivering transport services.

Recognising that transport and travel are derived demand constructs, mobility offers should be seen as an input into a larger activity-based paradigm of service delivery. This service-delivery-paradigm offers a wide range of non-transport mobility services that are essential to customers, and we argue that it is in this service delivery setting that transport integration might flourish. We call this *Mobility as a Feature* (MaaF) as a nice way of moving away from a dominating multi-modal perspective to a multi-service perspective. But there is a twist – we suggest that the future of MaaF in terms of an appealing business case, and even commercial success, should be driven by organisations who do not have a direct vested interest in transport supply ownership, but who have an extensive customer base to enable them to focus on the delivery of a broad-based fully integrated activity solution that inputs a range of appropriate transport solutions. This next generation interpretation of MaaS will require some time to be fully tested, but its appeal is the result of learning from the first 10-year (or generation 1) period.

Incentives and Payments

A critical consideration for MaaS and MaaF is how the incentives will work to deliver direct benefits to users, but also sustainability outcomes to society via changing user's travel behaviour. To date, MaaS has typically relied on financial incentives, funded from trials or venture capital, and has obtained very limited scale of the uptake. We have seen almost no government commitment to subsidising MaaS beyond what they already do for regular public transport (Hensher et al. 2021)^[3]. The future of MaaS as MaaF will require incentives that can be funded from a wider package of features of the

subscription plan. It may also apply under Pay as you Go (PAYG), although this needs more careful consideration. Even where government might step up and provide MaaS-specific subsidy input, this may not be enough to turn the tide towards a sustainable mobility solution. It can, however, achieve this with the MaaS framework.

So how might it work? Fundamentally, we need to identify the set of relevant services that can be offered with varying levels of financial discount or even better services tailored and available only to MaaS subscribers. This gets us away from the total dependence that MaaS has had on only financial incentives when they have been limited to travel modes, and as a consequence MaaS has struggled to be more than a niche product. Under a niche market setting, it is not financially feasible to offer better service levels for shared modes such as regular public transport, on-demand buses services, ride share and micro-mobility. That said, one cannot imagine bus services with improved frequencies offered only under the multi-modal MaaS framework.

The real opportunities for a diversified portfolio of financial and non-financial incentives are evident when we focus on the activity set that represents the features (or multi-services) of the offered subscription plans but done in a way that can achieve both commercial and societal sustainability outcomes. This requires a greater focus on non-transport service offerings that are not seen as add-ons to a transport service, but rather the transport service is seen as an add-on (or complement) to these non-mobility offers. These services can, indeed must, include incentives linked to activities such as retail purchases, broad based tourist expenditures, and even white good purchases and credit card discounts on fees charged or any service that adds value to the MaaS offer. This is a subtle but important twist that recognises the nature of travel, which is a derived demand arising from people's desire to participate in activities. It also opens up real opportunities to bring the private car into the mix in a sustainable way[4].

The Private Car in the Mix

Focussing on the private car, we can see it as a subset of MaaS. It is unlikely that a government agency is prepared to offer appropriate financial and non-financial incentives directly linked to the private car to make better use of the private car in a sustainable way, but a private sector organisation might well be able to do this or is already doing so in the case of insurance business[5]. Why an insurance business[6]? Most have a vested interest in insuring the private car as a significant revenue stream and have structures in place to make a car available (through a rental arrangement and even a car club) in the event of a car crash while repairs are being undertaken (often by a company with links to the insurance business). Insurance businesses also have a wider network of arrangements in place to offer attractive discounts on a variety of services for individuals who insure with them while ensuring they retain profitability. Insurance businesses operate in a very competitive market where they are constantly looking to grow their business and market share.

Insurance businesses have already expressed interest in the first generation MaaS as a way of delivering on a social licence[7], even if they have yet to integrate it into their business plan. The Sydney MaaS trial (Hensher et al. 2021, Ho et al. 2021, 2021a), for example, was undertaken in partnership with one of Australia's largest insurance companies (Insurance Australia Group, IAG <https://www.iag.com.au/> and <https://firemarkcollective.com/futures>), who also own the major car insurance company, NRMA (<https://www.nrma.com.au/>). MaaS Global has recently partnered with Unipol (Italy), a significant insurance company. <https://www.icmif.org/icmif-undrr/unipol-italy/>[8]

Imagine a subscription plan under MaaS where the insurance company is the aggregator (or broker) that offers a range of incentives to private car owners who choose to insure with them (existing and new customers) that includes discounts on regular public transport and the offer of a range of e-micro-mobility services that are funded by the premiums paid by private car owners, subject to commercial obligations. The additional benefits through premium discounts on car insurance and maintenance costs can be provided where (a) the car is electric or hybrid (the insurer 'earns' the social licence), and/or (b) the car kilometres are reduced (the insurer benefits from fewer claims). These are emission-busting

initiatives. It may also be possible to offer additional discounts where those kilometres (reduced or otherwise) are associated with a higher number of occupants in a private car[9]. Technology is available to measure this and if necessary, can be built in as part of embedded mobility.

The discount on reduced car kilometres is already in place[10] (with links to location of travel) and so is not an issue for an insurance business. In addition, service incentives can be provided that are not directly financial but have a financial benefit such as providing an e-scooter for free to facilitate a modal switch for the first and last mile trip associated with any main mode of transport (e.g., from where car is parked to a final destination, or to a train station).

Concluding Comments

MaaS directly focusses on where the greatest potential gains are in achieving scalability and societal sustainability goals, reducing the risk and increasing the ability to achieve an outcome that aligns with a business case that is both profitable, contributes to the social licence as well as delivers sustainable outcomes aligned with social development goals (SDGs).

The focus of the 1st generation MaaS on non-private car multi-modal offerings has generally failed to impact where it aspires to do so. The old adage 'to make public transport more attractive we have to make the private car less attractive' still holds and is the reason why we suggest MaaS has not delivered on its aspirations. MaaS may offer a new and rewarding perspective.

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[1] The outcomes in Helsinki with Whim, however, have all been pointing to the right direction (24% said Whim helped them to get rid of the car or to avoid buying, more usage of public transport). The market has just been too small yet to really move the needle.

[2] The best way of making money within MaaS is to decouple price from production cost. In particular, we need to sell the concept of a car (including a courtesy car) but produce some part of it with another mode without losing too much on price perception.

[3] This comment refers mainly to western economies; however, we are seeing some commitment in Japan, and a recent plan in Milan linked to a competitive tender to provide eight successful bidders with the opportunity to compete, and to receive subsidy from government if they deliver on pre-defined key performance indicators. This idea was initially proposed in Hensher et al. (2020, Chapter 8). This is, however, still essentially multi-modal,

[4] Lyft once pushed for an end to personal car ownership. Now it is betting that will continue and even provide a new source of revenue. Some 75 percent of its users own a car. "We're meeting our riders and customers where they are," says Jody Kelman, the company's head of fleet. But growing up can be painful. The rollout of car services, in partnership with SpotHero for parking, roadside assistance

provider Agero, and Goodyear service centers, is part of a revamp of its Lyft Pink subscription program. For \$9.99 a month it gives users discounts on rides, priority pickups, a handful of free bike and scooter trips, and now four free roadside services per year and a 15 percent break on car maintenance services. “What I’ve realized is the opportunity is around *reducing* personal car ownership” rather than eliminating it, says Kelman. Over the past few years, Lyft and Uber have had to come to grips with the transportation business. It turns out that it’s very hard to make money off rides; neither has yet posted a true profit. Lyft’s share price has dropped more than 80 percent since it went public in 2019. In November 2022, the company laid off 13 percent of its workforce, citing economic headwinds.

See <https://www.wired.com/story/lyft-aspired-to-kill-car-ownership-now-it-aims-to-profit-from-it/>

[5] We do however recognise the possibility of support from a local city, to incentivise drivers to save on insurance premiums and take public transport on certain days under certain metered conditions. Some cars have a transponder built in that measures driving style and rewards good driving behaviours; it knows every trip and at what time, so it is feasible to examine the travel patterns an identity people who could be incentivised to use public transport over personal cars in some instances. Discussions with Andy Taylor are acknowledged.

[6] Health insurance organisations could also be added in.

[7] The term social licence is the level of acceptance or approval that stakeholders and communities extend to a project, site, company or industry.

<https://www.governanceinstitute.com.au/resources/governance-directions/archive/issue-6-1/social-licence-is-key-to-australian-business-survival/>

[8] See also <https://www.mobility-payments.com/2022/11/04/maas-global-discloses-licensing-deal-for-its-technology-will-it-be-enough-to-save-company/>

[9] Which would also be recognised if the owner was making their car available to a community club.

[10] Even insurance via Woolworths: <https://insurance.woolworths.com.au/insurance-talk/drive-less-pay-less-car-insurance-increase-end-odometer-reading.html>