LEE LI MING
PROGRAMME IN
AGEING URBANISM

Mobility-as-a-Service (MaaS)

Ageing and Mobility[1]

David Hong

What is MaaS?

Mobility-as-a-Service (MaaS) became mobilised around 2015 in Europe largely as a sustainable alternative to single-mode private automobility.

Functional Denotation

MaaS denotes an on-demand service that offers multiple modes of travel (e.g., train, bus, ride hailing, car rental, bike sharing, etc.). MaaS also integrates various informational and transactional layers across travel modes (e.g., route navigation, trip planning, booking/ ticketing, payments, etc.) usually through a unified digital application.[2] MaaS can be provided business to consumer (B2C), business to business (B2B), government to

[1] This is an evolving database. We will be adding more examples and cases over time.

[2] Karjalainen, P. (2021). MaaS Market Playbook. https://maas-alliance.eu/2021/03/16/maas-alliance-playbook-addresses-trust-building-in-the-maas-market/.

consumer (G2C), business to government (B2G), or in several combinations.

Problems MaaS was Intended to Address

Some commonly cited issues in the literature (Smith et al. 2022; Karlsson et al. 2020; Mulley et al. 2020; Lyons et al. 2019) include:

- The overabundance of personal vehicles, resultant carbon emissions, and adverse health effects;
- The lack of service integration between public and private transportation operators, leading to a degraded user experience; and
- The 'first and last mile' problem, which describes the residual distance not covered by fixed transit routes and that travellers need to make through other means (e.g., walking from home to a bus station).

In relation to the older population, average speed, and the ability to walk long distances decreases with age.[3] There also may be additional obstacles in the built environment that raise the risk of on-foot travel for older adults, such as slippery surfaces, broken or dim lighting, roads in disrepair that may act as a tripping hazard, etc.[4] If the first/ last mile problem can be mitigated through MaaS, there is a chance to enhance the accessibility and inclusivity of mobility (e.g., for older adults with mobility limitations).

Caveat: MaaS as a Highly Contingent Proposition

In order for MaaS to work, it is contingent on a) user acceptance, b) economics, c) stakeholder cooperation/ interoperability and d) local context.

First, it is dependent on the user valuing the MaaS intermediary over and above

[3] Kåresdotter, E., Page, J., Mörtberg, U., Näsström, H., & Kalantari, Z. (2022). First Mile/Last Mile Problems in Smart and Sustainable Cities: A Case Study in Stockholm County. Journal of Urban Technology, 29(2), 115–137. https://doi.org/10.1080/10630732.2022.2033949.

[4] Močnik, Š., Moogoor, A., & Yuen, B. (2022). Exploring facilitators and barriers of older adults' outdoor mobility: A walk-along study in Singapore. Journal of Transport & Health, 26, 101386. https://doi.org/10.1016/j.jth.2022.101386.

"accessing and paying for such [mobility] services more directly for themselves."[5]

Second, the MaaS operator needs to sell at a margin and scale that is economically sustainable. According to a 2021 Arthur D. Little report, consumer facing MaaS offerings are 'failing to achieve enough scale to become economically viable' by themselves. For example, an e-scooter service that sells 20,000 trips per week at a trip price of €5, its yield on a 5% commission only nets €260k/ year. Significant scale is typically required for B2C models to achieve economic viability.[6]

Third, public and private stakeholders need to buy into the integration proposition. That is, transit operators need to allow MaaS operators to resell tickets, open up its data and payment integration network, and private operators similarly also need to join the ecosystem.[7]

Finally, does a densely planned and highly transit-connected city like Singapore even need further mobility integration through MaaS? The jury may be out on this question.

MaaS Experiment in Singapore

Singapore also briefly had a MaaS start-up called mobilityX backed by SMRT between 2019 and 2021. MobilityX onboarded mobility solutions like the MRT, ride-hailing (Grab and Gojek), bike-sharing and briefly escooters (until these were banned). The start-up shutdown, however, after shareholders reviewed its progress and future prospects in 2021.[8]

[5] Lyons, G., Hammond, P., & Mackay, K. (2019). The importance of user perspective in the evolution of MaaS. Transportation Research Part A: Policy and Practice, 121, 22–36. https://doi.org/10.1016/j.tra.2018.12.010.

[6] Van Audenhove, F., Tauvel, M. (2021). How to realize the promise of Mobility-as-a-Service | Arthur D. Little. (2021). Retrieved June 22, 2022, from https://www.adlittle.com/en/insights/report/how-realize-promise-mobility-service.

[7] Ibid.

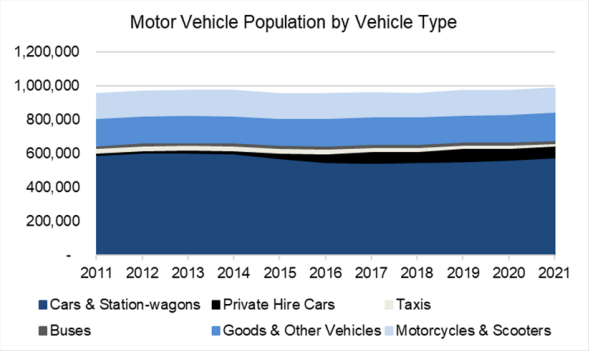
[8] Yufeng, K. (2021). SMRT-backed start-up mobilityX and its transport app Zipster shut down. The Straits Times. https://www.straitstimes.com/singapore/smrt-backed-start-up-mobilityx-and-its-transport-app-zipster-shut-down.

Singapore: MaaS and the Ageing Population

In considering MaaS, especially for the ageing population, Singapore's story is rather unique from the European context in which MaaS was first conceived.

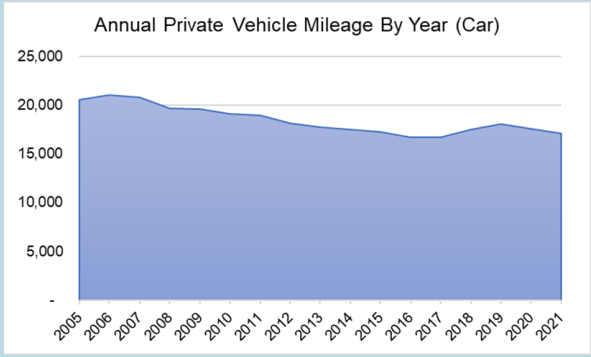
The number of cars is tightly controlled through the Certificate of Entitlement program, which has kept the total number of vehicles (Box 1) as well as vehicle miles travelled (Box 2) largely constant for the past decade.

Box 1: Total Number of Vehicles



Source: Land Transport Datamall. Motor Vehicle Population by Vehicle Type. Retrieved: July 22, 2022. https://datamall.lta.gov.sg/content/datamall/en/static-data.html.

Box 2: Vehicle Miles Traveled (VMT)



Source: Land Transport Datamall. Annual Mileage for Private Motor Vehicle. Retrieved: July 22, 2022. https://datamall.lta.gov.sg/content/datamall/en/static-data.html.

Hence, MaaS may not play a large role in reducing private car use.

Public transit also provides significant geographic coverage, with the Land Transport Authority (LTA) aiming to place 80% of households within a 10 min walking range from a train station by 2030.[9]

Singapore's land use planning also provides neighbourhoods with amenities like food centres, markets, coffee shops, community centres, walk paths, parks, etc within close proximity to housing, especially for HDB (public housing) estates.

[9] Land Transport Master Plan 2040. (2019) Land Transport Authority. https://www.lta.gov.sg/content/ltagov/en/who_we_are/our_work/land_transport_master_plan_2040.html.

Even with these advantages, however, one may ask the following questions:

a) Is there still a segment of the older population with poor access to neighbourhood amenities and transit that need further mobility help?
b) Are there longer essential trips that older adults may need to take out of their neighbourhoods (e.g., medical)?
c) Are there longer trips that older adults want to make (e.g., bulk grocery, social, shopping, educational, cultural, etc)?

Maslow's Pyramid

Though medical and food-oriented trips are important, it would be a mistake to think these are the only trip categories that older adults want or need.

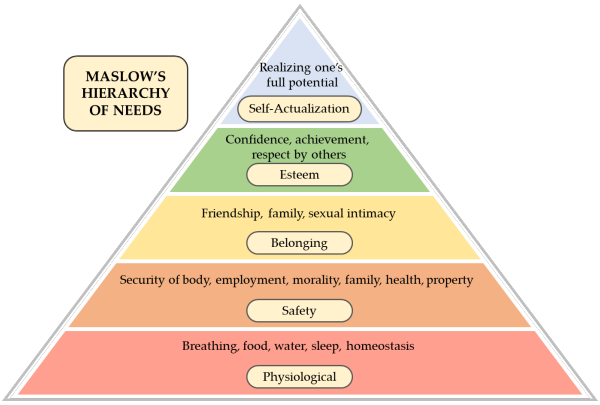


Figure 1: Maslow's Hierarchy of Needs. Adapted from Wikimedia Commons. Factoryjoe. (2009).

In Maslow's pyramid of needs (Figure 1), those that sustain life are essential but represent merely a base set of needs we have.

A mobility survey carried out in Germany [10] showed that shopping and leisure are the main motives for travel of those over 60. 'Access to healthcare, food shops… and other cultural, social and leisure facilities (including libraries, leisure centres, non-food shops, town centres and places of worship) were considered important in a review of local transport accessibility planning.' In Singapore, typical daily activities of older adults may also include exercising at parks/ recreational areas and sharing

[10] MiD. (2008). Mobilität in Deutschland 2008. Available at: http://www.mobilitaet-in-deutschland.de, Bundesministeriums für Verkehr, Bau- und Stadtentwicklung (BMVBS), (Germany).

meals with friends at markets/ coffee shops.[11]

Ageing Considerations for MaaS

One – There may be lessons to glean from Japan. With rising life expectancy and declining birth rates, Singapore may follow Japan's ageing demographic trajectory. While Singapore does not have rural areas like Japan, some behavioural studies indicate that Singapore may also have relatively transport challenged areas for older adults.[12]

Japan's adaptation of MaaS in rural areas (Box 3) is oriented towards its older adult users' needs and filling transportation gaps. According to the World Economic Forum, growth in MaaS has 'rapidly increased since 2018, when the government made MaaS a focal point of its Future Investment Strategy infrastructure-development programme'.[13]

Box 3: Japan's Rural MaaS Model

"Choisoko," a MaaS service started in Toyoake City, found that its digital promotions were not reaching its older adult users, and so it organised in-person community meetings and took out ads in paper-based newsletters.
It also takes bus reservations by phone, helps program community events for seniors, thereby increasing travel demand and promoting wellbeing; and finds alternative sources of income to user fees and government subsidies by allowing local businesses to sponsor stops near their locations. Choisoko has also worked to supplement rather than

[11] Koh, P. P., Leow, B. W., & Wong, Y. D. (2015). Mobility of the elderly in densely populated neighbourhoods in Singapore. Sustainable Cities and Society, 14, 126–132. https://doi.org/10.1016/j.scs.2014.08.012.

[12] Hou, Y., & Moogoor, A. (2019). Chapter 7. Spatial Analysis of Older Adults' Travel Behaviour in Singapore. 57. https://www.taylorfrancis.com/chapters/edit/10.4324/9780429243097-8/spatial-analysis-older-adults-travel-behaviour-singapore-yuting-hou-adithi-moogoor.

[13] Doi, T., Soble, J. Ageing is changing transport. Japan shows how we can adapt. (2021). World Economic Forum. Retrieved June 20, 2022, from https://www.weforum.org/agenda/2021/04/japan-ageing-population-transport/.

compete directly with local transport operators.

Source: Doi et al. Ageing is changing the way we move. Japan shows how transport systems can adapt (2021). World Economic Forum.

Such low-tech but user-centric design of a MaaS solution may gain more traction than a techno-centric one in Singapore's ageing context as well.

Two – Are there sharable personal assistive devices (e.g., electric wheelchairs, or seated e-scooters) that could feasibly be integrated into future MaaS offerings as 'feeder vehicles' for first/ last mile journeys? Managing the user abuse of shared vehicles and assessing business sustainability will be important, as global vehicle-share entrants have learned the hard way in recent years.[14]

Three – currently, requests for Medical Escort Transport (MET) services are taken and means-tested by the Agency for Integrated Care (AIC), and then provided by many different social services, non-profit, and care organisations.[15] Private care entities also provide MET services at higher costs. Finding a consolidated and easy-to-navigate medium to connect users with MET providers could go a long way in further enabling this vital social service.

Moving Forward: Considerations for Future MaaS in Singapore

Box 4 presents a non-exhaustive list of potential enablers as well as barriers for older adults when it comes to MaaS in Singapore.

Box 4: Values and Barriers to MaaS in Singapore Among Older Adults

Aspects that may help to serve older adults and their needs

- Ease of use and convenience
- Ease of navigation and useful information
- Autonomy/ independent mobility
- Age-ready first and last mile mobility options
- Safety and reliability
- Affordability

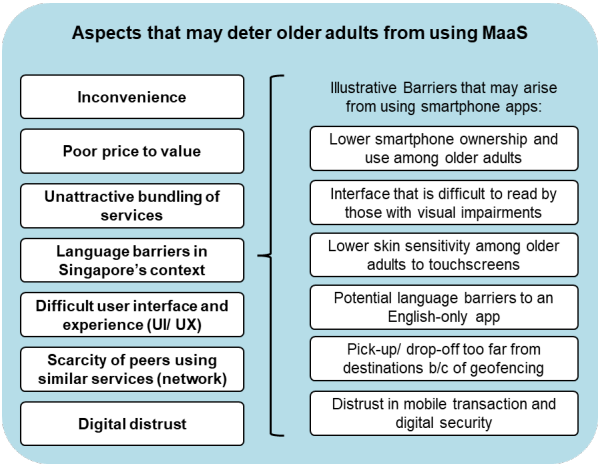
Question 1: How might an 'oldest of old' adult's last-mile journey differ from a younger person's and what transport mode would be suitable?

Question 2: Can data be gathered, and services be designed for needs-based, accessibility-based routing and transportation?

Box 4 continued on next page.

[14] For relevant lessons in the bike-share industry in Singapore, see Tan, A. (2018). Only 5 Out Of 8 Bike-Sharing Firms Remain in Singapore – How Many Will Finish The Race? Vulcan Post. Retrieved July 21, 2022. https://vulcanpost.com/642770/bike-sharing-singapore-shut-down/.

[15] Some of these include the Singapore Cancer Society, Bethesda Care Services, Red Cross.



In Singapore, language accessibility in Mandarin, Malay, Tamil in addition to English can be important, especially when it comes to older generation users.

The price-to-value proposition and attractive bundling are also important for the retiree segment that is budget constrained. For example, if MaaS is set up on a subscription basis and the price advantage over the status quo is unclear or inconsistent over time, users will be reluctant to make the shift. This holds true also if bundles are filled with services that do not take into account the needs and desired travel patterns of older users.

Conversely, safety and reliability often build the minimal foundation for an older user's trust prior to experimentation or user acceptance.[16] An easy to register, navigate, and use interface coupled with the ability to communicate special needs may be the next criteria for acceptance, and the real value above and beyond single-mode transport will be the ability to offer better first and last mile connectivity as well as potentially greater autonomy and independence in travel.

Each of these topics are challenging in their own right, and MaaS may not be a panacea for all of them. In order to include this rapidly growing age segment within business offerings, however, several of these elements will need to be studied with intentionality and tested with users from this population.

[16] Shrestha notes, "Safety is a serious concern for older people as they are likely to be more severely injured, take longer to recover and suffer greater psychological impact than a younger person in a similar incident." Shrestha, B. P., Millonig, A., Hounsell, N. B., & McDonald, M. (2017). Review of Public Transport Needs of Older People in European Context. Journal of Population Ageing, 10(4), 343–361. https://doi.org/10.1007/s12062-016-9168-9.

Sources:

Doi, T., Soble, J. Ageing is changing transport. Japan shows how we can adapt. (2021). World Economic Forum. Retrieved June 20, 2022, from https://www.weforum.org/agenda/2021/04/japan-ageing-population-transport/.

Hou, Y., Yap, W., Chua, R., Song, S., & Yuen, B. (2020). The associations between older adults' daily travel pattern and objective and perceived built environment: A study of three neighbourhoods in Singapore. Transport Policy, 99, 314-32.

Karlsson, I. C. M., Mukhtar-Landgren, D., Smith, G., Koglin, T., Kronsell, A., Lund, E., Sarasini, S., & Sochor, J. (2020). Development and implementation of Mobility-as-a-Service – A qualitative study of barriers and enabling factors. Transportation Research Part A: Policy and Practice, 131, 283–295. https://doi.org/10.1016/j.tra.2019.09.028.

Koh, P. P., Leow, B. W., & Wong, Y. D. (2015). Mobility of the elderly in densely populated neighbourhoods in Singapore. Sustainable Cities and Society, 14, 126–132. https://doi.org/10.1016/j.scs.2014.08.012.

Lyons, G., Hammond, P., & Mackay, K. (2019). The importance of user perspective in the evolution of MaaS. Transportation Research Part A: Policy and Practice, 121, 22–36. https://doi.org/10.1016/j.tra.2018.12.010.

Mulley, C., Ho, C., Balbontin, C., Hensher, D., Stevens, L., Nelson, J. D., & Wright, S. (2020). Mobility as a service in community transport in Australia: Can it provide a sustainable future? Transportation Research Part A: Policy and Practice, 131, 107–122. https://doi.org/10.1016/j.tra.2019.04.001.

Smith, G., Sochor, J., & Karlsson, I. C. M. (2022). Adopting Mobility-as-a-Service: An empirical analysis of end-users' experiences. Travel Behaviour and Society, 28, 237–248. https://doi.org/10.1016/j.tbs.2022.04.001.

Van Audenhove, F., Tauvel, M. (2021). How to realize the promise of Mobility-as-a-Service | Arthur D. Little. (2021). Retrieved June 22, 2022, from https://www.adlittle.com/en/insights/report/how-realize-promise-mobility-service.