| Paper Title: | Who should control Mobility as a Service? |
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| What's the strategic, technical or professional context for your paper?<br><br>*Context should outline your intent to develop knowledge in the profession and demonstrate the value of looking beyond your personal interest or that of your employer. | **Context**<br><br>This paper is reviewing best practice for implementing MaaS, based on worldwide examples, to suggest the likely best way forward in New Zealand. |
| What will attract people to read your paper and attend your presentation?<br><br>What kinds of people or roles would benefit most?<br><br>*This is your main selling point – for the people attending the conference | **Relevance**<br><br>This paper will be of most interest to representatives from central and local govt transport authorities who may be considering implementing their own MaaS solutions. |
| What is the particular question, issue or idea you intend to address in this session?<br><br>* Consider this an executive summary but be specific and relevant to your audience. | **Focus**<br><br>Who should develop and manage "Mobility as a Service" (MaaS) services in New Zealand? Three approaches that have appeared to date are (1) private transport service operators themselves, (2) central/local government transport organisations, or (3) independent software developers. Each approach has its advantages and disadvantages, for example in regard to coverage of available services, data supply and management, and integration with payments. This paper outlines the options and issues afforded by each approach, using examples from around the world. It concludes by suggesting some likely ways forward for New Zealand. |

# Introduction

"Mobility as a Service" (MaaS) is a means of providing customers with easy access to a variety of transport services, such as public transport, ride-share, and rental vehicles/devices. Typically, a mobile application or internet website is used to provide customers with the offerings available for a particular journey request, and ideally the MaaS system would also integrate payment for such services. While more comprehensive systems have been introduced overseas, New Zealand has been dipping its toes into MaaS as well, such as NZ Transport Agency's mobility apps for Queenstown and Auckland respectively.

A pertinent question is: **who** should develop and manage MaaS services? Three approaches that have appeared to date are:

(1) private transport service operators themselves (e.g. Daimler AG, SBB Switzerland),

(2) central/local government transport organisations (e.g. NZTA, metropolitan councils) or

(3) independent software developers (e.g. Transit, Whim).

Each approach has its advantages and disadvantages, for example in regard to coverage of available services, data supply and management, and integration with payments. This paper outlines the options and issues afforded by each approach, using examples from around the world. It concludes by suggesting some likely ways forward for New Zealand.

# Features of ideal MaaS applications

MaaS can mean different things to different people, and many MaaS applications ("apps"[1]) to date only provide partial MaaS capability.

In an ideal world, a complete MaaS system would feature the following attributes:

- Accessible via an intuitive smartphone app or internet website, regularly updated to address user feedback.

- Information about every publicly available transport service in a district (e.g. buses/trains, taxis/Ubers, car parking, scooter/bike-share, car-share/rental, etc), including location or routes, schedules/availability, and cost.

- The ability to suggest options for journey requests, based on origin/destination and preferences regarding timing, cost, modes, etc.

- Step-by-step instructions as you travel, to inform you when to leave a service or make a transfer, and which direction to travel.

- The ability to book and/or pay seamlessly for journeys, either per trip or via pre-paid packages of transport services.

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[1] In this paper, the term "app" will be used to collectively describe both mobile applications installed on smartphones and also website services accessed by users.

An ideal MaaS system would be able to identify potential multi-modal journey options rather than simply single-mode choices; this could include the use of walking legs to connect to other services (subject to user preferences regarding distance).

To date, there is probably no MaaS app anywhere in the world that fully achieves all this, particularly in terms of coverage and knowledge of all available transport services.

Typically, most MaaS systems have been provided at no cost to users (e.g. free download of an app) enabling widespread take-up. However, some are linked to specific transport services that a user pays for, with some of that cost helping towards system development costs. There are also a few MaaS apps requiring a small payment to purchase (e.g. 'London Travel Pro' and 'Go Brisbane'), but generally most users would expect a premium product offering to choose this over a free alternative.

## Private transport operator MaaS apps

One option is for transport providers themselves to develop MaaS apps providing options for their transport services; typical examples include Ola (rideshare) and NextBike (bike-share). This is particularly relevant for operators that provide multiple transport options they wish to vertically integrate. For example, Uber's 2018 acquisition of JUMP bike and e-scooter share could enable it to provide a wider range of transport options to its customers through its app. Other companies taking similar approaches include:

- Rideshare competitor Lyft, who recently acquired the bike-share company Motivate

- Daimler AG who has invested heavily in ride-sharing companies car2go and mytaxi, and low-cost bus service FlixBus across Europe

- Swiss passenger railway company SBB also provides car-sharing and bike rentals at train stations

While an integrated operator app makes it relatively easy for automatic payment mechanisms to be set up (e.g. see Figure 1), typically the problem is that a different app is required for each operator. Any comparison between potential journey options also needs to be undertaken manually by the traveller by checking each app.
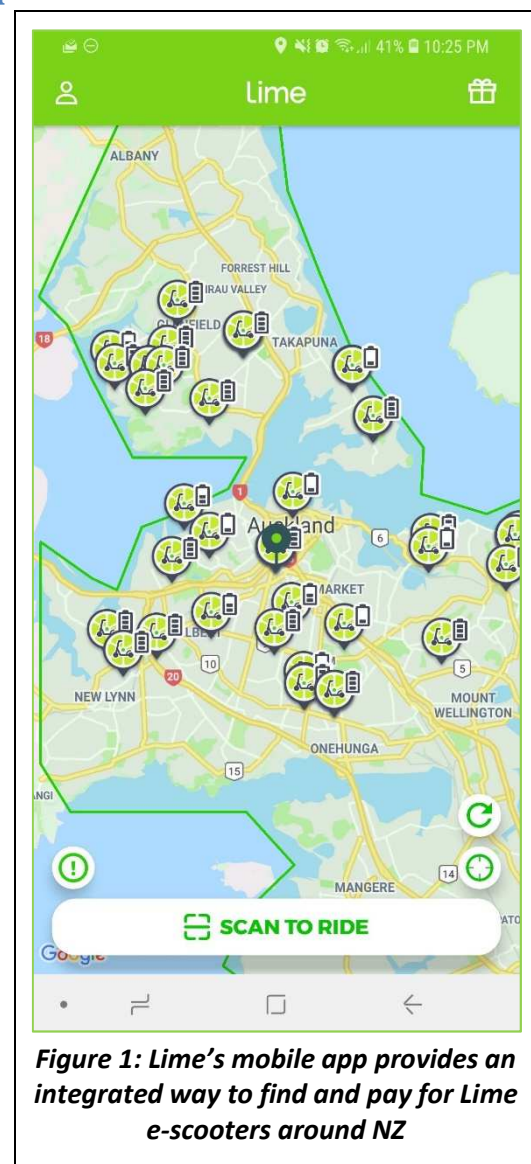


*Figure 1: Lime's mobile app provides an integrated way to find and pay for Lime e-scooters around NZ*

An interesting recent development in Denver, Colorado, was the addition of public transport information to the standard Uber rideshare app (Reich 2019). Uber noted that its customers wanted a full "first mile – last mile" seamless experience and so, in this sense, it is a smart business move to incorporate what could be considered complementary rather than competing transport providers. Although not initially available, Uber also plans to provide the ability to purchase public transport tickets through their app too.

# Public government transport organisation MaaS apps

Rather than having a lot of individual MaaS apps, an alternative approach is to have a centralised transport organisation, such as NZ Transport Agency or regional councils, develop their own MaaS app that incorporates a wide range of transport options available.

Worldwide, a number of public entities have attempted this approach, often commissioning a software company to help develop their service. For example, in 2016 the City of Los Angeles, in partnership with Xerox, developed 'Go LA', which was able to present various transport options including Lyft, ZipCar, Metro bus/train, biking/walking and public car parking (Walker 2016). A nice touch was the ability to choose itineraries based on three journey preference categories: "Sooner", "Cheaper", or "Greener" (see Figure 2).
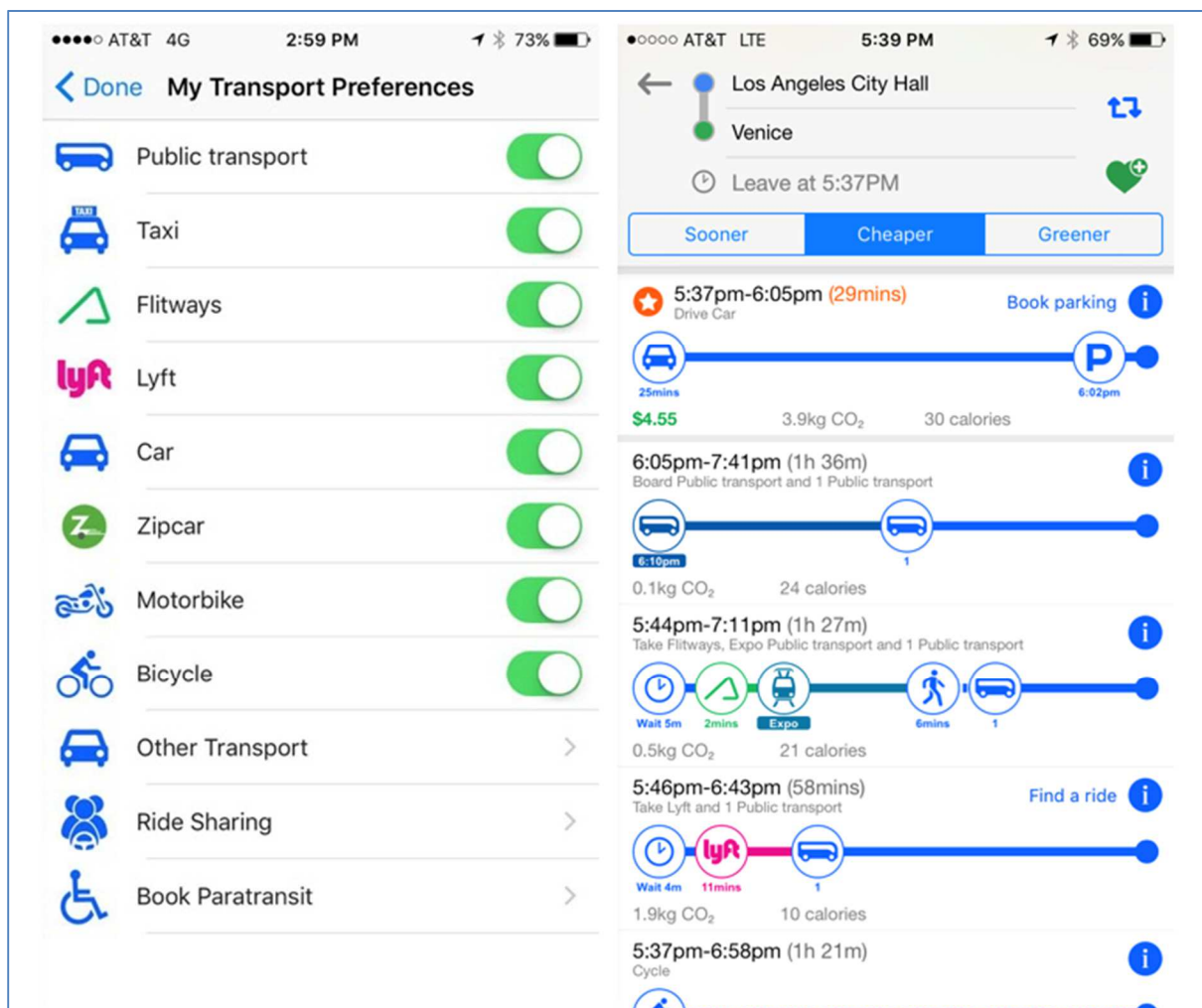


*Figure 2: Screenshot examples from 'Go LA' app*

New Zealand has been dipping its toes into public MaaS systems as well, such as NZ Transport Agency's "Choice" and "RideMate" apps for Queenstown and Auckland respectively (NZTA 2019). As well as the local region's bus, ferry and taxi services, the Choice app also presents information about local ski-field transport operators and van shuttle service Savy. Choice does not handle payments directly to operators though.

Other major regional councils are also providing journey planner apps, typically through their websites, that present options combining all their public transport offerings and walking legs. Like the NZTA apps, payment is generally separate to this.

The ability for a single app to contain information about multiple transport services is both its greatest strength and weakness. While the promised outcome of presenting multiple service options is a desirable goal, it does rely on all available transport operators cooperating in providing their system data, either directly or via some publicly available data feed or Application Programming Interface (API). It is typically difficult for public agencies to obtain all of the relevant service data from private operators (some of whom may not be very keen on sharing the stage with their competitors, or prefer their own proprietary apps); it can be even harder to ensure that this data is maintained and up-to-date. Even more complicated practically is the ability for a MaaS app to handle payments across multiple providers.

Another important benefit of the public agency managing the journey options is that they can also collate information on travel patterns across the district, helping the agencies better plan their future transport provision. However, again, without sufficient privacy assurances, this can be another reason for private operators to remain wary of providing their raw data.

While public organisations can typically invest significant money into developing multiple-option apps, unless the contractual arrangements oblige an ongoing maintenance service by the software provider, it may be difficult to ensure that the app remains up to date and that any issues with the interface are resolved. It is not uncommon for the "official" travel information system developed by a transportation agency (be it a mobile app or website) to be considered far more "clunky" to use than alternative independently developed offerings. This is perhaps not surprising when software development is invariably not a high priority or speciality of a transportation agency.

## Independent software developer MaaS apps

The third general approach to consider is to have independent (third-party) providers develop and maintain the apps themselves. Although many such systems started on the back of venture capital or public transport agency investment, long-term cost recovery is typically met by either

- advertising shown to users,

- payments by transport services included in the offerings shown, or

- financial sponsorship by other companies using their base data.

However, some MaaS apps may also charge a cost to users to subscribe to or download their service, or collect a small fee on top of every transport service payments made through their system (aka "clipping the ticket").

While some independent MaaS apps are essentially just aggregators of transport service information with little ability to book or pay for services (e.g. Transit & moovit apps, Google Maps website), a growing number are integrating the full travel experience.

Whim, developed by MaaS Global, is an example of a more integrated MaaS offering, first developed for Helsinki (Finland) in 2016 and now being delivered in other European cities (Zipper 2018). With the Whim app (see Figure 3), travellers in Helsinki can plan and pay for trips across public transportation, bikeshare, taxis, and carshare. Whim offers three tiers of service: a free, pay-as-you-go option; a monthly subscription offering unlimited public transportation and reduced rates for taxi and carshare; and a pricier "Unlimited" package that adds unlimited taxi and carshare access. Whim negotiates with individual transport providers before placing them in the app and takes a small commission when trips are booked (it is notable that some services like Uber are not currently available on Whim).
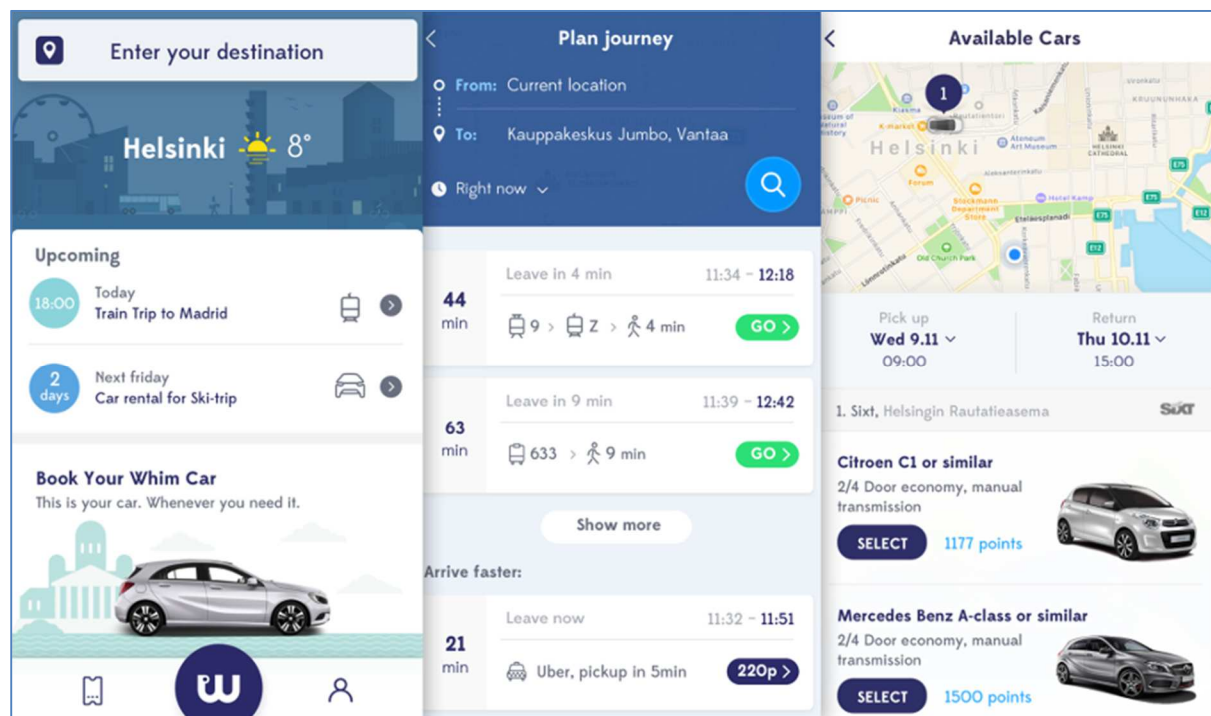


*Figure 3: Screenshot examples from 'Whim' app in Helsinki*

Like the public organisation apps, the success of independent app providers is often dependent on the ability to tap into all of the available transport services via data feed or API. Again, this may be equally dependent on the relative willingness of different providers to share their service information conveniently to outside parties.

As private entities often without other revenue streams, there is a strong motivation for independent developers to develop a strong, useful MaaS offering that will be widely picked up by users and operators alike. As a result, the apps are often of high quality, with service information and user interfaces updated frequently.

# Comparison of approaches

From the discussion above, it is evident that different approaches have different advantages and disadvantages. While each individual implementation of a MaaS app varies in regard to its specific success in achieving various desirable attributes, there are certain trends apparent within the three main types of approach. Table 1 attempts to summarise the key differences in attributes, particularly when considering the earlier discussed ideal attributes.

| Attribute   \  \ Approach | Private transport operators | Govt transport organisations | Independent software developers |
|---|---|---|---|
| Coverage of available transport services | 🚗<br><br>Own services only | 🚌 🚗 🚲<br><br>Most services | 🚌 🚗 🚲<br><br>Most services |
| Integration with booking/payments | 💲 💲<br><br>Own services only | 💲<br><br>Public transport only (sometimes) | 💲<br><br>Variable, mostly limited |
| User experience (apps/websites) | 🙂🙂<br><br>Varies | 🙂<br><br>Not high priority | 🙂🙂🙂<br><br>Most responsive |
| Cost to public transport agencies | -<br><br>Typically none | 💰💰💰<br><br>Develop/maintain software | 💰<br><br>Provision of data APIs Possibly co-funding |

*Table 1: Comparison of different MaaS development approaches*

As it stands, the biggest challenge at present is probably in terms of integrated booking and payment systems. While many individual operators have seamlessly provided their own systems to achieve directly within their MaaS apps, there are few systems that have attempted to coordinate booking and payment of multiple providers in real-time.

Some third-party providers (like Masabi) are attempting to provide common ticketing systems that can be used for multiple transport services, but it is slow going. Government or independent MaaS providers still remain somewhat at the bidding of private transport operators electing whether or not to be part of a common system or to go it alone with their own booking/payment systems. The picture is muddied even further when multiple-mode journeys require some distribution of common fares across multiple providers.

Still, government agencies may be best placed to be considered a "trusted" arbiter of how to collect and distribute payments. There may be a role for them to help develop agreed methods of payments from users to transport operators via intermediary MaaS app providers.

# Availability of Transport Service Data

A key to effective use of any MaaS app is access to good transport service data. However, if that data is provided in different formats by different providers, then this makes it difficult to collate and aggregate it all on a combined platform. To enable widespread consistent availability of transport information, a number of standardised means of presenting such data have been developed.

One of the most widely used standards is the General Transit Feed Specification (GTFS, 2019). GTFS allows public transport agencies to publish their service data in a format that can be used by a wide variety of software applications. Typically, GTFS is split into a static component that contains schedule, fare, and geographic information about services and a real-time component that contains arrival predictions, vehicle positions and service advisories.

An extension to GTFS allows for the ability to include demand-responsive transport services; potentially this could include rideshare services like Uber and Lyft in due course. A similar 'General Bikeshare Feed Specification' (GBFS) has also been developed to provide a common format for public bike-share (and conceivably scooter-share) services.

Ideally, all publicly available transport services would ultimately be available for interrogation and presentation of their offerings via one common data standard. However, at present, many private providers have developed their own proprietary data formats and often, are only using them internally with their own apps rather than making them available via open APIs to other MaaS app providers.

One way to encourage greater use of open data by transport service providers is for jurisdictions to insist on open APIs as a requirement for getting approval to operate in their area. For example, Washington DC insists on open data as a requirement for any private bike-share companies wishing to operate there (DDOT 2019). A similar requirement could also be requested of other providers, such as scooter and ride-share.

# Conclusion

The world of MaaS is still a rapidly evolving one, as various new transport providers and transport service aggregators vie for market share and public agencies attempt to find their role as both service providers and transport regulators/promoters. For this reason alone, no obvious "best fit" solution is apparent yet in the provision of MaaS systems, and many organisations have stepped in to fill various perceived gaps. However, some trends are emerging.

While most individual transport operators have developed a customised app for their own services, the limited breadth of services offered (i.e. typically only those within the company itself) mean that these can't truly be called MaaS apps. For users, it is often a double-edged sword of reasonably well-delivered apps (e.g. with helpful interfaces and seamless booking/payment systems) but requiring ownership and use of multiple apps from competing services to compare journey options.

Both government organisations and independent developers have attempted to bridge this gap by providing multi-service MaaS apps covering a wider range of transport options. To some degree, many have largely succeeded in providing useful aggregators and journey planners for users to compare options (independent developers are typically achieving more success in keeping the currency and usability of these apps up to date). Ensuring constant coverage of all available transport offerings in a district continues to be an ongoing task, especially when some private operators are still reluctant to be part of a common MaaS tool. The Achilles heel for most apps is in being able to process real-time bookings and payments, but a few are starting to make progress there.

In the New Zealand context, it is probably not in the best interests of the sector for central or local government transport organisations to attempt to develop their own fully-integrated broad-coverage MaaS apps. Software development is a complex business and not one that government is typically best placed to lead and maintain. Rather, government agencies could help independent developers produce effective MaaS apps via a number of means:

- Develop and promote common transport service open data standards (e.g. variants on GTFS). As well as using these standards for providing data feeds of their own public transport offerings, jurisdictions should also insist that provision of a suitable open data API is a requirement of any private transport operators wishing to trade in New Zealand.

- Investigate the development of common transport service booking and payment systems that can be implemented in an agreed manner by MaaS app providers and transport service operators.

- Where appropriate, consider helping to fund the development or upgrading of independent MaaS app providers to help achieve more integrated transport offerings within New Zealand (or its major cities).

- Where private transport operators are helping to fill a specific need within the broader transport system that is not easily met by a public agency solution, consider subsidising these operators (in a similar way to traditional public transport) in return for their open provision of service data and full integration into broader booking and payment systems.

By focusing on these initiatives, central and local government becomes the *enabler*, rather than the provider, of a well-integrated MaaS system in New Zealand.

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