

Mobility as a Service: Concept and Practice



March 2018

In recent years, the planning and delivery of community transportation have seen their own “industrial revolution,” except at a much quicker pace than was ever seen in the 18th/19th century version. The field has experienced the advent of sophisticated algorithms for scheduling routes and trips, GIS-based tracking and monitoring of vehicles, apps that allow customers to more directly interface with services and receive minute-by-minute service updates, and now even automated operations of vehicles. Simultaneously, and largely enabled by these technological advances, the range of modes for moving about the community has rapidly evolved. To the traditional choices of travel by private automobile, bus, taxi, and train, we have now added bikeshare, carshare, on-demand carpooling and shuttling, vanpooling, and transportation network companies.

Most of these advances have been added to the community transportation menu piecemeal, leaving transportation planners and operators to figure out how to integrate them into existing options. The focus of this brief is on one promising strategy for giving customers a single interface through which they can access any and all transportation services in their community: Mobility as a Service (MaaS).

What is Mobility as a Service?

MaaS is essentially the next step in the progression from isolated agency-by-agency information and operations to a one-call/one-click/one-pay transportation network. The philosophy behind MaaS is to direct people to their most appropriate mobility options, in real time, through a single, unified trip planning and payment application.

This term is frequently confused and misused, and it is important to understand what it means.

[ERTICO](#), Europe’s Intelligent Transportation Systems partnership, describes MaaS as “putting users, both travelers and goods, at the core of transport services, offering them tailor-made mobility solutions based on their individual needs. This means that, for the first time, easy access to the most appropriate transport mode or service will be included in a bundle of flexible travel service options for end users.”

For a visual understanding of MaaS, [this video](#) provides a great demonstration.

In communities with an array of transportation options, such as large urban areas, embracing the MaaS model provides maximum flexibility to customers for deciding among travel modes, schedules, and price points. In doing so, travelers become better consumers, learning about all alternatives to driving alone and more precisely identifying the mode that suits them best for a particular trip, without their having to commit to that mode for other trips. Having this type of centralized information and choice can also greatly improve access for travelers with mobility challenges, allowing them to understand the array of choices before them and decide on the most appropriate.

Benefits accrue at the system level from MaaS as well: demand is more efficiently spread across modes, communities are better able to identify gaps where travel choices are still sparse, and partnerships to fill gaps are encouraged. To be more proactive, providers can even actively determine areas of unmet demand by tracking searches for origins and destinations and comparing to service availability.

This can be particularly helpful in small urban and rural communities, which lack the varied menu of options seen in urban areas that are so crucial to a person’s access to work or health care. MaaS would allow mobility managers in social service and public agencies to identify service gaps and opportunities to incorporate new providers into the network.

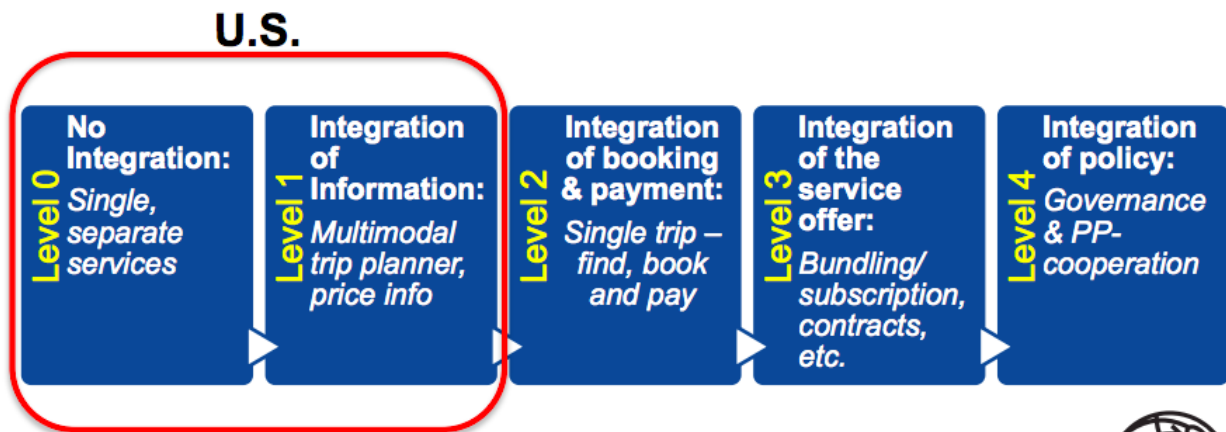
The Path to MaaS

Early versions of MaaS already exist, and some transportation entities are building their foundations with eyes toward being ready for full integration with public policy. It remains to be seen how its more advanced levels will take shape, but it is clear that there are many iterations communities would have to go through in order to reach those later stages.

To fully understand the path to MaaS, it helps to view this progression as a set of steps through multiple stages or “levels.” These defined levels not only provide benchmarks from which communities can evaluate their investments and resulting changes, but also provide a vision for what they want to accomplish.

Jana Sochor, of Chalmers University of Tech & RISE in Sweden, presented a Topology of MaaS to the ITS 2017 World Congress which serves as a useful guide to understand where a community stands along the spectrum of Mobility as a Service.

MaaS Topology



Source: Jana Sochor, Hans Arby and MariAnne Karlsson, "The topology of Mobility as a Service: A tool for understanding effects on business and society, user behavior, and technical requirements," Paper No. EU-SP1013, 2017 ITS World Congress, Montreal



To help in understanding what these steps look like, here are some real-world examples of Levels One through Four.

Level One

¹ Image Credit: Carol Schweiger's presentation to ITS World Congress 2017

Level One represents the loose integration of information into one interface. There are two forms this can take: one-call/one-click centers or informational apps.

There are [several examples](#) of one-call/one-click sites to explore, many of which were developed under the Federal Transit Administration's Veterans Transportation and Community Living Initiative grants (2010-2012).

[Find My Ride PA](#), a Pennsylvania-based service, provides a good example of helping anyone identify and evaluate options to meet their transportation needs. In some cases, users can even book a trip directly. Currently, FindMyRidePA is available in seven counties (Adams, Cambria, Cumberland, Dauphin, Franklin, Lebanon and York) and will be available in additional counties in the near future. At this time, the transportation services available through FindMyRidePA are limited to local public transportation options (i.e., fixed-route buses that operate on fixed schedules and [shared-ride services](#)) but will be expanded over time to include commercial services (e.g. taxi, train, private bus carriers etc.) and other non-profit transportation services.

There are also a growing number of digital travel information aggregators to choose from:

- [Transit App](#) collects all possible modes of travel (excluding solo driving) into a useful menu which allows customers to visualize what is available near any given location and how each option gets them to their destinations. In cities like Washington, D.C., the app has even integrated locations of local dockless bikeshare bikes. Its routing software also helps users understand the total trip length of any mode, including the walk to the transit stop or bikeshare bike, and helps travelers download and open the required apps to complete their journey.
- [Citymapper focuses on multimodality](#), meaning trips that use more than one type of transportation, such as mixing the bus and the train, to reach a destination. The app includes route planning that "creates new trip possibilities that [people] never knew existed" to educate users about how they can make their trips more efficient as well as more cost-effective.

To help in larger transit systems, Citymapper even provides step-by-step instructions on how to navigate stations, including the best spot to board a train. It even guesses how long a trip might take in the future on catapults or personal jetpacks!

- [TransitScreen](#), a Washington, D.C., based company, takes a slightly different approach by focusing directly on behavior change. By placing real time transit information in front of people at key locations, [the company hopes to influence travelers' transit decisions](#). The screens offer real-time information that highlight nearby options and arrival times, thus increasing awareness of existing transit options beyond driving.

Level Two

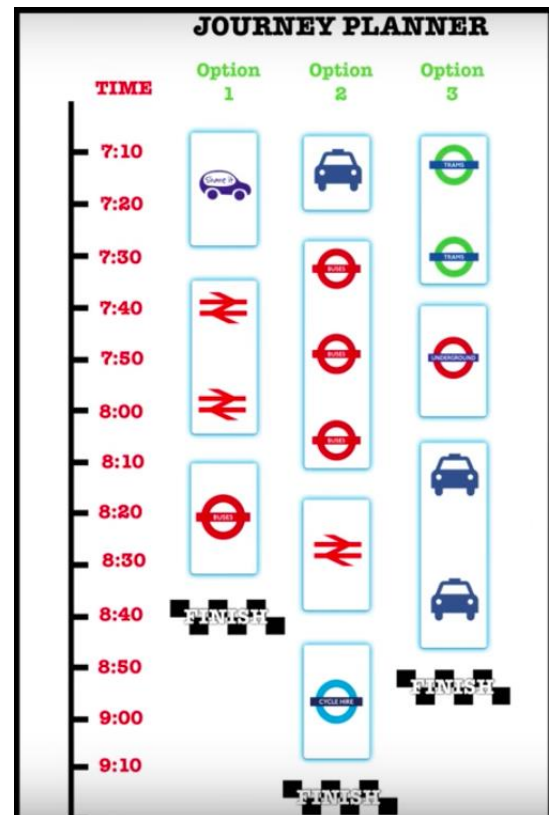
Level Two builds upon the information aggregators by allowing customers to book and pay for their trip without having to navigate away from the planner. Importantly, travelers would be able to pay for trips that use services from multiple operators with just one ticket or pass.

Germany's [moovel](#) and Finland's [Whim](#) have introduced multimodal ticketing in multiple cities, and continue to grow their offerings across the continent. For example, moovel's customers can now book and pay for a train ride on Deutsche Bahn, Germany's national train service, and then cover the last stretch of their trip with Car2Go or NextBike bikeshare.

²What makes this MaaS Level such an important development is the impact of this seamless “plan-decide-pay” option on human behavior. Let's take driving as an example. Part of what typically pushes travelers who live where there are multiple transportation options available to nonetheless drive themselves in their own cars is the ease with which they can just hop into the car, whenever they want, and go. In this scenario, there are basically two decision points: one, I will drive, and two, I get in the car. What humans are somehow able to forget along this decision path until it is too late is the aggravation of keeping the car fueled, maintained and ready to go; sitting in traffic; and searching for some place to park that car at their destination.

So, to entice people out of their cars, other transportation modes need to mimic the perceived ease of deciding and then driving a privately owned vehicle, to the extent possible. To be an equally or almost equally attractive choice, multi-modal transportation systems need to decrease the “friction” for individuals as they move from considering to doing, friction caused by having to take multiple actions or make multiple decisions. Integrating planning and payment into one space is a giant step toward achieving this.

In rural areas it is much more common for people to not have another transportation choice that comes even remotely close to the efficiency and convenience of driving their car. The challenge for rural mobility managers is also different; rather than focusing on moving people from their cars to other transportation modes, they are rather engaged in figuring out how to provide rides for those who don't have access to a vehicle or need an alternative in the case of an emergency. Success for rural mobility managers is to give people access to essential destinations.



Level Three

Level Three MaaS builds on the one-stop model of Level Two integration, adding a layer of service through bundling. In Level Three, customers can still choose to pay per single trip, just as in Level Two, but now also have the option to purchase a subscription to different packages of services, offered at different price points depending on what is included in the package. This allows users to choose which modes they envision they will most likely use and pay the membership fee that covers a certain amount of travel within those modes.

Whim's app in Helsinki includes two subscription levels which show the range of what can be offered: €49 per month buys unlimited transit use, and discounted taxi rides, car rentals, and bikeshare trips within the city,

² Image Credit: Screenshot London Department for Transport video on MaaS

whereas €499 per month allows unlimited use on all modes. (Note that Whim compares the cost of this unlimited package to the cost of owning a car, but with far more options than traditional ownership provides).

Both subscription packages also offer options for traveling into the greater Helsinki region for a surcharge, showing how the model is viable beyond just dense urban cores.

In Gothenburg, Sweden, a company named UbiGo [conducted a study on](#) the viability of a Level Three model, and found that users adopted MaaS quickly and easily. The pilot's subjects were even disappointed in it ending, and now the company hopes to launch a full service in Stockholm.

The up-front payment model offered through UbiGo and Whim type systems, versus a pay-as-you-go model, makes it even easier for people to make positive decisions to use alternatives to private vehicles since all one has to do is “unlock” their trip with a ticket or app. In this way, people are incentivized to use the modes that they've already “bought.”

In addition, the true cost of moving around is made more apparent to consumers, and helps them to compare the value of what they have purchased with other options, such as car ownership.

Whim and UbiGo are out in front on exploring these later levels of Mobility as a Service. So far their experiences provide the best view of what this approach can look like, and especially in the case of UbiGo, how people may use MaaS.

Level Four

Level Four of Mobility as a Service (MaaS) represents the fulfillment of this concept as the industry currently views it. This involves integrating the technologies and payment systems into general public policy and governance structures.

While the earlier MaaS levels involve operators acting somewhat autonomously alongside their partners, Level Four requires the full participation of the local governing structure to integrate MaaS as a core component of the transportation network.

This stage of MaaS remains theoretical for the most part, with few if any active examples. That said, California hopes to take the lead in the coming years; their pending experiments will inform how governments can work with communities to reach full MaaS implementation.

At January's [TransportationCamp DC 2018](#) in Arlington, Virginia, Jim Baker of the California Integrated Travel Program introduced a program in which California's Department of Transportation (CalTrans) aims to integrate travel planning and fare payment across as many modes and providers as possible in the state.

When the program fully forms, travelers should be able to figure out their travel from one end of the state to the other using one interface and making one payment.

Baker explained to the audience that the program wouldn't replace current electronic payment systems, such as their smart cards, but would instead act as an umbrella option that would give users access to all California providers. Thus, a resident of Los Angeles with a TAP card would be able to use it in San Francisco or Red Bluff and vice versa. In addition, the state plans to procure and install the necessary technology for smaller systems who currently do not operate on electronic payment to be integrated into this umbrella system.

This effort is still conceptual, with Baker and his team reaching out to transit providers across the state for feedback on what would enable or prevent the program’s success. As a result, the state is well aware that this is an experiment, but the ambitious nature of it fits in with a [more comprehensive vision of managing mobility](#) as technologies like autonomous vehicles emerge, and positioning systems early on to serve communities equitably.

Your Everyday Transportation Options Within Tompkins County

| Options by time & distance | | | | | | | | | | | |
|--|---|---|----|---|-----|---|--|--|--|--|--|
| 0 mins. | 5 | 10 | 20 | 40 | 60+ | ➔ | | | | | |
| 0 miles | 1 | 3 | 10 | 30 | 50+ | | | | | | |
| WALKING Use your favorite mapping app to find the best route or visit bikewalktompkins.org to learn about walking and biking resources in Tompkins County. | | BICYCLING Put a bike on the bus and go farther! BIKESHARING BIGREDBIKES Borrow a bike at Cornell 24/7 bike.zagster.com/cornell Zagster | | PUBLIC TRANSIT Your local transit system bus tracker & schedules tcatbus.com 607-277-7433 New mobile apps myStop & Transit App | | TCAT Going to or coming from places outside Tompkins County? Turn the page for Long Distance Transportation Options | | | | | |
| | | SHARE A RIDE Finger Lakes RIDESHARE zimride Find and share a ride on the Finger Lakes Rideshare network powered by Zimride. zimride.com/flxrideshare Share a ride with family, friends, or colleagues! Contact us for tips & advice way2go.org/rideshare 607-272-2292 | | RENT A CAR Ithaca CARSHARE Cars available 24/7 for members ithacacarshare.org 607-277-3210 One time, multi-day, or one-way trip? Consider a car rental company Avis – avis.com Enterprise – enterprise.com Budget – budget.com Hertz – hertz.com | | | | | | | |
| | | HAIL A RIDE and ridehailing apps TAXI | | ASAP Cab Company – 607-272-7222 Let someone else take you there Green Hornet Taxi – 607-280-3779 Ithaca Dispatch – 607-277-7777 Collegetown Cab – 607-588-8888 T-Cab – 607-279-0137 Lyft – lyft.com Uber – uber.com | | | | | | | |

| Information | Specialized Transportation | Additional Support |
|---|---|---|
| 2-1-1 Finger Lakes Region, New York Need help finding help? 211tompkins.org 1-877-211-8667 Way2Go Learn how we can help you or your organization way2go.org 607-272-2292 Take Charge of Your Transportation | GADABOUT For seniors (60+) and people with disabilities gadaboutbus.org 607-273-1878 RETIRED EDUCATORS DRIVE SCHOOL RIDES For ICSO students and families to attend school events and activities schoolsuccesstc.weebly.com REDSchoolRides@gmail.com | FISH FRIENDS IN SERVICE HELPING Volunteer transportation service to in-county medical appointments fishoftc.org 2-1-1 or 1-877-211-8667 Way2Go Medical There are other non-emergency medical transportation options available way2go.org/medical 2-1-1 or 1-877-211-8667 |
| | | AVRE – avreus.org or 607-724-2428 Travel training for people who are visually impaired Catholic Charities – 607-272-5062 x27 Bus passes and gas cards for people who qualify Challenge – 607-272-8990 x124 Travel training for people with disabilities and other barriers County Office for the Aging – 607-274-5482 Referrals to people who can help seniors with transportation |

3

Supporting pillars

As of this writing, most communities across the United States have not entered the spectrum of MaaS, but loose partnerships and open data standards have pushed a growing number of cities into Level One. Levels Two through Four remain largely conceptual, with some pilots beginning to take shape.

In order to realize the benefits of MaaS programming, there are key foundational pieces that mobility managers and their partners should build. These establish the technological capabilities and public support/policies that

³ Image Used with Permission from Dwight Mengel, Tompkins County Department of Social Services

allow MaaS providers and facilitators to ensure customers get where they need to go.⁴ The following represent the key developments mobility managers must establish in order to grow a successful Mobility as a Service program.

Partnerships

MaaS involves integrating information and services from a range of providers. Current examples of aggregators of transportation information in the US include the apps like Transit and Citymapper, but could be any public or private actor with a stake in MaaS' success as programs become more complex.

As a result, mobility managers need to develop and foster partnerships with any of the actors involved to ensure consistent service and access for users, as well as to save resources for agencies.

As MaaS evolves into a subscription-based program, providers and mobility managers will need to agree on how they will split revenues that flow through the program. This is an agreement that agencies and companies should develop at the beginning of their relationship in order to facilitate growth and innovation, but also consistency and reliability as the system develops and more providers join. It will be important for all entities to agree on a cost structure that supports the service without diverting too much revenue from participating providers.

For communities that pursue a digital, app-based version of MaaS, providers will need to agree on standardized methods for sharing their information for the coordinating entity to compile into one interface. A good example of this is the General Transit Specification Feed (GTFS), which establishes a consistent format that transit agencies can follow for creating data feeds that apps can read.

It helps if mobility managers lead participating transportation providers in procuring the right software and equipment to effectively share data.

Finally, mobility managers must develop political partnerships to enable proper investment in a MaaS program and to create a fully deployed program at Level Four.

Funding

As with all aspects of mobility management, the infrastructure of MaaS requires a certain level of investment to achieve its goals and to run properly. From a wider perspective, this also includes funding public transit services to the point that they become viable options.

Within the partnerships that MaaS creates, partners must agree on user fees and payment structures as well as how to pool, share, and distribute funds from the program. Elements that need to be funded include items such as

⁴ To learn more about step to create the foundation for a MaaS system, read the white paper recently published by the MaaS Alliance, "Guidelines and Recommendations to Create the Foundations of a Thriving MaaS Ecosystem" (September 2017). https://maas-alliance.eu/wp-content/uploads/sites/7/2017/09/MaaS-WhitePaper_final_040917-2.pdf.

- provider fees to the coordinating entity, whose function could range from both coordinating and operating transportation to distributing funds appropriately to participating providers
- software platform development
- any subsidies to users

Shared Data

In addition to being critical to partnerships, shared data itself is itself an infrastructural aspect of MaaS. As the program evolves, customers will come to expect easily accessible information, including real-time location tracking and service updates, which can influence their decisions.

From an operational perspective, this is useful for tracking areas of need, with customers able to identify gaps in their network and provide feedback. To be more proactive, providers can even actively determine areas of unmet demand by tracking searches for origins and destinations and comparing to service availability, while communicating more effectively with customers.

Behavior change

Especially in areas with heavy congestion and pollution issues, MaaS can serve as an effective method for directing individuals towards transportation choices that benefit the community as a whole.

People want the most [straightforward, seamless way](#) to reach their destinations, and want to be able to choose the option they *perceive* achieves the right balance of convenience and cost. This is why even residents of cities with strong transit systems elect to drive, since their view is that waiting for a transit vehicle to arrive is a burden, and the cost of driving (whether accurately perceived by them or not) is a price they are willing to pay. Education within a MaaS system attempts to make all the costs associated with a particular mode, including driving, transparent so users can make the best decision using accurate information.

Humans are also creatures of habit, and even when it could be in their best interest, they will tend to resist changing from their current routines. A prime example of this hurdle comes with older adults who are reluctant to stop driving, as they often view cars as a representation of their independence.

In communities with an array of transportation options, such as large urban areas, embracing the MaaS model can help to educate travelers about alternatives to driving alone and spread demand across modes. Importantly, centralizing information and payment to maximize mobility makes the best possible options more accessible for vulnerable populations.

MaaS and Mobility Management

Many communities need a champion to pull disparate services together in this nature. This is especially true in smaller cities and rural communities that are less likely to have the technological infrastructure for third-party apps to access at will. Champions can also catalyze support from policymakers that prioritize the technology and services that would create a successful mobility environment.

Doing so would greatly benefit residents of a spread-out area by connecting them with services that exist, guaranteeing their access to work or health care. Mobility managers in social service and public agencies could identify service gaps and opportunities to incorporate new providers into their network.

In both urban and rural areas, an additional motivation for mobility managers to connect individuals to options that can make vehicle ownership unnecessary is so those with lower incomes can allocate their scarce resources to more basic necessities, such as food, housing, or medicine. There are also a number of implications that MaaS holds for persons with disabilities, which the National Aging and Disabilities Transportation Center [digs into in their white paper](#).

If they can achieve this, while still connecting those individuals to business clusters in small cities or towns for jobs, training, and other services, they can help those individuals build up resources—financial and otherwise—so they can address deeper barriers that prevent them from moving toward more financial security. The MaaS model helps local service agencies economically provide the regular connections and emergency rides while making it easy to integrate new options with minimal disruption for all parties involved.

Local mobility managers are best acquainted with their communities' mobility needs, and are the ideal champions for this project. They likely already pull together whatever options exist, and this approach could provide an important opportunity to streamline services while also better quantifying the value of mobility management.

About the National Center for Mobility Management (NCMM)

The National Center for Mobility Management is a national technical assistance center funded through a cooperative agreement with the Federal Transit Administration, and operated through a consortium of three national organizations—the American Public Transportation Association, the Community Transportation Association of America, and Easterseals Inc. The mission of the Center is to promote customer-centered mobility strategies that advance good health, economic vitality, self-sufficiency, and community.

The National Center for Mobility Management (NCMM; www.nationalcenterformobilitymanagement.org) is a national technical assistance center created to facilitate communities in adopting mobility management strategies. The NCMM is funded through a cooperative agreement with the Federal Transit Administration, and is operated through a consortium of three national organizations – the American Public Transportation Association, the Community Transportation Association of America, and Easterseals. Content in this document is disseminated by NCMM in the interest of information exchange. Neither the NCMM nor the U.S. DOT, FTA assumes liability for its contents or use.