

SEEKING PERPETUAL MOTION WITH MOBILITY AS A SERVICE

By Joël Hazan, Nikolaus Lang, and Hind El Abassi Chraïbi

FOR FANS OF TRADITIONAL model trains, success is the constant roundabout of cars that easily negotiate tracks and tableaus, traversing mock villages, waterways, and places of business.

Modern mobility proponents—a group that includes cities around the world—seek perpetual motion, too, using both established forms of transit and new ones: ride sharing, free-floating bikes and scooters, and more. They aim to create a large-scale real-world version of that toy train vision, one that allows people to move quickly and seamlessly through metropolitan areas. Someone living in a suburb, for instance, could travel easily to work in a city, using an app that allows her, with a single click, to book and pay for, say, a shared autonomous electric vehicle that will take her from her doorstep to a train with a stop near her office.

This kind of access is called mobility as a service. MaaS enables end-to-end transit using the new mobility offerings that are proliferating in cities around the world as well as traditional modes like public transportation

and taxi services. It relies on a digital platform to support all aspects of commuter journeys, from planning to optimized transit.

MaaS is more than just the next potential digital B2C bonanza for private players. It's something that cities need to endorse, enable, and guide, because access brings economic benefit to urban areas and MaaS can dramatically improve access. With MaaS in place, cities can optimize travel, including B2C offerings, and reap the benefits of perpetual motion.

Moving Toward MaaS

Cities have an opportunity to take charge of a burgeoning array of new transportation offerings. They can step up to put in place the technologies, programs, and regulations that will work best for their residents, including businesses, and that will provide for a thriving economy. To do so, they must collaborate with stakeholders, finding a way to reach common understandings to meet the needs of all. (See the first article in this series on mobility, "[Solv-](#)

ing the Cooperation Paradox in Urban Mobility,” November 2018.) Cities must orchestrate the activity of stakeholders on six fronts: measure, capture value, integrate, incentivize, regulate, and experiment.

Taking on the role of MaaS orchestrator will help cities to optimize transportation and meet objectives in three key areas:

- **Economic**, to optimize investments in infrastructure and to foster financial transactions and therefore the wealth of a city
- **Environmental**, to relieve congestion and lower the use of personal cars, thereby alleviating pollution
- **Societal**, to make urban mobility more inclusive in terms of improving access to all areas and for all socioeconomic classes

So, MaaS holds vast promise for cities; indeed, some are already serving as MaaS testing grounds. Private players see the potential upsides, too: although the MaaS concept is in its early days, a variety of enterprises are rushing to participate and cash in. (See the sidebar, “The MaaS Gold Rush.”)

We believe that individual commuters, too, are ready to embrace MaaS. They increasingly expect convenient and efficient interaction with mobility ecosystems, given the growing number of options available. They are very fast adopters of on-demand and seamless services—witness the upward trend in the use of ride-hailing services in three major cities, as shown in Exhibit 1. They have needs that current transportation options cannot meet satisfactorily. Our research shows, for example, that access can vary markedly in a city; the poorest zones in Paris are only about half as accessible as the wealthiest. And commuters are willing to test credible “green” alternatives to their private vehicles. A BCG survey that assessed consumers’ willingness to use shared autonomous electric vehicles found, for instance, that “environmental benefits” was a top-three reason for 33% of respondents.

Dissecting MaaS: Progress and Challenges

We distinguish four levels of MaaS functionality. (See Exhibit 2.) Each level represents an increase in sophistication as companies expand their technological ca-

THE MAAS GOLD RUSH

Ride-hailing apps, free-floating bicycles, electric cars. All of these revolutionary changes in urban mobility are attracting investors and users. It’s no surprise that MaaS is also drawing attention from enterprises that have a connection to the mobility industry or to relevant technology:

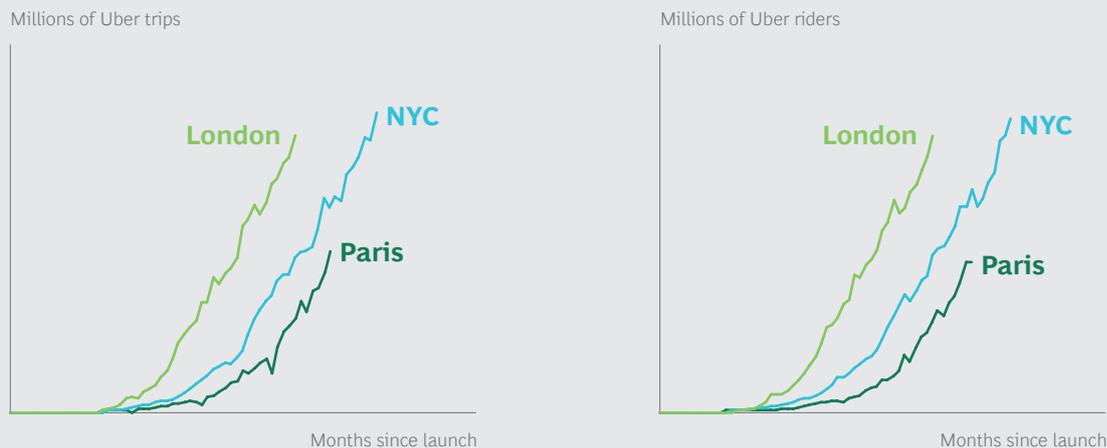
- **Transport providers**, which see MaaS as an extension of their current business. They want to secure their access to end users by aggregating their offerings with those of the competition. Wiener Linien, for instance, is offering WienMobil, an app that gives users access to travel options in and around Vienna.
- **Automotive OEMs and car rental companies**, which are looking to

reinvent their business models as new mobility options like ride hailing and ride sharing shift car ownership from individuals to fleets. Some of these players have already expanded their business to include ride-hailing platforms (Daimler acquired Chauffeur Privé in 2017, for example); they are now looking to move further down the mobility value chain by developing MaaS platforms (Toyota has invested in MaaS Global’s Helsinki-based Whim app).

- **Nonmobility players and startups** (such as transitapp and moovel) see MaaS as a “winner takes all” B2C battle with promising economic potential.

EXHIBIT 1 | The Rapid Uptake of Ride Hailing

The trend in three cities—Paris, New York, and London—indicates that ride hailing meets mobility needs



Sources: Uber data; BCG analysis.

pabilities to accomplish more with the same input data (multi-operator real-time data on capacity, pricing, and operations). But while each level is attractive to end users, MaaS providers struggle to achieve the right economic model. Each functionality level calls for a different business model, which has its own limitations and hurdles. We believe that it's only at level four that—eventually—the full potential of MaaS will be realized and that MaaS will be truly economically viable.

Level One: Planning. Initiatives at this level coordinate various modes of transportation and personalize routes. Level-one platforms offer free itinerary planning for users, and they sell users' data to advertisers.

However, only monopolistic players with high penetration rates, such as Google and Tencent (which is reportedly looking at MaaS options), can afford such a business model.

Level Two: Planning + Ticketing. At this level, platforms are able to aggregate mobility offerings from different operators, resell operators' tickets to individual commuters, and charge commissions to operators.

Level-two platforms rely on a travel agent model. Revenues are usually derived from

commissions on each trip but can also be based on lead generation.

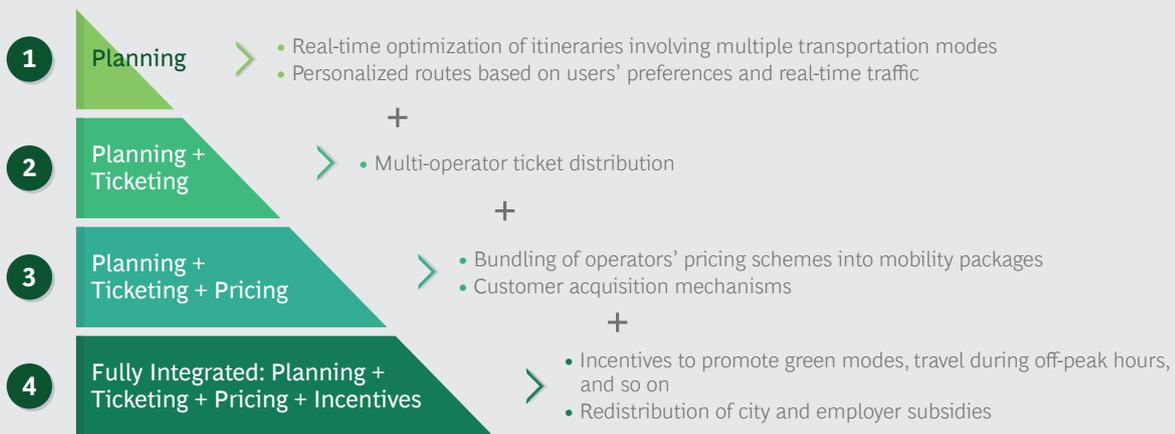
This model poses particular challenges for the mobility industry, because transport providers already operate in a low-margin context and cannot afford the distribution of funds to third parties. Travel apps can impose commission rates because hotels, for instance, need the attention of those apps, but the few current travel options won't feel that pressure. There are few operators in a given city for them to work with. So, third-party mobility distributors are left with limited bargaining power.

Level Three: Planning + Ticketing + Pricing. MaaS initiatives at this level incorporate operators' pricing and means of attracting customers.

Level-three platforms bundle single transportation tickets into all-inclusive mobility packages. They use various customer acquisition techniques to expand their user base. This is what Netflix and Spotify did in their respective industries, but they rapidly realized they had to take control of their unit costs in order to be sustainable. Netflix started to produce content, and Spotify indexed the royalties paid per stream to its own business targets.

EXHIBIT 2 | How BCG Defines the Four Levels of MaaS

Each level leverages the same input data but uses a different, increasingly sophisticated business model



Source: BCG.

Bundling mobility solutions with very different unit costs is not an easy equation. All-inclusive pricing will motivate users to choose modes of transportation that are more convenient for them but also more expensive to operate, like ride-hailing and taxi services. The level-three model is unsustainable because it lacks incentives to encourage users to choose less expensive transportation options (for example, mass transit and free-floating bikes as well as travel at off-peak hours).

This brings us to level-four platforms, which will provide incentives for users.

Level Four—Fully Integrated: Planning + Ticketing + Pricing + Incentives. Only at level four will MaaS operators be able to achieve real success and economic sustainability and to offer the fully equipped version of MaaS that we have previously described, one that makes possible a real-world approximation of perpetual motion. To reach this level, MaaS players must put in place incentives that will encourage commuters to use economical transportation modes. Fully integrated MaaS players will also incorporate investments, planning, and more. They will be the distributors of subsidies that encourage commuters to use MaaS offerings as well as incentives that prompt them to use those offerings in particular ways (traveling at

off-peak hours, for instance, at a discounted price).

This ultimate level is where the interests of public authorities meet the needs of private players.

Cooperating to Level Up

Both cities and MaaS operators have a big interest in reaching the fourth, fully integrated level of MaaS. That is where the real value lies. Right now, although multiple MaaS initiatives are underway in major cities around the world, they remain at the earlier stages. (See Exhibit 3.) In fact, the Helsinki-based Whim app is one of the rare level-three platforms; it is considered to be the international reference for MaaS. With Whim, users can subscribe to a monthly unlimited mobility plan that gives them access to all transportation modes in Helsinki and the surrounding region. In February 2019, Citymapper announced the launch of the second level-three MaaS platform, in London, with the goal of building individualized, multimodal packages. For now, Citymapper is footing the bill for the discount offered to customers using public transportation. Close collaboration with Transport for London will be essential for Citymapper to achieve its ambition and become profitable, as will fruitful negotiations with other private players.

Residents of a city with a fully integrated platform would be able to utilize the best modes of transportation at the best time at the best price and with the greatest ease. A city like this would be able to activate MaaS to further the three overarching urban objectives: improvements to the economy (optimized infrastructure and commerce), to the environment (diminished pollution by encouraging modes such as ride sharing and discouraging the use of private vehicles), and to society (discounts for the commuters who most need them).

Fully integrated MaaS operators would be economically viable, thanks to the enabling elements that cities can provide for them, such as centralized transportation subsidies, taxes on personal vehicles, and enforcement of incentives. Only public authorities can do those things, and only with those things in place can sustainable economic models for MaaS players be created.

Which apps and which players will ascend to the fully integrated level of MaaS is unclear. What is clear is that to achieve it, cities and MaaS operators must all play their parts, cooperatively. Cities need MaaS, and MaaS needs cities. MaaS has to be addressed as part of a broader solution involving the whole mobility value chain, from infrastructure to digital platforms, from public authorities to private players. No one will be able to win alone. The cities

that will succeed will be mobility activists that foster innovation. They will get deeply involved with private players as they execute, on the six fronts, their role as orchestrators in the context of MaaS:

- **Measure.** Cities will define the KPIs (level of congestion, for example, or average time spent commuting) of their transportation ecosystem. Targets will be defined on the basis of those KPIs, and MaaS initiatives will be assessed against them.
- **Capture value.** Cities will make substantial investments in MaaS, but much of that money can be a reallocation of mobility funding derived from smart moves like taxes on personal vehicles and the strategic use of subsidies.
- **Integrate.** This action is inherent in an initiative like MaaS—cities will bring together a variety of public and private players to create the coordinated web of mobility that is essential to MaaS.
- **Incentivize.** Cities will incentivize both players and commuters through the redistribution of subsidies in the form of discounts.
- **Regulate.** Cities will mandate one single MaaS provider, to simplify the user experience and to centralize control over the incentives system.

EXHIBIT 3 | BCG's Benchmarking of MaaS Initiatives

1	Planning	Google Maps	Citymapper	transitapp	moovit
2	Planning + Ticketing	moovel	WienMobil	Free2Move	Uber
3	Planning + Ticketing + Pricing		Whim	Citymapper (London)	
4	Fully Integrated: Planning + Ticketing + Pricing + Incentives	No fully integrated MaaS offerings yet exist			

Source: BCG.

- **Experiment.** In a nascent area like MaaS, experimenting will be crucial, and cities must be sure to find the right balance of regulating and encouraging new efforts. Fostering innovation is key in an area like this.

Practically speaking, cities need to establish an operating model to work with all stakeholders. Part of that approach: drawing a line that connects a city's economic, environmental, and societal objectives to the policies it will enable for private players and the results it will require of them; reinventing public-private collaboration models (for instance, establishing an exclusive contract between the city and a tech player that specifies the city's requirements and the tech player's development plans as well as the KPIs that the city and developer agree upon for measuring value); and defining precisely what is expected from private players (such as certain levels of decrease in congestion and emissions).

ACHIEVING THE BEST of MaaS technology requires a virtuous circle: one that connects cities that lend their regulatory and urban planning expertise, private operators that contribute their mobility and technology expertise, and other public and private entities (environmental, community, and business groups, for instance) that can influence transport uptake. When all the parts—and parties—are in place, the benefits of the new mobility (one akin to the constant flow of cars in a model train landscape) will be within reach.

This article is the second in a series on the future of mobility. In subsequent publications, we will explore in more detail the mobility-related actions that cities must take, drawing on the findings of our research platform; we welcome the input and participation of cities and private players.

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