Australasian Transport Research Forum 2021 Proceedings
8-10 December, Brisbane, Australia
Publication website: http://www.atrf.info

The prospects for Tourism-focused MaaS in Queensland

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Abstract

Transport is one of the key enablers of tourism development and growth. The emerging innovations in tourism transport include micromobility (small, lightweight devices such as electric scooters or bicycles) and microtransit (on-demand and flexible public transport). These can be integrated using Mobility as a Service (MaaS) by platform to provide user-centric and seamless intermodal access with "bundled" payment options. MaaS also has great potential to improve connectivity and enhance tourism experiences, benefitting the environment and reducing congestion in tourist destinations. This paper presents a new agenda for innovating tourism in regional Queensland cities by introducing MaaS solutions. The analysis is informed by stakeholder interviews (n=20) and regional case analyses of three study areas. The results indicate a tourism-focused MaaS platform is recommended with higher priority for Townsville as the city is more ready with a greater offering of transport options to be integrated. A potential MaaS trial for tourism users to test choice bundles and integration with tourism events and attractions could provide useful data for Queensland's MaaS rollout. Eventually, a broader spectrum MaaS could emerge, including both transport and non-transport (dining, attractions and event) offerings, and this can expand into more tourism cities, be it regional or metropolitan in Queensland and beyond.

Keywords: Mobility as a service; MaaS; tourism; multi-modal integration; value-added services.

1.Introduction

Visitors travelling in unfamiliar destinations often face many transport challenges caused by lack of information, disconnected transport services and confusing payment methods (Matyas 2018). A possible solution to this is to provide a Mobility as a Service (MaaS) platform dedicated for tourists - not just merely integrating transport services and payment, but also combining travel information such as event feeds and access to attractions. This "soft" measure focuses on improving information, ease of use and behavioural changes, but is yet to receive significant investments in Australia, whereas "hard" infrastructure provision (i.e. more roads and airports) often receives significant funding and political support, as evident in multi-millions worth of projects approved (James, Burton & Burke 2016).

With MaaS is gaining traction globally, the application of MaaS in tourism also begun to generate some interest (but remain niche) in Europe and Asia (Kim et al. 2021). Trials have begun in Finland and Japan on tourism MaaS solutions. While MaaS are also rapidly expanding

in Australian cities with recent trials in Sydney (Ho et al. 2021) and Brisbane, the focus has been placed on urban resident commuters, not tourists. For Queensland, apart from initial successes in micromobility (thanks to the early legalisation of the public use of personal mobility devices), the development of fuller integration of microtransit and MaaS remained slow. Although it should be commended the newly established Mobility as a Service Program Office of the Department of Transport and Main Roads (TMR) is now coordinating microtransit and MaaS roll out, Queensland are at risk of being left behind in both i) general development of MaaS and ii) specific tourism applications. This paper first provides a brief review of tourism in which MaaS applications is offered. Second, a regional case study of MaaS potential for Queensland with three study areas (Townsville, Rockhampton and Gladstone) is presented. Third, the research of regional case studies and stakeholder interviews to show why a new agenda for a MaaS for tourism pilot is warranted in regional Queensland, with the prime candidate being Townsville.

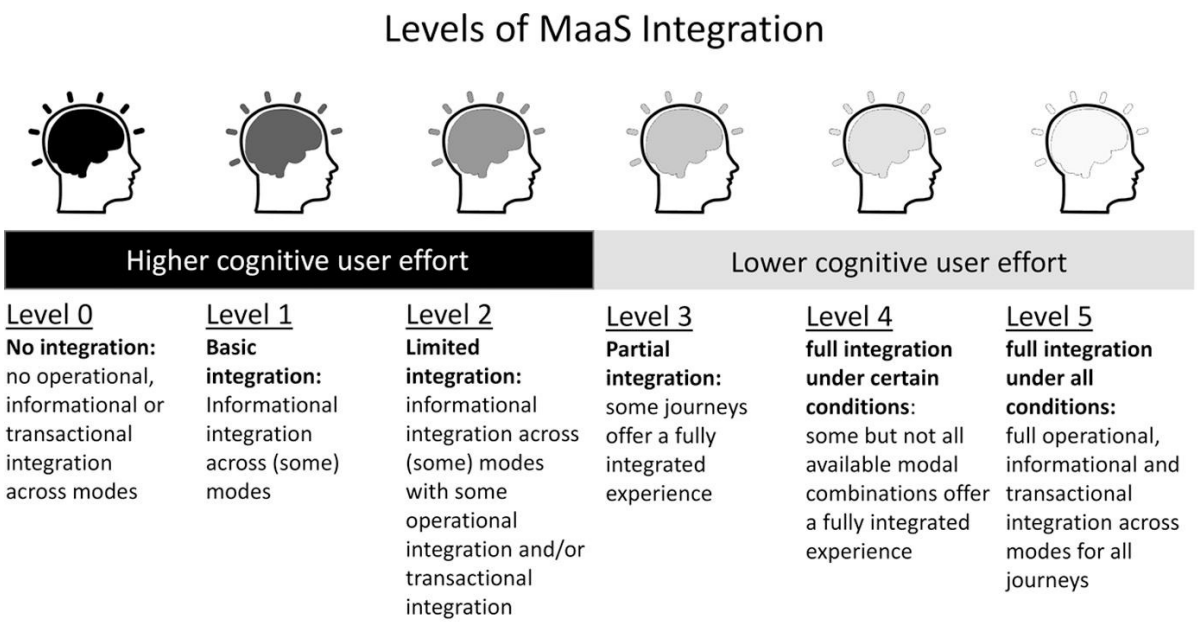
2. What is MaaS, and for tourism?

MaaS is still a nascent concept but it generally describes a shift away from personally owned modes of transportation and towards mobility provided as a service. A more comprehensive definition of MaaS (Storme et al. 2020) should include the following components

i) User-centric - the travel needs of an individual are matched with a tailored mobility package (or "bundle") (Hensher 2017);
ii) "Co-modal" services - travel needs of users are fulfilled the most suitable combination of travel modes for the activity (Jittrapirom et al. 2018);
iii) MaaS services are offered via a user-friendly digital interface, typically a smartphone application (in short "app", also referred as "platform") that provides access to a wider ecosystem of services (Pangbourne et al. 2018) (Pangbourne et al., 2018).

With the above, MaaS can be enabled by integrating various transportation services, be it public or private, providing travellers a seamless integration of multi-modal trips – both in terms of transfer and ticketing. Increased digitisation of societies with ubiquitous mobile internet access is helping to address many technical barriers of MaaS. Better policy integration is also advanced by more commercial applications and growing interest of MaaS from practitioners, academics and policy makers. But from a user perspective, MaaS is only useful if it is cognitively simple to use – hence a highly developed MaaS should allow users to travel "seamlessly" and low cognitive effort, in which travel is operationally, informationally, and transactionally integrated (Figure 1).

The concept of MaaS can also be applied beyond transport, say if the integration of travel options also includes non-transport components, such as tourism. However, attention of MaaS has been focused mostly on local commuting transport within the same city or metropolitan region.



cognitive user effort: the effort involved in relying upon the mobility system beyond the private car to fulfil mobility goals
operational integration: interchange penalties are low and door-to-door journey experience is 'seamless'
informational integration: journey planning and execution information for available modes is offered through one interface
transactional integration: payment and any required booking and ticketing is offered through one interface

Figure 1: Conceptualisation of the Levels of MaaS Integration taxonomy (Lyons, Hammond & Mackay 2020)

3. Emerging of tourism applications of MaaS

In this section, the two pioneers of MaaS development in tourism are outlined. This provides some global context and how Queensland, and Australasian justifications can learn from these early movers. Instead of a more exhaustive review of all global examples, Finland and Japan's touristic MaaS applications are chosen because of better public information available.

3.1. Finland

Finland is widely seen as a pioneer of MaaS, with more advanced implementation across metropolitan settings (e.g. its capital Helsinki) and rural locations (e.g. Arctic Lapland). MaaS development in Finland was pivoted by EU's goal of inter-member state harmonisation of travel and the required legislative reforms. The *Act on Transport Services* (Finnish Government 2017) require all transportation services to share their data and allow for inter-platform interoperability, which then enabled MaaS platforms to flourish across Finland. The key policy goals of MaaS in Finland include improvements to accessibility as well as supporting economic development, including tourism. While commercial MaaS operators such as *Whim* attracted significant attention, another major consideration is to bridge the urban-rural divide between the more sparsely populated northern areas. Unlike urban areas where replacing the car is possible (with decent public transport and micromobility offerings), it has been acknowledged the value proposition for MaaS in non-urban (and international travel) settings need to be placed on value-adding, non-travel services, including events, accommodation, and leisure services (Aapaoja et al. 2017). While there has been similar "one-stop-shop" in the form of online travel services (OTA), these are often not integrated with local travel options (e.g. public transport). The challenge lies in the number of stakeholders and the level of collaboration needed to combine that many travel and tourism offerings.

This was trialled by the National Technical Research Centre (*Valtion Teknillinen Tutkimuskeskus* (VTT)) of Finland under the the Value-Added Mobility Service (VAMOS!) Project. One of the first project was in 2016: *YlläsTikett*, a tourist-facing app to assist travellers was developed in Ylläs, a ski report located near Kolari in Lapland, northwestern Finland. *YlläsTikett* initially served as a ticket integrator, allowing users to buy transport tickets and attractions (ski-passes, concerts) and even meal vouchers at tourism destinations. The project later evolved into the Open Arctic MaaS program, a strategic framework for further digitisation of transport services to allow integration of transport information and operation with tourism suppliers (e.g. resorts) and visitors (Pihlajamaa 2019). The Finnish experience highlighted the challenges of steeper learning curves in regional areas with smaller organisations and special mobility needs of different kinds of tourists (Pihlajamaa et al. 2018). With broader national policy and legislative changes, MaaS development in Lapland was enabled by active co-creation and sharing of innovation by local stakeholders, involving including local governments, transport operators, tourism associations and research institutes.

3.2. Japan

As MaaS gained traction in Europe, it also caught the attention of the Japanese government. In 2018, the Japanese Ministry of Land, Infrastructure, Transport and Tourism (MLIT) begun the development of a national MaaS policy for Japanese cities and regions. The Japanese approach is more centralised and top-down compared to European efforts – with clear demarcation of metropolitan, regional and rural MaaS typologies, and a special category is created for tourism (Table 1). This focuses on a nationally consistent approach with a standardised backend that works with existing payment systems while acknowledging local needs and differences. As with all new initiatives, it encourages local prefectures to experiment with MaaS trials. For tourism applications, two main types emerged, namely large scale metropolitan platforms (e.g. *MyRoute* in the cities of Fukuoka and Kitakyuushu, at the southern island of Kyushu) and small scale rural services (Sasaeai Kotsu, Tango Peninsula, Kyoto Prefecture).

Table 1: Five locational types of MaaS in Japan (Ministry of Land, Infrastructure, Transport and Tourism (Japan) 2019, p.49)

Typology:	**Metropolitan core**	**Suburban**	**Regional Town**	**Rural**	**Tourism**
Density:	Very high	High	Medium	Low	Varies
Dominant Mode:	Railways	Railways and motor vehicles (incl. bus)	Motor vehicles	Motor vehicles	Varies
Issues:	- Peak hour over-demand	- Lack of first/last mile connection and accessibility - Congestion	- Car dependence - Government budgetary constraint and reduction of services	- Car dependence - Depopulation - Ageing population - Declining transport options - Transport exclusion of those without cars	- Seasonal demand - Mixed needs - Language barrier for foreign tourists
MaaS goals:	- Divert peak hour rail to other modes - Door-to-door services - Super-small taxi that is suitable for urban traffic	- Provide first/last mile connection - Offer taxi-like services - Reduce car use	- Provide non-car travel options	- Make rural area more liveable - Attract younger demographics	- Connect between airport, accommodation, and tourist destinations

As of 2020, there are already up to 50 MaaS demonstrator projects in Japan. One of the better examples is *Myroute* located in the regional city of Fukuoka on the southern island of Kyushu. The project was developed by Toyota with the learnings from *Whim* in Finland, where Tokyo provides rideshare services there. First trialled in November 2018, *Myroute* combines most transport and tourist offerings into one app, with at least seven modes of transport are included, plus dining and tourism services (Figure 2). Now the platform covers 7.3 million people after it was expanded to Yokohama in the Kanto Region near Tokyo. *Myroute* is the first MaaS platform in Japan (and one of the few in the world) that combines micromobility (Docomo bikeshare) with other modes (World Economic Forum 2021). It also featured Whim-style "all-you-can-travel" subscriptions that provided significant financial incentives for users. What more innovative is the "business-collaboration" model to allow *Myroute* users to obtain dining and attraction information. The app became quite popular with both local and tourist users.

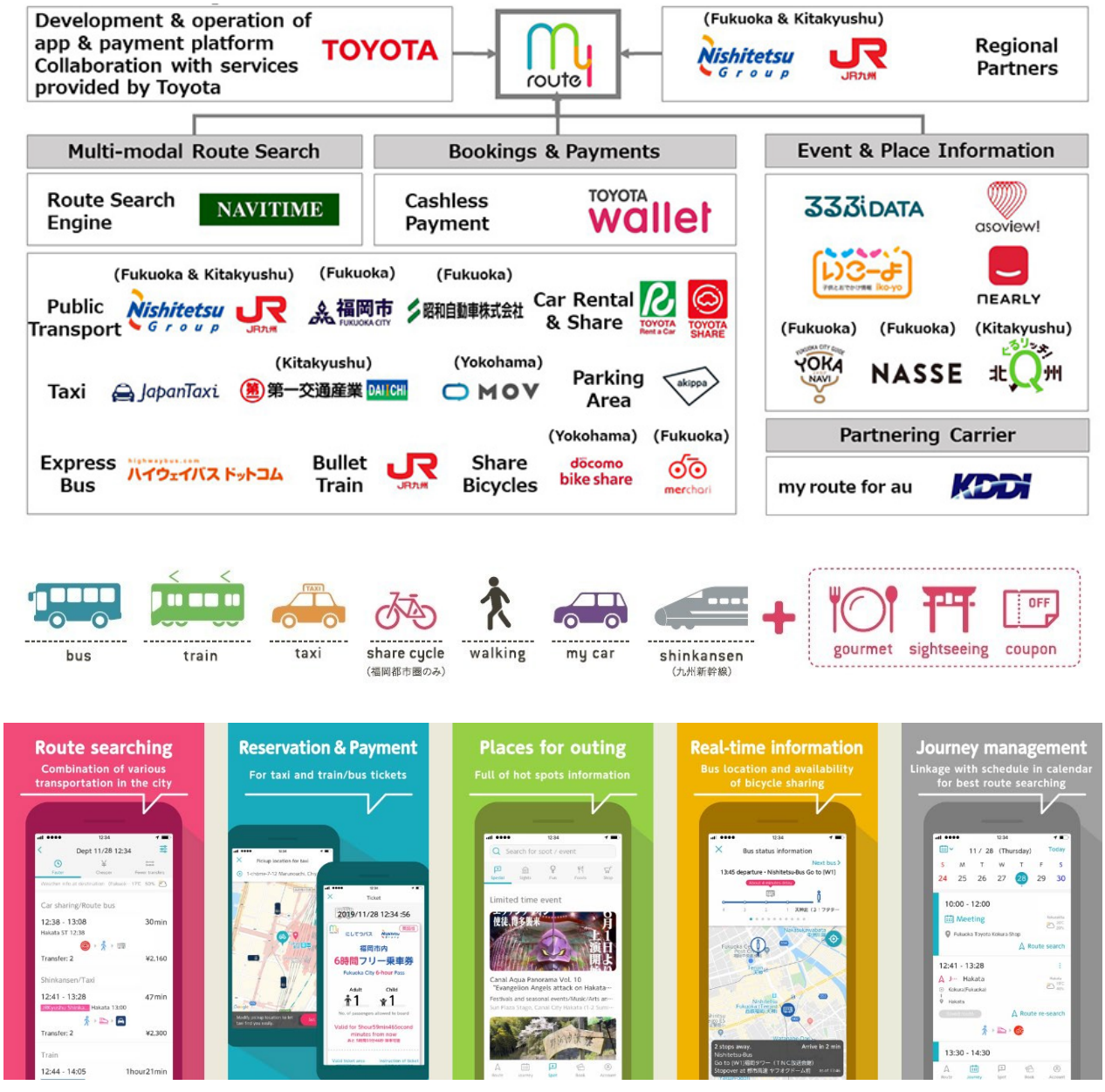


Figure 2: *Myroute* MaaS system and partners (above) and app screenshots (*Myroute* App page, below)

For rural areas with declining young population, it does not have the critical mass for *Myroute*. Instead, it attracted non-government organisations (NGOs) to develop service that uses smartphone apps to provide taxi-like services in a rural township with a declining population. Operations are regulated under national legislation with a focus on supporting rural communities for its transport needs, and also to serve incoming tourists. The Sasaeai Kotsu service in Tango Peninsula, Kyoto Prefecture, is an example of "Uberisation" of community transport. Uber was unable to enter Japanese urban markets as traditional taxis enjoyed many incumbent advantages. Instead, it teamed with local NGOs entered the Tango area where the population is ageing, along with depopulation (Takahashi & Nomura 2020) - conventional taxi operators abandoned operation there. Uber started operations with a local NGO supported by local government under the Sasaeai Kotsu (lit. Mutual support transport) scheme. The NGO matches drivers to passengers (targeted towards local residents or tourists) using the Uber Japan system and provides support through subsidies to drivers with their own private cars. All operations are regulated under national legislation. Against a trend of declining taxis and buses in rural areas, this service model could be used elsewhere to support rural communities (Mulley & Kronsell 2018).

4. Regional Queensland case study

4.1. Study areas

In view of the international exemplars, this paper also sought to explore opportunities for tourism-focused MaaS in regional cities/towns in Queensland. Certain prerequisites are hypothesised for MaaS to be a viable option in regional Queensland. These include:

1. A minimum population of 10,000 people
2. A public transport offering (that may be improved by MaaS)
3. A transient workforce (for example; mining workers or defence force employees) who do not necessarily require a personally owned vehicle or a second personally owned vehicle; and, or
4. A reasonable level of demand for mobility from tourism (for example; a transient population who do not necessarily have a personally owned vehicle).

Based on these criteria, three case study sites of 1) Townsville; 2) Rockhampton (including Yeppoon); and 3) Gladstone were selected. Table 2 outlines the main population and travel behaviour characteristics of these regional cities. All three regional cities examined have relatively low population densities, making it a challenge to provide high frequency public transport services. Where cycling once comprised around 6% of all journeys to work in the 1980s, this has now fallen to 2.1% in Townsville and around 1% in Rockhampton/Yeppoon and Gladstone. Townsville is the regional area with the largest population of the three. Townsville and Rockhampton/Yeppoon both have significant tourist visitation. While the international visitations numbers were lower in 2019 (pre-COVID-19), spending per trip for domestic tourists was comparable with urban centres, especially in Townsville – this indicates regional areas can still attract tourists to spend while visiting.

Table 2: Key population and travel characteristics of the three study regions

	Townsville	Rockhampton (incl. Yeppoon)	Gladstone
Demographics and land use			
Population (2019, estimated)	195,032	119,590	63,412
Area	3,731 km^2	18,328 km^2	10,484 km^2
Population density	52.27 persons/km^2	6.52 persons/km^2	6.05 persons/km^2
Travel characteristics*			
Trips per day	573,359	304,196	163,843
Average distance per trip	7.94 km	9.57 km	8.18 km
Mode Split - Commuting			
Car as driver	61.3%	59.6%	62.5%
Car as passenger	28.1%	28.3%	28.3%
Public Transport	2.7%	2.0%	2.5%
Cycling	2.1%	1.0%	1.2%
Walking	5.7%	9.1%	5.5%

(Data from **2011 Queensland Household Travel Survey**)

4.2. Regional stakeholder interviews

To understand the current transport challenges and how MaaS can be an opportunity for regional areas, stakeholder engagement was conducted for three selected study areas. Due to COVID travel restrictions, nearly all of these interviews were conducted using online conferencing protocols (e.g. Microsoft Teams or Zoom). One workshop was held with multiple participants at the request of the agency involved. The interviews and the workshop (conducted between September 2020 and March 2021). The interviews were generally of 1-hour duration. Table 3 shows the participants by type and location. These interviews were recorded and partially transcribed to allow for further analysis. The transport text was analysed and then thematic analysis was carried out to highlight the key barriers and opportunities for MaaS in regional Queensland.

Table 3: Participant location and types

Type of participant	Townsville	Rockhampton (incl. Yeppoon)	Gladstone	Outside Study Regions
State Government (Qld)	Translink			
Local Government(s)	Townsville City Council (Workshop)	Rockhampton Regional Council*	Gladstone Regional Council	n/a
Transport provider	Public and private transport service providers, including bus and personalised booking services (incl. on-demand transit and community transport)			
Users Academic/Experts	n/a	University	n/a	n/a Other Australian States (NSW) and UK

*Local government area of Yeppoon, which is under the jurisdiction of Livingstone Shire Council was unable to be interviewed after multiple requests

4.3. Potential for MaaS in the study areas

The regional analysis and interviews provided some key local knowledge and potential of MaaS for tourism in the regions studied. Currently, the dominant way to travel in the regions is by private vehicle. There is also a strong car culture, and public transport is often unable to provide services that can compete with private vehicles. The level of modes available varies

in the three regions studied. The current transport offerings in the study regions are summarised in Table 4. The themes were based on an extension of Lyons, Hammond and Mackay's (2019) level of MaaS integration framework as outlined in Section 2 and Figure 1. Currently, the level integration that allows for multi-modal travel is limited in the case study areas.

Townsville being a larger regional centre offers more options than others. However, there is no real integration between modes for seamless multi-modal travel. While an introduction of a MaaS platform is important, the backbone of MaaS remains the services themselves. Due to smaller settlement size, trips in regional cities are often short distances, which may present a good opportunity to replace car-based trips with active transport or micromobility (Leung et al. 2021). Most of the respondents agreed that MaaS could open the possibility for door-to-door service done by on-demand services using smaller vehicles than could be competitive to private car ownership. As NSW has started on-demand services in regional areas already, perhaps some guidance in their experience can be offered to Queensland.

4.4. Tourism as the pivot for MaaS in regional Queensland

Most respondents agree tourists could be an important market for MaaS and it helps to resolve transport issues during peak tourism seasons, with overcrowding of services, and also better airport connections. Tourism specific applications can also be developed to offer multilingual support, attraction, dining, or accommodation recommendations, which can help disperse tourists to more local destinations.

> *"I think (MaaS) could really assist with people who are coming here from overseas, or even from interstate. If they don't have a car, MaaS can definitely assist them in getting around, beyond the public transport network, taxies and rideshare. Maybe there could be a tourism kind of private services, or airport shuttle that could be part of that same ecosystem and (users) without going on Google to looking up every transport provider in the region and not sure what's out there. I think a big benefit of MaaS is that it will reduce the transfer penalty on the information side and also the connection side. Potentially, if you can get other operators on board, they can provide the services." (State government respondent)*

Current Townsville is the largest tourist destination among the three regions compared, but still dwarfed by Gold Coast (Table 5).

The potential tourist MaaS markets identified by the respondents are:

- Townsville: Magnetic island and proximity to Great Barrier Reef, with younger and international backpackers.
- Rockhampton: Yeppoon: In 2019, the tourism growth was up to 17% and was driven by intrastate visitors. For now, Rockhampton region tends to draw older age groups, and they tend to prefer point-to-point or car rental modes.
- Gladstone: Tannum Sands and Agnes Water are some of the tourism offerings in the region.

Table 4: Transport offerings available to users in the study areas

Transport offerings	Townsville	Rockhampton (incl. Yeppoon)	Gladstone
Bus	*Sunbus (Townsville)* 14 routes 10 fare rates 15 fare zones	*Sunbus (Rockhampton)* 9 routes (3 fare zones) *Young's bus* 10 routes (8 fare rates, 17 fare zones)	*CDC (Gladstone)* 8 routes 4 fare rates 5 fare zones (No weekend/ public holiday services)
Personalised travel (taxi or ride-booking)	Taxi: *13 Cabs* Ride booking *Uber* *Didi* *Ola* *Shebah* Demand Responsive Transit (DRT, proposed)	Taxi: *13 Cabs* Ride booking: *Uber* *Didi* *Shebah*	Taxi: *13 Cabs* Ride booking: *Uber* *Didi* *Shebah*
Ferry	*Sealink* – Magnetic Island and Palm Island	*Freedom Fast Cats* – Great Keppel Island	*Sealink* - Curtis Island *Curtis Ferry* - Curtis and Facing Islands
Micromobility	E-scooters *Neuron and Beam*	E-scooters N/A (Council has been approached)	E-scooters N/A
Rail (QR)	*Spirit of Qld.* (Brisbane – Gladstone – Rockhampton – Townsville – Cairns (coastal))		
	The Inlander (Townsville – Mt. Isa (inland))	*Tilt Train* (Brisbane – Gladstone – Rockhampton (coastal)) *Spirit of the Outback* (Brisbane – Gladstone – Rockhampton – Longreach (inland))	
Air	*Townsville Airport* (8 airlines, 11 destinations)	*Rockhampton Airport* (2 airlines, 5 destinations)	*Gladstone Airport* (2 airline, 1 destinations)
Transactional Integration: Users are able to book, pay, and get tickets for door-to-door multi-modal transport options through a single platform and across multiple providers.	**Bus and ferry for Magnetic Island:** Return ferry and 1 day bus pass package available. **Other modes:** Transactions to allow journey booking, payment and execution are mode specific and separate.	**Most modes:** Transactions to allow journey booking, payment and execution are mode specific and separate.	**Most modes:** Transactions to allow journey booking, payment and execution are mode specific and separate.
Information Integration: Users are able to interrogate the availability of door-to-door mobility services, to plan door-to-door journeys and access support in journey execution through a single platform in real time.	**Bus and Ferry:** Translink platform allows intermodal journey planning, but without real time information. Google Transit allows for intermodal journey planning. **E-scooters:** Available devices can be seen on apps in real time. *Non-public transport modes are not visible on Google.*	**Bus:** Google Transit allows for some intermodal journey planning across the two bus companies in the region. *Non-public transport modes are not visible on Google.*	**Bus:** Google Transit allows for some intermodal journey planning across the in the region but there is only one public transport provider. *Non-public transport modes are not visible on Google.*
Operational Integration: Public, active, and shared transport options are available and competitive for multi-modal door-to door journeys.	Only the Magnetic Island bus and ferry have some operational integration.	No evidence of operational integration.	No evidence of operational integration.
Summary (MaaS levels by Lyons, Hammond & Mackay (2020)**)**	**Bus and ferry (Magnetic Island) attained close to Level 2, otherwise at Level 1. Other are modes at Level 0.**	**Bus attained Level 1. Other modes are at Level 0.**	**Bus attained Level 1 (but there is only one public transport operator to start with). Other modes are at Level 0.**

Table 5: Key demographic and tourism statistics of the case study areas

	Regional Study Areas			Comparative Urban Region
	Townsville	**Rockhampton (incl. Yeppoon)**	**Gladstone**	Gold Coast
Number of tourism businesses	1,658	1,043	491	8,960
Visitations per year ('000)				
International	125	66	55	1,037
Domestic (overnight)	952	745	476	3,730
Domestic (day)	1,069	1,105	441	7,456
Total	*2,146*	*1,916*	*972*	*12,224*
Spending per trip ($)				
International	616.00	363.64	363.64	1,232.52
Domestic (overnight)	760.50	542.28	495.80	870.99
Domestic (day)	138.45	150.23	113.38	102.06

(Tourism data from Tourism Research Australia, Local Government Area Profiles 2019)

5. Discussion

This paper reviewed some international examples of MaaS for tourism attempts in Finland and Japan, alongside their MaaS policy and practices for regional or rural areas and their key learnings for regional Queensland. We also analysed three three regional areas in Queensland of varying size and transport offerings with quantitative and qualitative data. Based on the interviews and regional analysis, there is a consensus that Townsville is the most suitable site for any first broad-spectrum or tourist-focused MaaS trial in the three study areas, given the city has:

- the most potential for tourism-focused MaaS and higher airport passenger turnover than in the other regions.
- a highly supportive local government, interested in MaaS and on-demand transport and a local transport plan in place to support multi-modal travel.
- the largest population of the study areas and a relatively contiguous urban area.
- a younger local population that may be more receptive to MaaS uptake.
- some forms of intermodal integration already (e.g. Bus and ferries to/from/on Magnetic island).
- is currently having a good range of public transport, micromobility.
- specific corridors in the city with decent public transport patronage, to which other first/last-mile services can connect.
- Translink branding is already in place.
- some intermodal hubs already in place (e.g. the newly built Townsville City bus hub, which is served by all routes in the city. The Breakwater Ferry Terminal the hub for long-distance coach and ferries to Magnetic and Palm Islands).
- bold transport proposals of trackless trams or the reuse of rail corridors, and demand responsive transit (DRT) is being proposed under the City Deal.

Using the TMR proposed “open-ecosystem” MaaS model, a possible MaaS concept could be a tourist-focused MaaS with event and attraction information embedded. Initially, the trial could be focused for tourist markets. This type of MaaS needs to provide multi-modal offerings, with visitors to Townsville can benefit by using MaaS to arrange long distance and local travel (e.g. airport pickups). Bookings can be planned and paid using the same interface. Non-transport services may include information and bundles of attractions, accommodation,

events and guided tours. Multilingual versions can also be developed for major tourism markets. Initially transport services are included but non-transport services could also be invited to join for supportive services. In this way, customers can book and pay for both transport and non-transport (or "transport-plus") services. While "pay-as-you-go" is the baseline option, subscriptions, bundles and packages could also be included. As evident in global examples and stakeholder feedback, the support from local government and tourist organization are vital.

Ultimately, the tourism MaaS trial could evolve into a broad-spectrum regional MaaS to augment with existing services and meet current needs in Townsville (Figure 3), also including local residents, students, and people with special needs (e.g. patients, seniors, disadvantaged, indigenous peoples, etc.). The following actors could be involved in a potential tourism MaaS in Townsville:

- **Government:** State government (TMR) sets the MaaS vision and provide regulatory and policy guidance to MaaS operators and service providers, both transport and non-transport. Translink may play a greater role in transport related matters, e.g. mobility data broker and MaaS-oriented transport contracts. Local government may also play a role in policy, planning and infrastructure provision.
- **MaaS operators' (MO)** role is to provide an "one-stop shop" for customers to access information - including real time events, such as disruptions. MO could be new entrants (who may not provide transport services), but they could also be run by government (possibly Translink) and also existing Transport Service Providers.
- **Transport Service Providers** supply core mobility services for the MaaS ecosystem in the form of various modes. The introduction of DRT in Townsville should be incorporated in the MaaS system as a testbed. The real challenge here is to balance the interests of subsidised modes (e.g. urban buses) and for-profit modes. The aim should be "grow the pie" by converting previous car users to use modes offered in MaaS. In addition to passenger transport, freight and delivery services can also be incorporated in MaaS, which may be useful in some regional or rural settings and are already in existence now.
- **Non-Transport Service Providers (NTSPs)** are often overlooked in MaaS. Transport can be seen as a "derived demand" - a purpose that needing travel creates the demand for travel. By combining both transport and non-transport services, more trips can be created, and also more service can be consumed, thus generating wider business and economic benefits. As an example, a sporting event in Townsville Stadium could be sold as a package, which includes admission, venue transport and associated dining for the day/night.

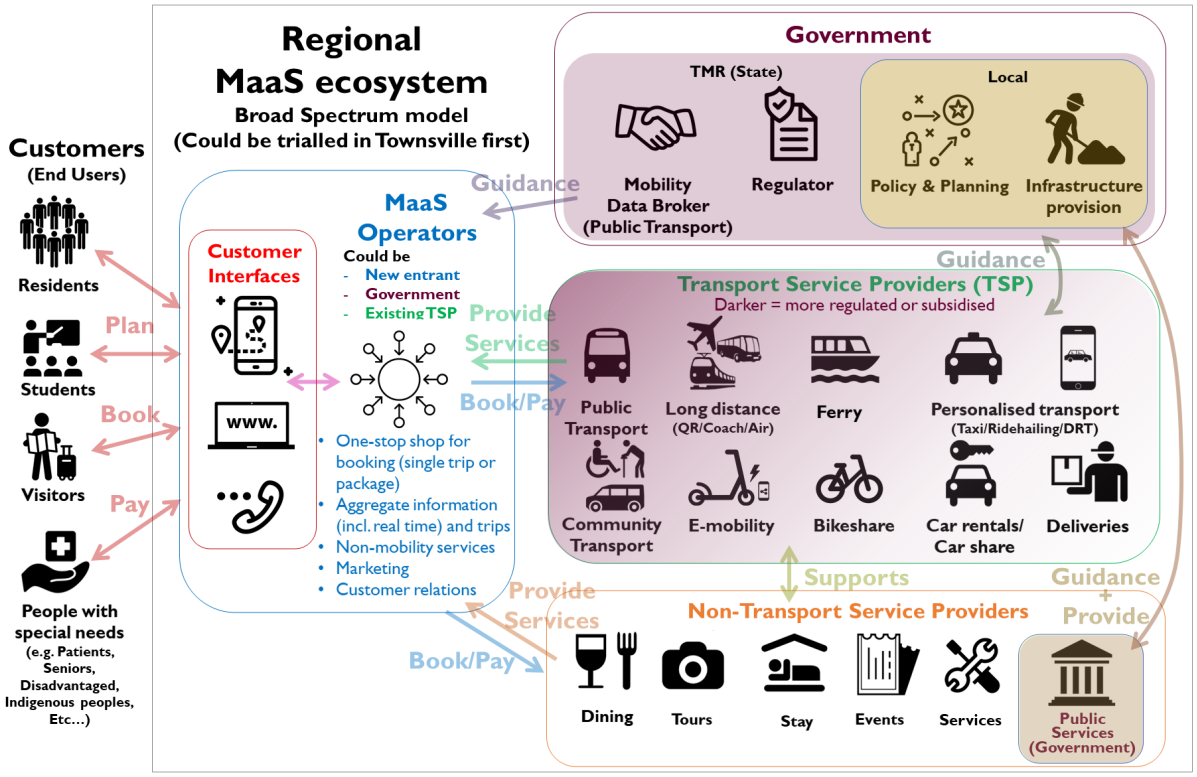


Figure 3: Illustration of a broad spectrum regional MaaS concept with tourism (non-transport) offerings

6. Future Opportunities

Despite the uncertainty of COVID and its widespread impact on tourism and travel, this does not diminish MaaS's great potential to address existing inefficiencies of the transport system and produce transformative changes. While the pandemic has greatly affected public transport usage, it has also boosted outdoor-based travel modes, such as cycling or micromoblity (in particular e-scooters) – app-based e-scooter sharing use is already recovered to pre-COVID levels (Brisbane City Council 2021). If used wisely, MaaS can even help to enhance contact tracing and restore public and tourist confidence of travelling on shared-modes, instead of private vehicles.

While it is attractive to introduce MaaS in metropolitan areas first, trialling MaaS in a regional context may also be beneficial, as seen in the example of Northern Jutland of Denmark, where its population density of 74 persons/km^2 is only slightly higher than Townsville (52 persons/km^2. As demonstrated in this paper, various global exemplars of tourism MaaS for different users and local settings also helped to illuminate the possible model for Queensland regions. This work identified the emerging regional MaaS research and practice development.

The promises of MaaS are many, but there are also numerous hurdles ahead and needs to be tackled with. A future MaaS pilot is recommended so as to further understand the level of acceptance and develop best practice. We proposed a tourism first approach for Townsville, which has the potential to be developed into a broad spectrum MaaS. While this study only looked at three regional settings, MaaS for various user market can also be developed depending on local contexts. While not examined in this report, Cairns could also be a good

candidate of a tourist focused MaaS with an ecosystem dedicated for visitor travel and service offerings. MaaS can help local governments and destination marketing organisations (DMOs) to market their cities for events tourism and prepare for mega-events – with Brisbane and various Queensland cities being confirmed to host the 2032 Olympics. It should be noted Townsville will be a major hub for association football during the games. Tourism MaaS developments not only could help Queensland cities to provide a more seamless travelling experience, but also to gain a better tourist city image and profile.

Acknowledgements

This paper is an extended summary based on the final report of the Transport Academic Partnership (TAP) Supplementary Research and Development Project under the TMR04720 – Mobility as a Service (MaaS) Regional Research with the generous support of MaaS Program Office of the Department of Transport and Main Roads (TMR) of Queensland Government. The authors would like to thank the interviewed respondents and international experts for the insights of MaaS applications in tourism.

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