

Deloitte Review

Issue 20 | 2017

Complimentary article reprint



The rise of mobility as a service

Reshaping how urbanites
get around

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Illustration by Traci Daberko

Breakthroughs in self-driving cars are only the beginning: The entire way we travel from point A to point B is changing, creating a new ecosystem of personal mobility. The shift will likely affect far more than transportation and automakers—industries from insurance and health care to energy and media should reconsider how they create value in this emerging environment. Deloitte offers a suite of services to help clients tackle Future of Mobility-related challenges, including setting strategic direction, planning operating models, and implementing new operations and capabilities. Our wide array of expertise allows us to become a true partner throughout an organization's comprehensive, multidimensional journey of transformation.

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The rise of mobility as a service

Reshaping how urbanites get around

By Warwick Goodall, Tiffany Dovey Fishman, Justine Bornstein, and Brett Bonthron
Illustration by Traci Daberko

If Netflix's business model were applied to urban transportation, how might that change the way city dwellers get around?

That's the question at the heart of an ambitious initiative taking shape in Finland's capital, which aims to make it unnecessary for any city resident to own a private car by 2025.

SINCE 2016, Helsinki residents have been able to use an app called Whim to plan and pay for all modes of public and private transportation within the city—be it by train, taxi, bus, carshare, or bikeshare. Anyone with the app can enter a destination, select his or her preferred mode of getting there—or, in cases where no single mode covers the door-to-door journey, a combination thereof—and go. Users can either pre-pay for the service as part of a monthly mobility subscription, or pay as they go using a payment account linked to the service.

The goal is to make it so convenient for users to get around that they opt to give up their per-

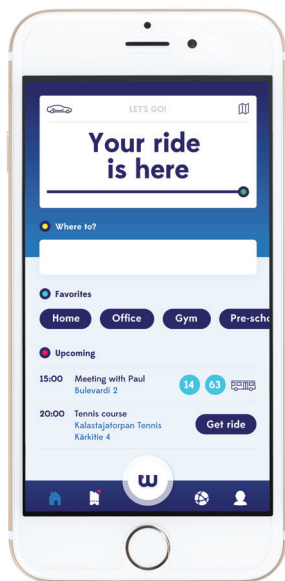
sonal vehicles for city commuting, not because they're forced to, but because the alternative is more appealing. According to Sampo Hietanen, the visionary behind Whim, “We want to prove that we can beat the service level of a car. Or at least be comparable to it. We want to show that people want it, not just that we can do it.”¹

Streaming services like Netflix have fundamentally changed the way people search for, consume, and pay for media. Transportation now stands on a similar frontier.

Helsinki's vision represents the next revolution in mobility: mobility as a service (MaaS). At its core, MaaS relies on a digital platform that integrates end-to-end trip planning, booking, electronic ticketing, and payment services across all modes of transportation, public or private. It's a marked departure from where most cities are today, and from how mobility has been delivered until now (figure 2).

Rather than having to locate, book, and pay for each mode of transportation separately, MaaS platforms let users plan and book door-to-door trips using a single app. By answering the question of how best to get individual users where they're going based on real-time conditions throughout the network, taking account of all the possible options and each user's own preferences (for example, time and convenience vs. cost), and facilitating seamless mobile payment, MaaS starts to move us toward a more user-centered mobility paradigm.

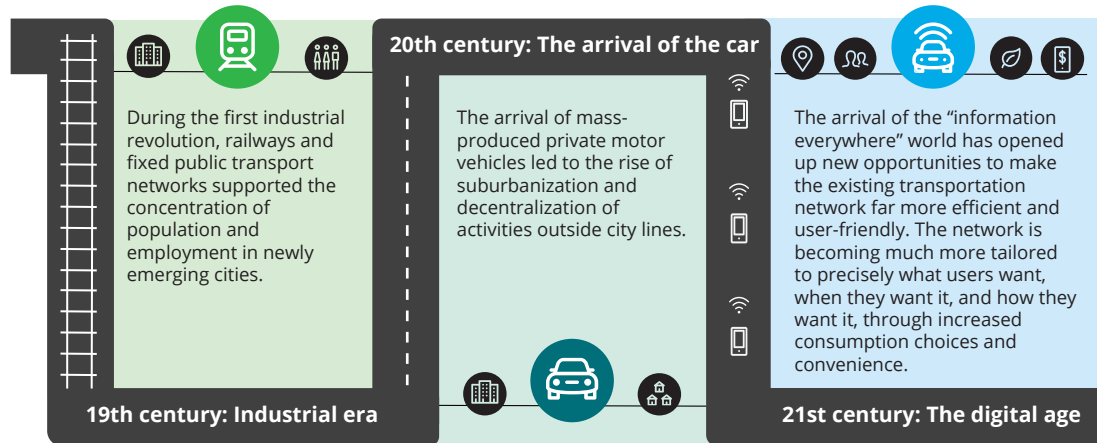
Figure 1. Whim mobility as a service app



Source: MaaS Global.

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Figure 2. Mobility through the ages



Source: Deloitte analysis.

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This article examines what’s driving interest and experimentation in MaaS in cities around the world, outlines the core elements of MaaS and how this concept could evolve, and describes the role of government and the private sector in realizing the benefits MaaS brings.

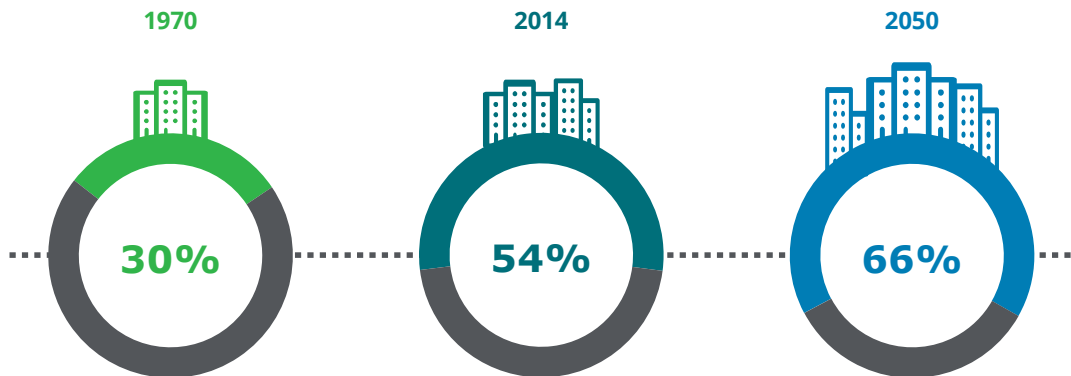
WHAT’S FUELING GLOBAL INTEREST IN MAAS

WHILE Helsinki may be the poster child of the emergent MaaS movement, it is hardly alone. Paris, Eindhoven, Gothenburg, Montpellier, Vienna, Hanover, Las Vegas, Los Angeles, Denver, Singapore, and Barcelona have all piloted local versions that span the spectrum from modest peer-to-peer (P2P) offerings to integrated public transportation to combined mobility services that include private-sector players.

As gridlock plagues a growing number of cities around the world—a problem that will likely worsen in the coming decades, as millions more people are expected to migrate to urban centers (figure 3)—transportation planners are embracing new ways of tackling the old problem of congestion.²

The conceptual embrace of MaaS by transportation planners and operators is, in many ways, a natural evolution of two key trends.

First, increasingly, people no longer view transportation through the prism of “either/or”: *Either* you fall into the “more roads” camp or you favor “more transit.” The problem that confronts transportation planners everywhere is that adding new infrastructure capacity to relieve congestion—be it roads or transit—is notoriously slow and costly. It’s what legend-

Figure 3. Global urbanization trends: Percent of population living in urban areas

Source: United Nations, Department of Economic and Social Affairs, Population Division, *World urbanization prospects: The 2014 revision, highlights* (ST/ESA/SER.A/352), 2014, <https://esa.un.org/unpd/wup/Publications/Files/WUP2014-Highlights.pdf>.

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ary road builder Robert Moses learned in New York City in the 1930s; every time the city opened a new parkway, it was overrun with traffic jams.

Even if timelines could be collapsed and resources were plentiful, there's little appetite for turning cities into even larger parking lots than they are today. The push is firmly in the opposite direction. People want to make cities more livable, and many believe that means making them less vehicle-centric.

As urban density continues to grow, MaaS provides an alternative way to move more people and goods in a way that is faster, cleaner, and less expensive than current options. By adding more variability into the supply side of transportation, MaaS could transform a relatively inflexible transportation system into one that is significantly more pliable.

Second, consumers have increasingly embraced new mobility options and apps over the last decade. Carsharing had nearly 5 million members worldwide in 2014, up from around 350,000 in 2006, and is projected to exceed 23 million members globally by 2024 (figure 4).³ There are more than 1,000 public bikeshare schemes in more than 50 countries—in 2004, only 11 cities worldwide had such programs.⁴ Ride-hailing services have seen similarly rapid growth. In six years of operation, Uber's global footprint has expanded to more than 500 cities in more than 70 countries.⁵

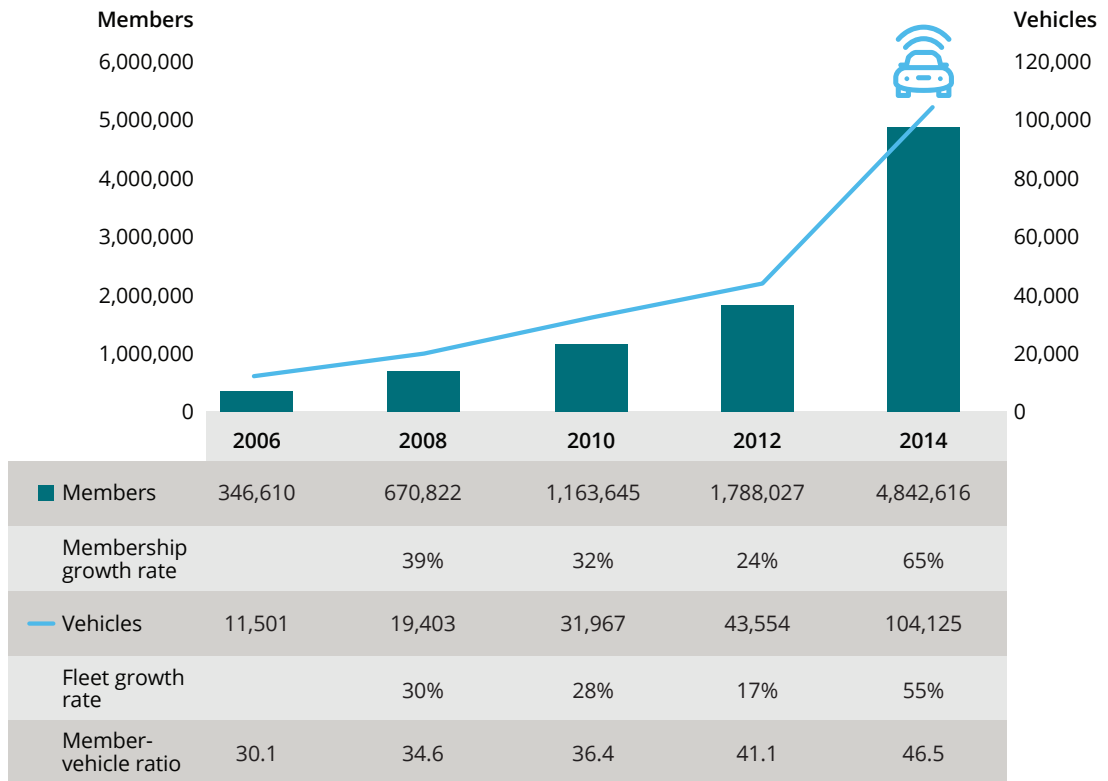
Journey planning apps, which help users identify and compare different modal options for getting to their destinations, have become commonplace, with local and global offerings available in every city. The natural next step would be to bring all of these options together on a

common platform. This would enable journey planning across a range of transportation modes, offering flexible payments and personalization based on user preferences regarding time, comfort, cost, and/or convenience. With so many more choices available, customers should have the ability to seamlessly plan and pay for multiple services as they travel.

FROM MASS TRANSIT TO MAAS TRANSIT: THE CORE ELEMENTS OF THE MAAS ECOSYSTEM

CITIES and municipalities can create a localized MaaS solution that works with the transportation assets and private-sector partners available. From one location to another, there will undoubtedly be

Figure 4. Global carsharing growth, 2006–2014



Data depicted as of October in each even-numbered year.

Source: Susan Shaheen and Adam Cohen, *Innovative mobility carsharing outlook: Carsharing market overview, analysis, and trends*, Transportation Sustainability Research Center—University of California, Berkeley, winter 2016, <http://tsrc.berkeley.edu/node/968>.

variation across offerings. Yet some critical components are common to most MaaS efforts.

Infrastructure

MaaS is a data-driven, user-centered paradigm, powered by the growth of smartphones. To work effectively, MaaS would require the following conditions: widespread penetration of smartphones on 3G/4G/5G networks; high levels of connectivity; secure, dynamic, up-to-date information on travel options, schedules, and updates; and cashless payment systems.⁶ To enable these conditions, a diverse range of actors would need to cooperate: mobility management players, telcos, payment processors, public and private transportation providers, and local authorities with responsibility for transportation and city planning.

There should also be a thoughtful integration of physical infrastructure that enables transfer between transportation services, such as bus and subway interchanges, or bike and carsharing spaces at stations. Transportation planners should think through how the various modes link up.

Data providers

Users access MaaS through a platform—either a multimodal trip-planning app or a webpage. Competition among these platforms is fierce. A good one identifies a range of transportation options and offers real-time traffic updates, often crowdsourced. Consumer adoption depends on having good coverage, which can vary

greatly. CityMapper, Moovit, and Ally are a few of the platforms used around the world.

The data provider is one of the intermediary layers between the transportation operator and the end user. It manages the data exchange between the multiple service providers, providing the application programming interface (API) gateways and analytics on usage, demand, planning, and reporting. Because individual service providers are not likely to share their app data, having a third party involved can remove some of the barriers to cooperation that would otherwise arise.⁷

Transportation operators

Essential to any MaaS offering, of course, are its largest players, the public transportation operators. Demands to expand service delivery have driven many transportation agencies to introduce new modes of travel, such as bikesharing, or to join up with complementary modes, such as carsharing. For example, in Quebec, some municipal transportation authorities have offered mobility packages that include bikesharing and carsharing provided by Communauto, a private-sector concern.

Gaps in public transportation services have fueled a growing army of small-scale private providers, each offering a specific service: parking, carpooling, peer-to-peer car clubs, ride-hailing, or on-demand bus rides. Typically, each operator requires its own app, with a separate interface and payment mechanism, and each service maintains its own customer relationships.

Trusted mobility advisor

The newest and most integral component of MaaS consists of third-party aggregators. Using an asset-light model similar to Alibaba, Airbnb, or Uber, the trusted mobility advisors link the services of the various private and public operators, arranging bookings and facilitating payments through a single gateway.

An important factor in making MaaS a success will be getting all of the players to work together.

Accomplishing that kind of integration has proven to be such a hurdle that only a few services have emerged in this category. UbiGo had a small pilot run in Gothenburg, Sweden, that was expanded in late 2016. Helsinki's MaaS.fi pilot, which ran at the start of 2015, has relaunched as a private-sector start-up, MaaS Global. In Germany, Deutsche Bahn's Qixxit is a nationwide scheme that provides public and private journey planning and allows for one-stop payments within its app.

THE EVOLUTION OF MAAS

MAAS is at a very early stage in its development, with much innovation and experimentation underway.

Over the next few years, as cities aim to do more with less—offering a larger array of services using the same or reduced levels of funding—the number of pilot programs is expected to rise.

Meanwhile, incumbent transport operators are beginning to understand that their business models will likely need to change, and along with that their role in the emergent ecosystem as they seek to harness technological advances that enable a wider range of choices, different uses of data, and a higher level of responsiveness. The number of private-sector providers may very well also increase, seeking to fill the gaps in local transportation services.

An important factor in making MaaS a success will be getting all of the players to work together. Private sector participants might join the movement in search of profits, while government agencies could seek the public policy benefits that stem from reduced congestion: higher productivity, better air quality, fewer traffic accidents, and a smaller urban footprint for parking. Participants will gain these benefits only if they collaborate.

Few current platforms, however, include both private and public options and link everything together in a single solution. Even fewer take payments or allow journeys across multiple transportation operators to be paid for in a single transaction.

Future iterations of MaaS should create an integrated system of mobility that is more pliable than the existing transportation network, where supply is aligned with actual demand and where more choices are provided to enable travelers to get from point A to point B in ways that are easier, faster, cheaper, cleaner, and safer than those currently available.

INTEGRATED CITIES: SEAMLESS INTERMODAL TRAVEL

MOST cities have some sort of journey planner. The next step is to include both public and private transportation options, recommendation engines, and reservations/booking and payments capabilities. At present, Deutsche Bahn's Qixxit and Daimler's Moovel come closest to providing a national integrated service (figure 5). Each covers the entire country, aggregates both private and public providers across a range of travel modes, and can be paid for in one app.⁸

Frictionless cities: Ticketless travel

A key component of any MaaS model is ticketless travel. Using a smart card or smartphone, a user is able to enter and exit all transportation modes required for any given journey.

This is old news in Japan. JR East, the country's largest railway company, introduced a rechargeable, contactless fare card in 2001. In 2004, NTT DoCoMo, Japan's largest mobile phone provider, created the "wallet mobile," which served as electronic money, member card, credit card, and a ticketing mechanism

for air travel and events. In 2006, the two companies joined together to launch Mobile Suica, moving payments from smart cards to cell phones.⁹ Since then, they have built an extensive ecosystem of transportation operators, retailers, and service providers, and attained interoperability across most of the country's transportation systems. Japan aims to extend the interoperability of the Suica card across all train lines nationwide in time for the Tokyo Olympics in 2020.¹⁰

Fair cities: Payment and enforcement

Today's MaaS offerings include two types of payment options—a monthly subscription or pay-as-you-go. The monthly subscription enables the operator, either a public entity or a third party, to "purchase" the services in bulk for users, and then pass along a discount. The pay-as-you-go option works like most route-planner apps: A trip can be organized as a single trip chain, but the user would then pay separately for each leg.¹¹

The complexity involved in delivering a service that spans multiple modes of transportation, with multiple providers, for a single, discounted fare has stymied many an offering. Thus far, the stumbling block has been ensuring that each mode is being appropriately compensated for its portion.

Many fare structures are old and complex, with ticketing schemes involving zones, day tickets, a variety of discounts/concessions, and fare ceilings. This problem should be addressed so

that the public understands what it is paying for. The contactless fares in London, for example, are capped by daily and weekly rates, so that users never pay more than the cheapest equivalent ticket.¹²

Future MaaS offerings will likely need an integrated end-to-end version of pay-as-you-go, where users pay for the entire trip from point A to point B and there is pricing integration across modes. A system may also need to be put in place to manage physical gates, with personnel checking identification and managing fraud.

EFFICIENT CITIES: MATCHING DEMAND AND SUPPLY

THE most sophisticated service providers use the data they collect on consumer movement across the transportation network to understand travel patterns, optimize the network, and calibrate demand and supply.

In practice, this aspect can be challenging, due to the need to achieve critical mass, be responsive to consumer demand, and, at a minimum, break even on the service. Helsinki's government-run on-demand bus service, Kutsuplus, folded after two years due to lack of scale and flexibility.¹³

Privately held Bridj, another form of on-demand bus service, currently operates in three US cities—Boston, Washington, DC, and Kansas City. The service is limited to rides between specific residential areas and business districts.

The minibus routes are dynamically plotted based on rider pick-up and drop-off destinations, matching transportation capacity to demand. The cost is slightly higher than taking public transportation but considerably lower than taxi fares would be.¹⁴

Singapore's Beeline SG, part of its Smart Nation initiative, is a pilot that sits somewhere between Helsinki's Kutsuplus and Bridj's on-demand bus service. The government shares anonymized data from public transportation smart cards with private-sector bus operators to create new demand-driven routes. These are not hop-on, hop-off bus services: Instead, each shuttle runs once a day, from the origin to the destination in the morning and back at night, and riders must book in advance. Prices are just a few dollars more than for public transportation. The service went live in August 2015 with the launch of an app; to date, 10 new routes have been created.¹⁵

Whither driverless?

Looking even further into the future, MaaS offerings will likely incorporate autonomous vehicles. Singapore has begun testing a very limited driverless taxi, provided by nuTonomy. Uber is testing its driverless cars in Pittsburgh. And Tokyo aims to have fleets of robot shuttles and self-driving buses in operation for the 2020 Olympics.¹⁶ Although autonomous-vehicle technology is still in the pilot stage, it holds a great deal of promise for the future of MaaS.¹⁷

Driverless technology is not yet ready to run on a mass scale, and there are a number of complicated issues to work out, such as regulations around safety, liability, data use, and privacy. Still, Deloitte estimates that by 2040,

up to 80 percent of passenger miles travelled in urban areas could be in shared autonomous vehicles.¹⁸ Most major car manufacturers are starting to develop driverless cars, and Ford and BMW have announced their intention to

Figure 5. Illustrative MaaS pilots around the world

Project	Description	Run by	Scope
Whim app	Through its subscription-based integrated mobility app, Whim, MaaS Global offers users access to a variety of transportation options, from taxis to rental cars, public transport, and bikeshare. The app learns users' preferences and syncs with their calendars to intelligently suggest ways to get to an event.	MaaS Global	Helsinki
UbiGo	This fully integrated mobility service combines public transportation, carsharing, rental car service, taxi service, and a bicycle system—all in one app, all on one invoice, with 24/7 support and bonuses for sustainable choices.	Part of the project Go: smart by Lindholmen Science Park, with partners from industry, academia, and government, co-funded by Vinnova	80 households; approximately 200 users in the city of Gothenburg
Qixxit	With more than 21 service providers, the Qixxit app plans routes according to user needs. It offers carsharing, ridesharing, and bikesharing options; identifies ideal train connections; and shows all travel possibilities for users to compare and choose from.	Deutsche Bahn	Germany
Moovel	Enables users to search, book, and pay for rides with a single app—book and pay for car2go, mytaxi, and Deutsche Bahn in a single experience. Public transportation mobile payments are available in Stuttgart and Hamburg.	Daimler	Germany; also testing in Boston, Portland, and Helsinki
Beeline	In Singapore's first marketplace for crowdsourced bus services, users can book a seat on buses listed by private bus operators and track their location. They can also suggest new routes since new routes are activated by community demand.	Government agencies Infocomm Development Authority and Land Transport Authority in partnership with transportation operators, academia, and the private sector	Commuters in Singapore

Project	Description	Run by	Scope
SMILE app	The idea behind SMILE was to offer a wide range of different transportation options with the following functions: information, booking, payment, usage, and billing. A standardized interface enables all mobility partners to link their technical systems via specific adaptors to provide all their data, including the ticketing.	The SMILE project was initiated by Wiener Stadtwerke in cooperation with Wiener Linien (Vienna's public transport provider), Austrian Federal Railways, and private carsharing, taxi, and bikesharing service providers.	1,000 pilot participants in Vienna
Bridj	Bridj is an on-demand commuter shuttle service with a mobile phone application that allows passengers to ride a shuttle between home and work during commuting hours. Using a fleet of flexible vehicles, Bridj optimizes pick-ups, drop-offs, and routing based on demand, meaning a 40–60 percent more efficient trip than traditional transit.	Bridj Inc.	Commuters in Boston, Kansas City, and Washington, DC
Communauto/ Bixi	In Quebec, some municipal transport authorities have offered mobility packages that include bikesharing by BIXI and carsharing provided by Communauto. For example, a user can save on the regular price of a public transport pass and bikesharing by subscribing to the BIXI-AUTO-BUS package.	Communauto	Cities in Quebec, Canada

Sources: Whim, <http://whimapp.com>; UbiGo, <http://www.ubigo.me/>; Qixxit, <https://www.qixxit.de/en/>; Moovel, <https://moovel-group.com/en>; Beeline, <https://www.beeline.sg/>; SMILE app, http://smile-einfachmobil.at/pilotbetrieb_en.html; Bridj, <http://www.bridj.com/welcome#how>; Maria Kamargianni, Melinda Matyas, Weibo Li, and Andreas Schäfer, *Feasibility study for "Mobility as a Service" concept in London*, UCL Energy Institute, May 2015.

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mass-produce fully autonomous vehicles for ridesharing by 2021.¹⁹

MAKING MAAS MATERIALIZE

INHERENTLY, making MaaS a reality requires building a multi-stakeholder consortium of players. This is not just government's responsibility—the private sector also has an important role to play. But for private

players to be an equal partner in shaping this future, the promise of market value must exist.

Set the scene

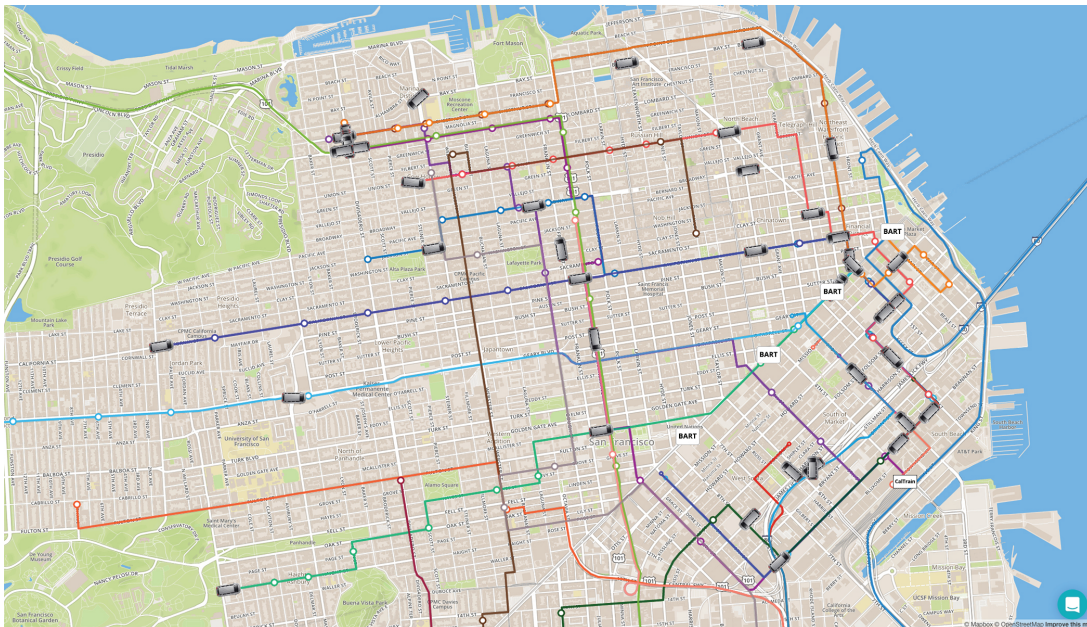
One of the important roles for government in MaaS development is to bring everyone to the table. The European Union, for example, has created the MaaS Alliance, a public-private partnership that facilitates information-shar-

SWING LOW, SWEET CHARIOT: COMING FOR TO CARRY ME HOME

San Francisco-based Chariot is another on-demand minivan service that “crowdsources” routes. These neighborhood services take advantage of clusters of people living in the same area and traveling to the same destination, such as a central business district. Riders input their desired pick-up location, and the system matches it to existing routes and available seats. The cost is as little as \$3 each way. If no suitable route exists, the user’s request is stored and used to determine where the most popular future routes might be. There are currently 31 routes in operation (figure 6).

Such is the interest in creating smart city transit solutions that the big players are taking note: Ford Motor Company’s smart mobility business recently acquired Chariot.²⁰

Figure 6. Chariot’s crowdsourced commuter van service routes in San Francisco



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Too much regulation and the private sector may find it difficult to innovate or participate; too little regulation and the public interest is not served.

ing among players. MaaS Alliance's four working groups deal with legal issues, technical issues, the user experience and social impact, and market development.²¹ Forums like this are often necessary to enable all players across the ecosystem to collaborate in ways that spur further development of the MaaS market.

Government should define the vision and set the metrics by which success is measured. Moreover, the public sector can encourage behavior that aligns to broader public policy goals, such as reducing congestion or traffic accidents.

Government can also encourage investments in programs. The US Department of Transportation (DOT) launched the Smart Cities Challenge, in which 78 cities submitted plans for intermodal innovations.²² The goal of the challenge was to encourage cities to think creatively about the future and to experiment with new mobility alternatives.²³ Off the back of the challenge, states such as Nevada, Michigan, Pennsylvania, and Florida are now developing their own pilot programs.²⁴

Protect the public interest

Governments should play an important role in ensuring that the new transportation envi-

ronment doesn't compromise safety or security. Safety guidelines should address the new technologies, while anticipating future developments. Autonomous vehicles may be a hot topic, but in the creation of MaaS systems, governments should also address more prosaic issues around vehicle driving, service provision, consumer protection, data protection, liability, and equal access.

Government entities can use their power to foster equity in transportation provision, ensuring geographic coverage and accessibility, as well as serving low-income and underserved populations. This often involves working hand in hand with private-sector operators. The Seattle Department of Transportation's agreement with car2go required the company to equitably serve neighborhoods across the entire city within two years of launching. Similarly, Florida's Pinellas Suncoast Transit Authority partnered with Uber to provide alternative service to areas in which bus services were curtailed due to budget cuts.²⁵

Finding the regulatory sweet spot is key. Too much regulation and the private sector may find it difficult to innovate or participate; too little regulation and the public interest is not served.

Promote data accessibility

Any multimodal MaaS solution would require access to the public transit system's route and real-time location data to be successful. As a start, public transportation operators should open their API feeds to developers and the data providers mentioned above. According to City-Go-Round, only 292 transit agencies of the more than 1,000 that exist globally have open data, though more are being added regularly.²⁶ Transport for London, the city's transportation operator, does not have its own app; instead, it provides its API to more than 8,000 developers. Its data is currently used in more than 500 apps.

Participate as a good citizen

The private sector can take ownership of specific programs run on behalf of cities. This serves larger governmental aims while offering companies some branding opportunities and increased visibility, and a chance to get some business out of the association.

In the City of London, the bike rental scheme has been sponsored by large banks, which contribute around 10 percent of the operating costs plus an additional amount toward expanding the coverage. The result is a win-win for both parties: The city is able to offer a wider array of mobility options, and the cost is partly borne by a private company. The bank, in return, benefits from the advertising and gets ac-

cess to the data of everyone signing up for the service.

More than 300 businesses have joined up with Montreal's public transportation authority to offer riders discounts and other rewards. The STM Merci app collects data on riders' locations and preferences and how often they use public transportation, and sends them offers from relevant retailers.²⁷ It promotes the city's goals of encouraging users to rely more on public transportation and directs would-be customers to businesses they might not have known about.

Ultimately, it most probably behooves public and private parties to play ball. A well-functioning MaaS ecosystem can boost the economic competitiveness of a city, to everyone's benefit.

LOOKING AHEAD: ROADMAP TO THE FUTURE CITY

MAAS might be at a very nascent stage, but it's a model that most people already have experience with. Take a web-based travel aggregator, for example. It offers a range of flight options based on a user's preferences: Travel directly? Cheaply? Users can then add on a range of other services: hotels, car rental, and so on. There are even special deals offered by participating businesses that have a relationship with the site.

Instead of utilizing this model twice a year for a big trip, imagine doing it multiple times a day

for single journeys. But instead of paying *à la carte* for each add-on, all services are bundled into a single price and paid for in one click.

We are not quite there yet, but there are three reasons to believe that MaaS could quickly evolve beyond the pilot stage.

First, the benefits for cities are compelling. Simply adding more roads, more trains, and more parking garages is unlikely to solve the problems of our congested urban areas. Nor are major capital investments feasible for cities confronted with difficult fiscal situations. With more people moving into cities all the time, those problems will almost certainly only worsen without a unified transportation solution.

Second, the benefits for individuals are compelling as well. Non-networked forms of transportation don't meet the needs of the modern urbanite. In many cities, getting from point A to point B is difficult at nearly any time of day, and sometimes downright miserable. City dwellers have shown a propensity to try new travel options that make traversing the urban environment more bearable. As sustainable models for MaaS emerge, the public is bound to embrace the best of those services, too.

Third, the technology that makes MaaS work is already here. With smartphones and 4G/5G networks, deep learning and artificial intelligence, autonomous drive and dynamic routing, the world is ready to build and run the new services most in demand.

But where to start? The entry criteria are becoming clear:

1. **City governments should buy in.** Government leaders need to see the benefits and support MaaS in their cities. For their part, private partners play an important role in pledging their support.
2. **Public-private partnerships should be established, and they must be open.** Many cities might reject one or a limited number of large private players coming in to provide a unified solution, but the capital and innovation capabilities of the private sector are essential.
3. **Technology architecture should be agreed upon.** Municipalities should create an open architecture that private partners can integrate to, but that still meets the needs of their citizens. Again, private-sector partners can support cities in this effort.
4. **Municipal transportation should be included.** Buses and trains that serve citizens today can't be excluded from the MaaS ecosystem. It's often logical to leverage the payment systems for buses and trains that already exist and operate on the back end.

MaaS represents the next evolution in mobility. If it's not there already, it's coming to a city near you. DR

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The authors would like to issue special thanks to the following advisors who helped shape the perspectives in this article: **Scott Corwin, Simon Dixon, Derek Pankratz, Junko Kaji, Jason Warnes, Tanu Mohan, Nadun Muthukumarana, and Costi Perricos**. The authors would also like to thank **Atin Gupta** and **Andrew Craig** for their work in researching MaaS opportunities in the United States.

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