MOBILITY AS A SERVICE:

Microsoft | Capgemini

HOW TO DELIVER THE GREEN PROMISE AT SCALE

WHY MAAS IS ESSENTIAL TO ACHIEVING GREEN MOBILITY

Given the recent IPCC report and the last annual UN Climate Change Conference in Glasgow (COP26), it is clear that climate action is needed, and it is needed right now. One of the areas that can contribute is green mobility.

Although the electrification of vehicles will certainly contribute, it will only replace internal combustion engine (ICE) cars with electric vehicles (EVs), and the production of EVs actually leads to more emissions than the production of traditional cars.

Besides that, cars also take up a lot of space, which can hamper environmental progress – especially in urban areas, by leaving less room for climate-adaptation measures such as green spaces. Shared mobility, and more specifically, Mobility as a Service (MaaS), is seen as the next step forwards. MaaS integrates various forms of transport services (transport modalities) into a single mobility service that is accessible on demand and holds many promises for users, cities and the environment itself.

WHAT'S SO GREAT ABOUT MAAS?

What's in it for the traveler?

MaaS offers many advantages to travelers as they have access to different types of transport modalities to get from A to B (known as multimodal travel) including public transport or the sharing or rental of cars, taxis, bikes or scooters. The traveler can switch modalities (intermodal travel) during the trip by using a single app that provides all relevant information for planning, booking, paying, etc. MaaS can be used from the first to the last mile of the trip and can take personal preferences of the traveler into account when booking a trip.

Most travelers and car owners are unaware of the true financial and environmental cost of a car. They seldom take into account the amount of time they actually use it, and typically underestimate the carbon footprint of the entire trip. The average European car spends less than 5% of its life in use – leaving this expensive asset unused 95%[1] of the time. MaaS allows the shift from ownership of cars and other vehicles to the use of more environmentally friendly and often more cost-effective mobility systems.

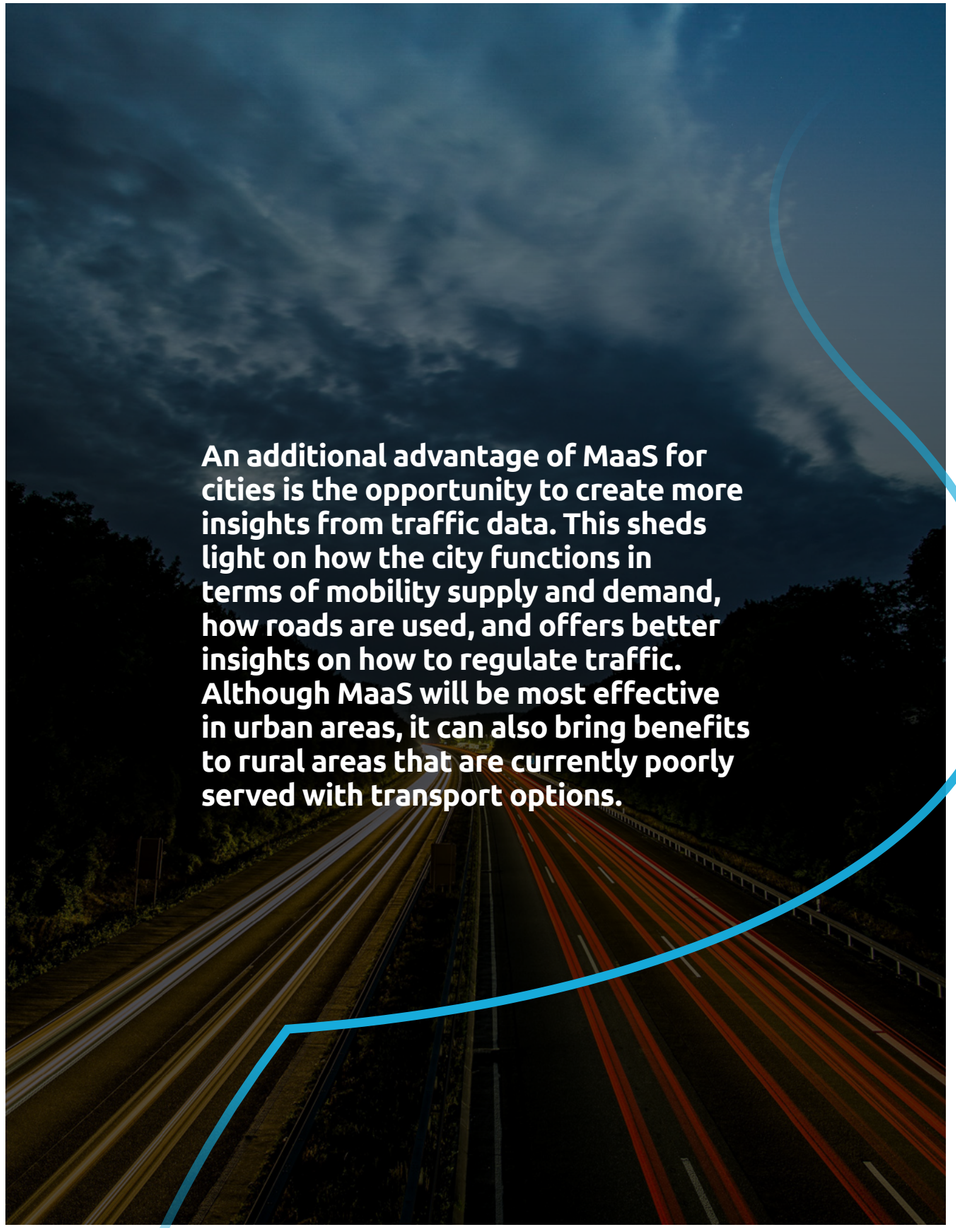
1: Bates & Liebling, 2012

WHAT'S SO GREAT ABOUT MAAS?

What's in it for the government?

From a government or city perspective, MaaS promises to deliver many benefits:

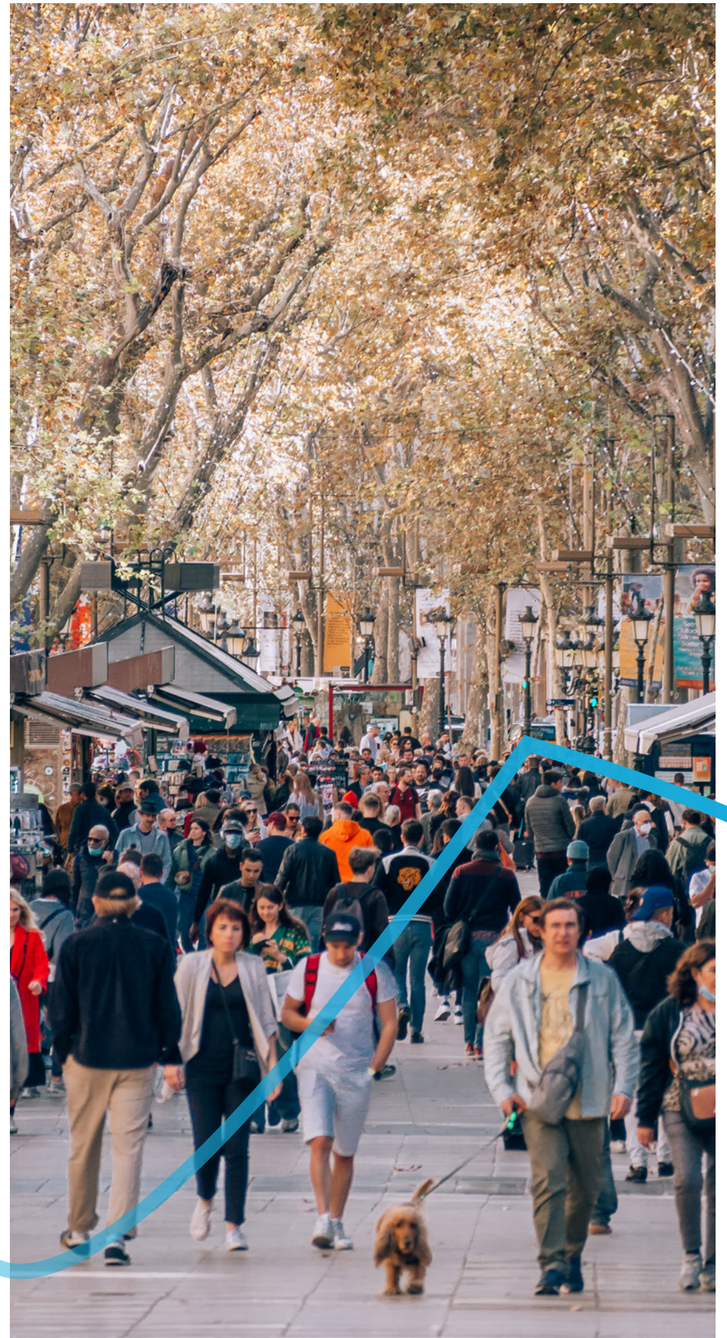
- Reduces road congestion, energy use and pollution. The environmental benefit increases with the widespread use of e-vehicles (e-cars, e-bikes, e-scooters, trains, traditional bikes ,etc.) instead of those that use fossil fuels. Shared mobility uses less electricity than owned electric vehicles.
- Stimulates walking and cycling, thus supporting a healthy lifestyle, improving quality of life and community health.
- Improves road safety.
- Decreases parking and road space that may be used for greening the city and implementing climate-adaption measures such as reduction of heat stress and improving drainage after heavy rainfall.
- Lowers household expenses.
- Increases social connections and functions as a tool for improving inclusion and participation.
- Offers freedom and personal mobility for everyone.
- There are even economic benefits, such as the integration of MaaS with retail and parcel services.
- Reduces expensive traffic jams, with knock-on impacts on the economy and the stress level of travelers. Hence this requires a real-time and accurate application for travelers.



THE CHALLENGE OF ACHIEVING CRITICAL MASS

MaaS cannot, however, be implemented overnight.

Although it has been introduced over recent years in many cities (eg. Barcelona, Copenhagen, Milan, and Paris), with investments in rental bicycles (electric and conventional) and converting car lanes into bike lanes, more drastic actions are needed. Cities must reengineer city traffic directions and discourage car usage through steps such as increased parking prices, reduced number of parking spaces, etc. – and this will not happen without resistance. The EU's Twin Transition (Green Deal and Digital Transition) will drive the acceptance of MaaS, but it needs to scale much faster than the current pace in order to be an effective tool for a city.



Harness the power of the people

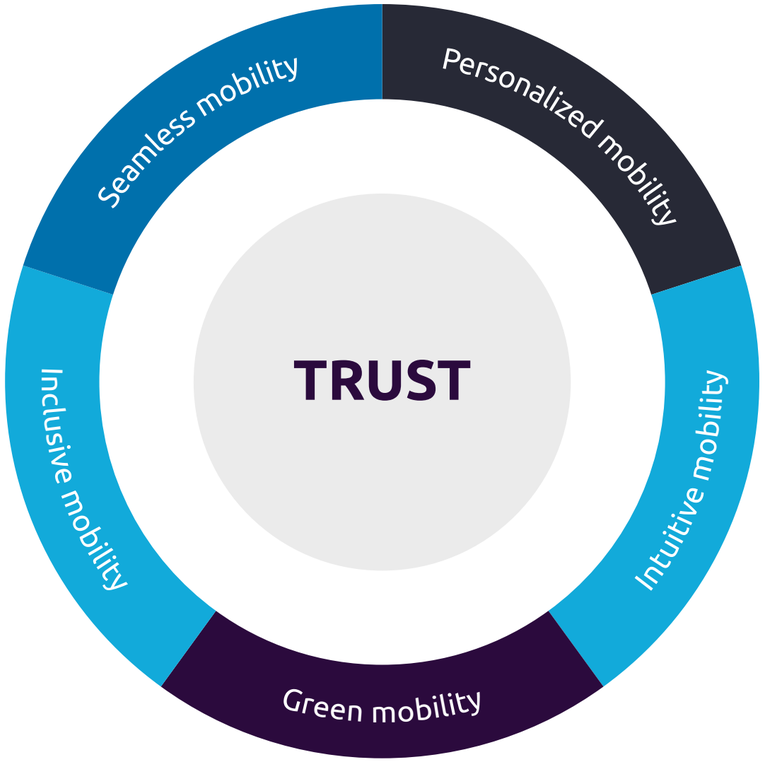
The biggest challenge will be creating a MaaS system that fulfills the needs of all parties involved. The city/ governmental authorities will have their objectives, as will any commercial parties and private companies involved in the MaaS ecosystem. Yet the success of the city depends on how well the MaaS offering is tailored to the needs of travelers. The only way to achieve the desired policy goals is to build a system that people like to use.

HOW DATA INTEGRATION DRIVES THE 5 ESSENTIAL ELEMENTS OF MAAS

In order to create a user experience that will encourage travelers to switch their routines, we must address five critical elements. These elements are both rational and emotional in nature, but can only be achieved if there is a trusted level of data integration.

Travelers need access to data to plan, book and pay for each MaaS trip, while transport service providers will need precise predictions of demand, so they can ensure that the right transport options are available in the right place at the right time. This requires a data ecosystem that connects and cross-links mobility service providers (MSPs) with transport service providers (TSPs) and makes that information conveniently available to travelers. In addition, it must comply with personal data regulations and give travelers control over how their data is used – such as the ability to access loyalty schemes and third-party promotions (eg. free coffee).

The five essential elements of MaaS, facilitated by trusted data



SEAMLESS MOBILITY:

JOINING THE DOTS OF INTERMODAL TRANSPORT

The great advantage of a car is that it can take you in comfortable seclusion from door to door. Of course, traffic jams and bad weather may have a negative impact on the experience, but the convenience and privacy of this transport mode make it attractive to millions.

In order to compete with a private vehicle that takes the traveler from A all the way to B, MaaS should be able to offer a seamless user experience. Optimized, user-centric and connected mobility options for travelers are the starting point for successful adoption of MaaS. A seamless travel experience requires the integration of different mobility and related services as a “one-stop shop” platform, including car and bicycle rental or sharing, and taxis as well as various forms of public transport.

Seamless mobility should work from door to door, so the first and last mile should be available on demand, while intermodal transfers should be easy. Many of these transfers may happen at a switch or mobility hub where the transit from bike to shared car, rental or public transport takes place. An essential part of seamless mobility is the MaaS app, which should also show what options are available at the hub, if the train or bus is on time and if not, what the alternative way to travel is. The app should provide information such as an accurate estimated time of arrival (ETA) and the carbon footprint for all itineraries, and also enable rental cars and bikes to be booked, paid for and unlocked before use.

A reliably seamless experience creates comfort and reduces stress while traveling, but the main benefits are rational ones. McKinsey estimates that seamless mobility will lower congestion levels and therefore reduce travel times: “Seamless mobility could be cleaner, more convenient, and more efficient than the status quo, accommodating up to 30 percent more traffic while cutting travel time by 10 percent.”[2]

2: https://www.mckinsey.com/business-functions/sustainability/our-insights/the-road-to-seamless-urban-mobility

PERSONALIZED MOBILITY:

CHOOSE YOUR OWN ROUTE

Different people have different needs in terms of subscription models, preferred modes of transportation and additional services based on their personal preferences. Some customers wish to travel comfortably, others as cheaply as possible, while others like to use travel as part of an active lifestyle. Building on the seamless mobility, personalized offerings are another key to successful adoption of MaaS. The MaaS platform can optimize the customer-focused experience with relevant recommendations based on collecting and analyzing user data.

These recommendations could mean simply highlighting the modes of transportation known to be preferred by an individual user. More advanced options might be using personal data to enable music playlists, discounts from preferred (and local) coffee outlets, or podcast suggestions based on your interests. Using real-time information about the weather will also help provide the best travel advice, while the experience could be further enhanced by integration with family and friend finders. The possibilities are endless, but relevance to the individual user is the key differentiator.

This element addresses both rational and emotional aspects for the individual traveler. It requires for the traveler to share the right preferences in the app to get the best customer service, which once more shines the spotlight on the need for a trusted data infrastructure that respects data privacy and compliance factors.

This is an example of the shift from mobility-centric MaaS to a customer-centric model, as demonstrated by the Tokyo Metro MaaS initiative. Rather than focusing only on the need for travel, Tokyo Metro says it also takes into account the personal needs and preferences of each traveler to make each journey as enjoyable as possible as well as efficient: “We will support the movement, business, and life of each and every one of us in Tokyo, where diverse values and cultures are filled, and enhance the vitality of the city.”

INTUITIVE MOBILITY:

GREAT FOR THE ENVIRONMENT, NATURAL TO USE

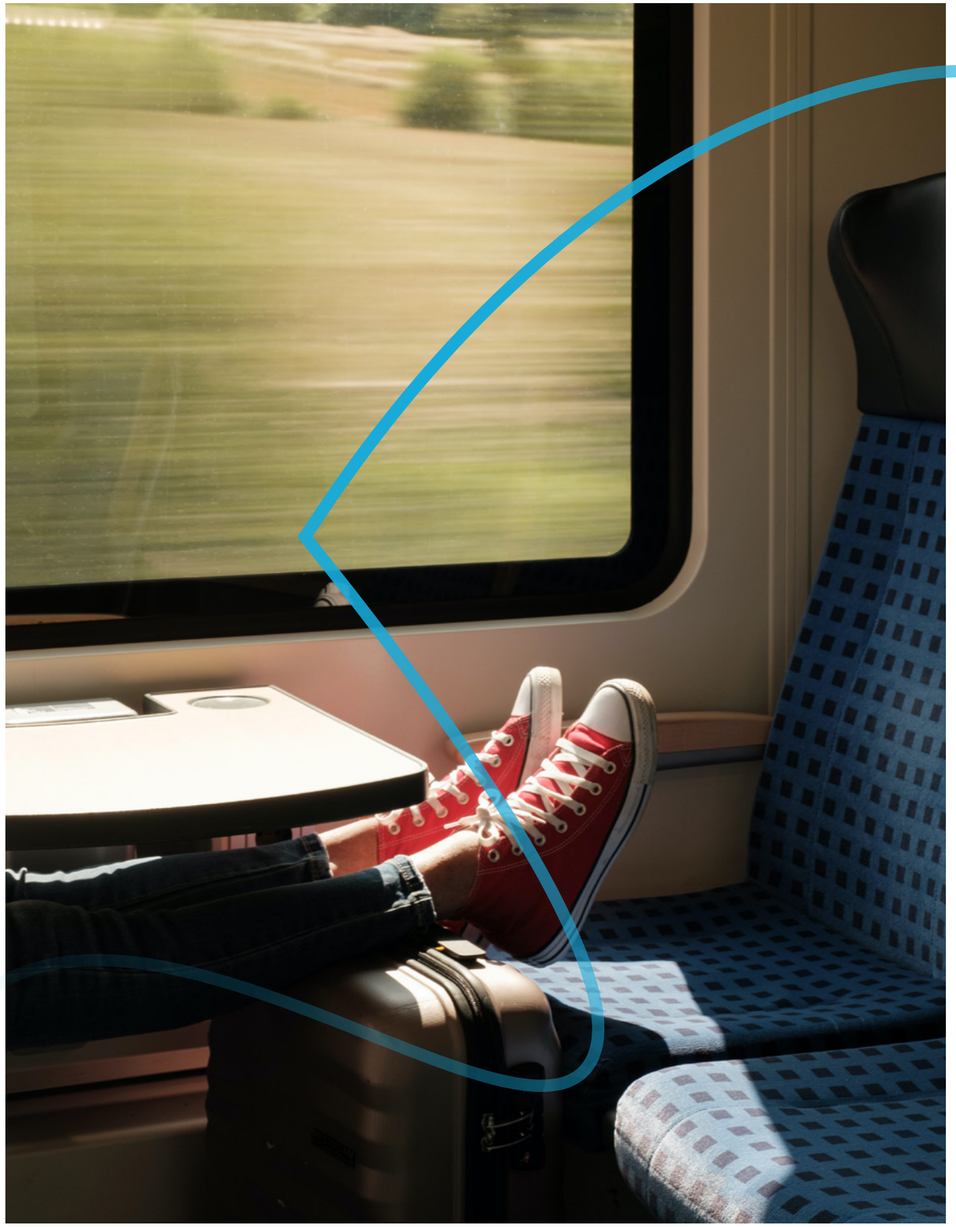
This element focuses on the emotional element of behavior, because the app should work intuitively for different types of users.

The most successful MaaS apps are the ones that make life easy for the traveler: no need to have a lot of knowledge of the transport system, trip planning, how to unlock a car or bike, how to pay different providers, etc. The app should plug and play and be self-explanatory for each user.

In addition to making it easy to plan, book and pay for the trip, the app should also help travelers when plans change. If there are delays or cancellations, or if weather conditions worsen, the app should explain how to switch to an alternative route or mode of transport. In the event of an accident, the app should also handle the insurance process.

A successful MaaS app should enable users to easily manage their personal settings and create an experience they prefer – yet this experience should be made consistent across other geographies too. The ability to use a familiar method to manage mobility anytime and anywhere creates a sense of trust and reliability that is comforting to a user – an emotional benefit that helps MaaS compete with private forms of travel such as owned cars.

New technologies can also be used to make the experience still more intuitive. Augmented reality is increasingly used (for example, by Swiss rail operator SBB) to give travelers an immediate and instinctive way of finding their way around a transport system. Virtual departure boards with real-time information and familiar payment options are clearly shown against real-world surroundings to provide clarity and ease of use to travelers.



GREEN MOBILITY:

WHY GREEN TRAVEL MEANS A CLEAN CONSCIENCE

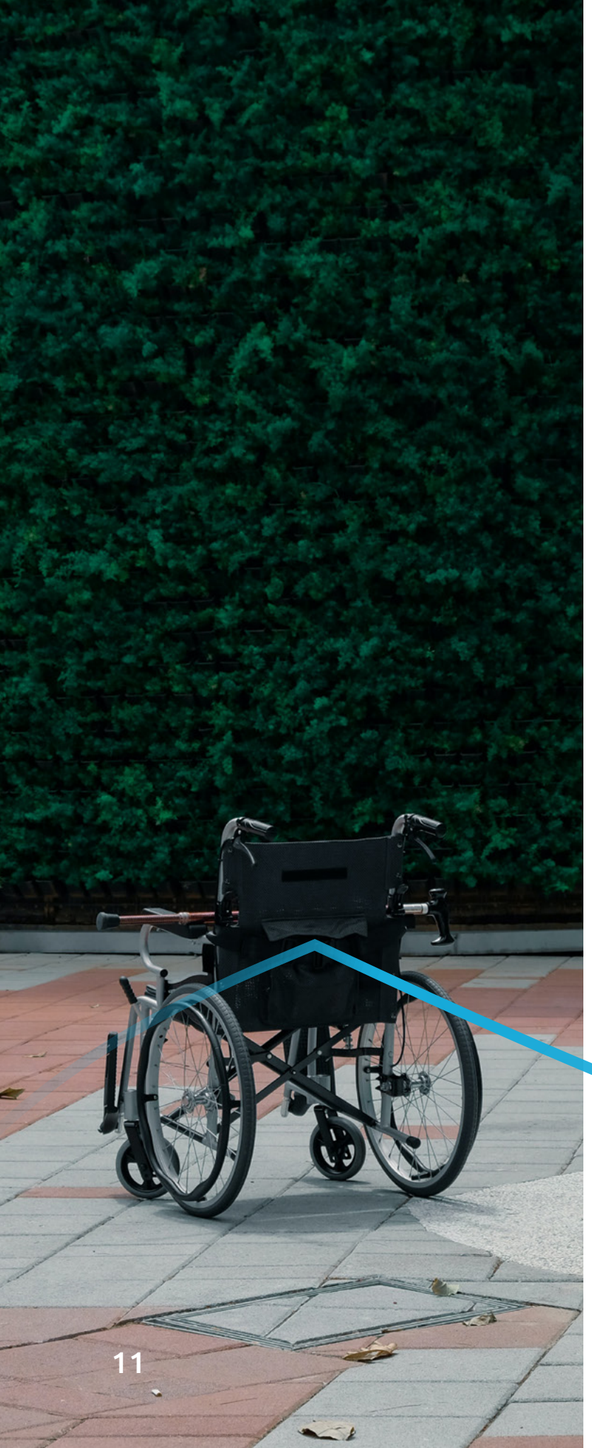
Sustainability goals require multi-modal and inter-operable transport across countries. However, achieving this greener mobility can only be achieved if MaaS is successful, starting in the major cities but eventually becoming the standard across the EU.

While citizens are becoming very conscious of the climate changes and the importance and urgency of green mobility, MaaS will help them to quantify their individual impact more accurately. Showing someone's personal level of sustainability and rewarding them for reducing their carbon footprint helps to increase the adoption of MaaS.

MaaS apps should offer travelers several options to travel and display the carbon footprint of each alternative, thus allowing travelers to make the greenest possible trip. Additionally, those who choose the most sustainable route could be rewarded with 'sustainability points', to be redeemed for enhanced services or other bonuses.

This element balances the rational with the emotional impact: people who want to travel green feel good about their choices as they know they are responsible for lower CO2 emissions.

A further factor is that many companies have already committed to carbon neutral (or even carbon negative) targets. This will encourage them to promote MaaS, since using MaaS will help them reduce the carbon footprint associated with employee travel.



INCLUSIVE MOBILITY:

MAKING EVERYWHERE ACCESSIBLE TO EVERYONE

Not everyone is aware that over 1 billion people (approximately 15% of the world's population), experience some form of disability. And between 110 million and 190 million people experience significant disabilities.

When designing MaaS, this is crucial to take into account. How do you make MaaS inclusive for people with a vision or hearing impairment? Is the option of MaaS offered for people with a walking disability? How do you support people that are less familiar with technology?

This involves taking into account issues such as the physical accessibility of a train or bus, or the time it may take them to get to the next transportation mode, or about adding voice support in the app. Making MaaS inclusive is both a societal responsibility and a way to increase the adoption of MaaS overall.

Inclusive mobility requires in-depth knowledge of disabilities and additional information about accessibility of multimodal transportation. Much of this information may be gathered through citizen engagement initiatives with certain groups of travelers (eg. elderly people or people with a disability). Once features and functionality have been identified, they must then be fully integrated into the MaaS system to create a complete, seamless experience for all users, regardless of age or physical ability.

WHO ARE THE KEY PLAYERS IN A MAAS ECOSYSTEM?

For a MaaS initiative to succeed, we know we need travelers to want to use it. But for this to happen, there must be whole-hearted and coordinated support from the various governmental and private companies who are driving the initiative.

The ecosystem can be extremely complex and will vary between geographies, but the main players are as follows:

- National governments, road authorities, cities and international cooperation. In addition to environmental benefits of MaaS, governments can also fulfill social responsibilities by offering support to low-income households with subsidized commuting costs.
- Transport service providers (TSPs) such as public transport authorities, railway companies, airlines, taxi firms, as well as providers offering bike-sharing, car-sharing, etc.
- Mobility service providers (MSPs), i.e. the players that offer the platforms and the apps that make up the technological infrastructure.
- Consumer brands, who can use MaaS communication channels for advertising or by taking part in loyalty schemes that provide discounts to MaaS users.
- Citizens, who are not only users of MaaS, but can also be providers by making their mobility assets (cars, bikes, etc.) available on a shared basis.

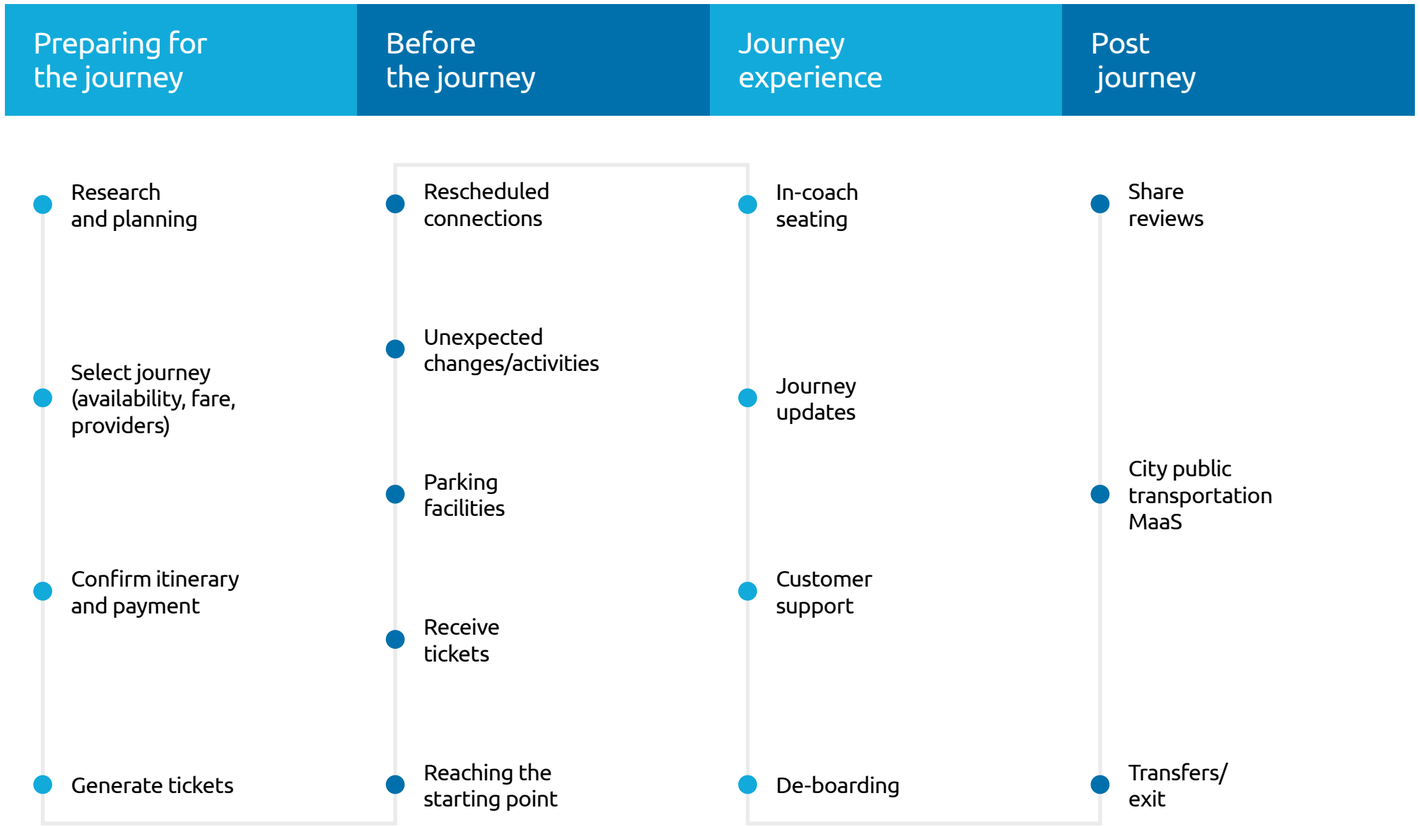
MAPPING THE MAAS CUSTOMER EXPERIENCE

The MaaS customer journey experience shown here includes a variety of mobility options with easy door-to-door journey planning and integrated payment processes.

This intelligent journey planning requires mobility options that adapt in real time to the individual traveler and the city, including dynamic pricing, personalized incentives and optimized dispersed re-routing.

From a connected asset perspective, the mobility infrastructure should be proactive and alert operators to likely physical failures or trending data anomalies in the city's mobility behaviors. Intelligent safe systems and operations connecting data silos and transport systems should provide a single, common view of mobility patterns for more efficient planning.

This entails connecting entire organizations into a common platform. Achieving this vision calls for Mobility as a Platform that becomes a system of systems, where travelers, assets, transport services providers, intelligent infrastructure providers and operators, transport data providers, public safety and city mobility services providers and regulators are coming together within a secure, trusted ecosystem.



WHY CAPGEMINI AND MICROSOFT?

Both Capgemini and Microsoft are part of the ecosystem to create the optimal MaaS experience.

From advisory services to engineering, data and systems integration, we help with all aspects of MaaS that are needed to create trust – both with travelers and between ecosystem partners. We also partner with the World Climate Council to fight climate change and have extensive programs to serve their clients in their road to becoming net zero.

Working together, using Capgemini's experience in planning, building and managing MaaS systems, and the power of Microsoft's cloud solution to enable seamless, trusted data-sharing, we offer a powerful solution for governments, cities and other organizations who aim to leverage the enormous potential of Mobility as a Service.

CAPGEMINI:

A METHODOLOGY FOR MAAS

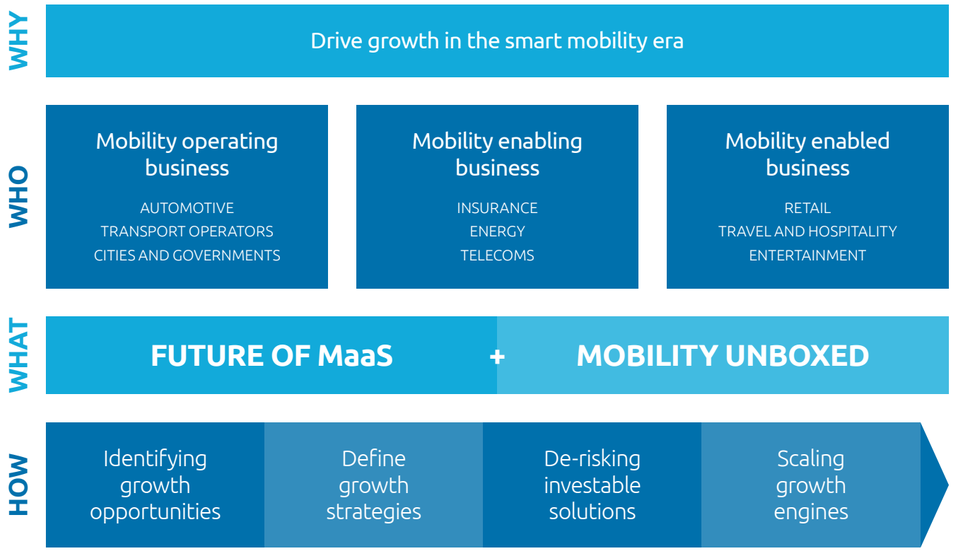
Capgemini offers end-to-end support for different types of clients and industries in the domain of MaaS.

We can help scale MaaS operations, while also ‘unboxing the potential’ of integration with partners in retail, travel and hospitality and entertainment. We support city governments in finding the right balance between serving travelers and protecting their rights and privacy. We also reduce the risks of a winner-take-all scenario, while giving enough space for businesses to flourish. Depending on the client needs, we help identify opportunities, define their strategy for growth, de-risk investable solutions and scale growth engines.

Capgemini serves many players in the field of MaaS such as Whim, Moovit, Siemens, Moovel, Free2Move, Transdev, Keolis, Ruter and rail companies such as SNCF and NS. We developed and helped implement the MaaS platform in Paris (RATP), developed control towers (or city command centers) in Brussels, Dusseldorf and Dijon, and helped develop the 2getthere autonomous bus initiative. We have also worked with other ecosystem players such as Sodexo.

The services we offer include: strategy, UX design, innovation, data analytics and data services, constructing the platform, multimodal route and price calculators, system integration (internal and external), hosting and outsourcing of systems, customer care, grid management, and managed services.

Capgemini has a tested methodology to build, develop and maintain ecosystems. With Capgemini Engineering, we also have a very strong technological engineering capability, able to explore the current data structures and standards of cities and MSPs, and build a platform where cities and MSPs can share their data. In addition to helping facilitate data sharing and data exchange, we are also working on how to visualize data to gain insights to further improve the efficiency and effectiveness of MaaS systems.



MICROSOFT:

PLATFORM AS A SERVICE

The Microsoft cloud platform, with extensive platform-as-a-service capabilities, provides a number of the building blocks necessary for creating MaaS solutions.

With Microsoft platform services, solutions can be built, assembled and scaled quickly. Power platform as part of Microsoft DevOps, for example, is a low-code/no-code tool to quickly build applications as a service provider. This platform is also a leader in the Gartner quadrant for low-code application tools.

Other powerful PaaS services that contribute to a successful offering include Azure Maps services. Many innovations need a form of maps and geospatial information, and Azure maps can offer these applications to quickly combine location intelligence with data and applications.

The Microsoft IoT platform is another powerful component for developers. Providing support for thousands of certified sensors, it enables virtually any IoT sensor or device to be used. Featuring Edge devices with integrated AI and real-time analytics “as a service”, the platform combines with Azure maps to provide both the developer and the end user with tools for IoT-based innovation.

Microsoft’s Azure digital twin offering, Digital Twin V2, is a spatial intelligence graph that can create a virtual view of almost any environment and build models between people, devices and locations. The integration, again with Azure maps and IoT, can provide tremendous added value in a variety of applications across virtually all agencies, entities and citizens.

In addition to these PaaS components, the Microsoft Azure data + AI platform is a valuable toolkit for building innovative solutions: from machine learning, knowledge mining, chatbot frameworks and a package of cognitive services, almost any solution can be offered. The Azure synapse analytics tool can be used alongside it to store, analyze and filter out virtually all available data from a platform concept.

MICROSOFT:

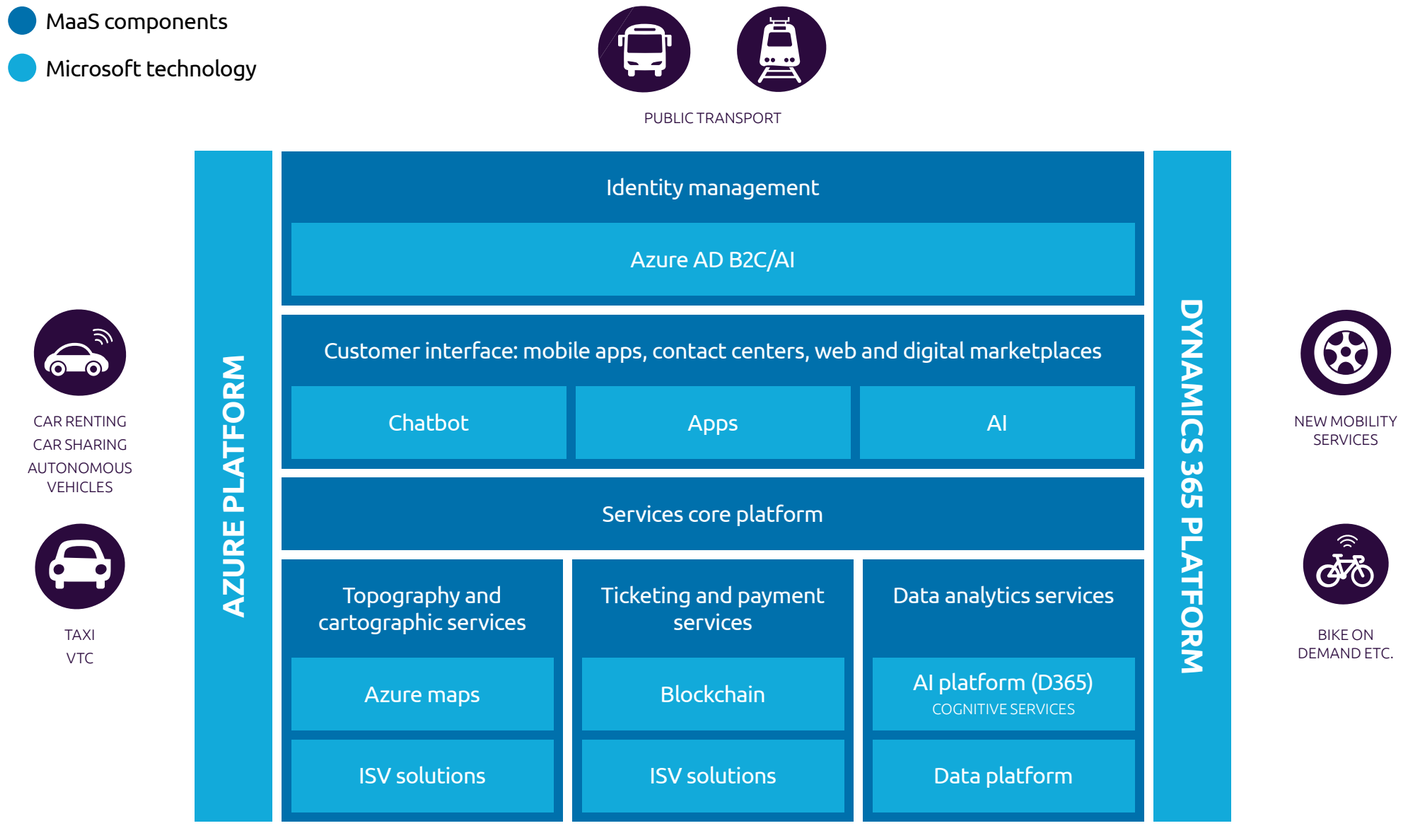
PLATFORM AS A SERVICE

With Microsoft Power Platform, non-expert users can create and share low-code apps in hours. These apps can connect to data and use Excel-like expressions to add logic and run on the web, iOS and Android devices with Microsoft Power Apps, as well as unify data from many sources to create interactive, immersive dashboards and reports.

A further asset is the Azure marketplace. This platform is, as the name implies, a location where various partner applications are made available to quickly develop a service. Conversely, well-developed successful applications can be offered through this marketplace so that they can be shared across the various governments.

In addition to providing the components listed above, Microsoft has been carbon neutral since 2012 and aims to be carbon negative by 2030 – which helps them contribute to an innovative policy that focuses on sustainability.

A MaaS reference architecture



ARE YOU READY FOR MAAS?

Get in touch and find out now

We have helped many clients to prepare for and build successful MaaS systems, but each situation is different. This is why early discussions often focus on the existing infrastructure and whether a certain city or area is “ready” for MaaS.

By working with the Technical University of Budapest, we have developed the MaaS Readiness Index (MRI), a tool that assesses the suitability of cities and mobility service providers to develop a Mobility-as-a-Service offering. We have converted the MaaS Readiness Index into a digital assessment to provide initial feedback on Maas maturity levels, helping pave the way for more detailed planning.

Want to know if you are ready for MaaS? Talk to us and find out.

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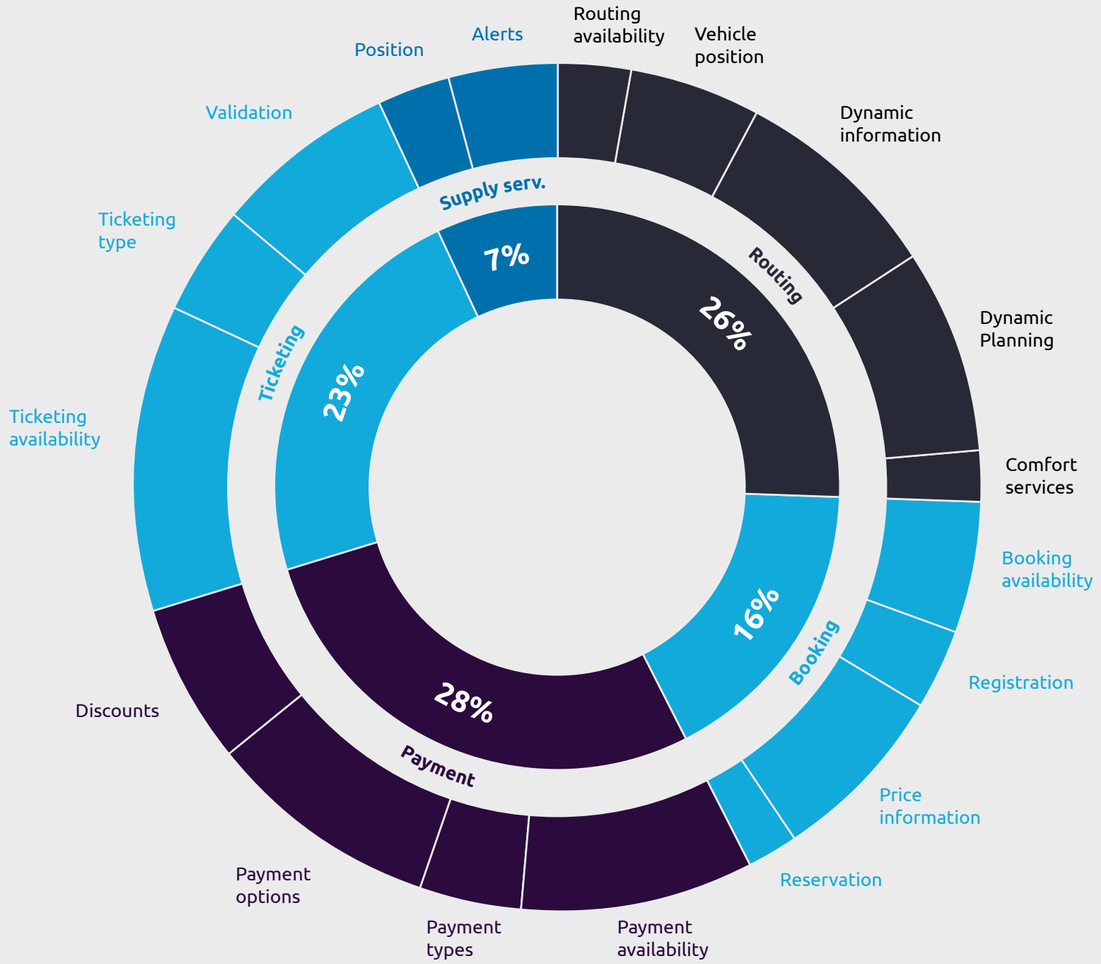

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About Capgemini

Capgemini is a global leader in partnering with companies to transform and manage their business by harnessing the power of technology. The Group is guided everyday by its purpose of unleashing human energy through technology for an inclusive and sustainable future. It is a responsible and diverse organization of over 300,000 team members in nearly 50 countries. With its strong 50-year heritage and deep industry expertise, Capgemini is trusted by its clients to address the entire breadth of their business needs, from strategy and design to operations, fueled by the fast evolving and innovative world of cloud, data, AI, connectivity, software, digital engineering and platforms. The Group reported in 2020 global revenues of €16 billion.

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