



The Innovative Mobility Landscape
The Case of Mobility as a Service
A Summary

The Innovative Mobility Landscape

The Case of Mobility as a Service

A Summary

About the International Transport Forum

The International Transport Forum is an intergovernmental organisation with 62 member countries. It acts as a think tank for transport policy and organises the Annual Summit of transport ministers. ITF is the only global body that covers all transport modes. The ITF is administratively integrated with the OECD, yet politically autonomous.

ITF works for transport policies that improve peoples' lives. Our mission is to foster a deeper understanding of the role of transport in economic growth, environmental sustainability and social inclusion and to raise the public profile of transport policy.

ITF organises global dialogue for better transport. We act as a platform for discussion and pre-negotiation of policy issues across all transport modes. We analyse trends, share knowledge and promote exchange among transport decision-makers and civil society. ITF's Annual Summit is the world's largest gathering of transport ministers and the leading global platform for dialogue on transport policy.

About WBCSD

WBCSD is a global, CEO-led organization of over 200 leading businesses working together to accelerate the transition to a sustainable world. We help make our member companies more successful and sustainable by focusing on the maximum positive impact for shareholders, the environment and societies.

Our member companies come from all business sectors and all major economies, representing a combined revenue of more than USD \$8.5 trillion and 19 million employees. Our global network of almost 70 national business councils gives our members unparalleled reach across the globe. Since 1995, WBCSD has been uniquely positioned to work with member companies along and across value chains to deliver impactful business solutions to the most challenging sustainability issues.

Together, we are the leading voice of business for sustainability: united by our vision of a world where more than 9 billion people are all living well and within planetary boundaries, by 2050.

This report addresses the current and future context for urban mobility, including the sustainability challenges ahead. It reviews how the urban mobility landscape is changing with respect to mobility operators and services. It also addresses the development and characterisation of Mobility as a Service (MaaS) as a means to improve urban mobility outcomes. Finally, it reviews a number of essential governance and regulatory challenges that stakeholders must address to create a healthy Mobility as a Service ecosystem that delivers clear benefits to people and is aligned with societal objectives.

Urban mobility is at a crossroads. On the one hand, leaps in technology, infrastructure and energy production have enabled tremendous accessibility gains over the past century, opening new horizons for billions of people around the world. More people travel, further and faster than at any other time in history. This movement has fuelled economic and social gains around the world. However, they have come at a cost, compromising safety, health, equity, efficiency and posing both local and global environmental threats – most fundamentally, for global climate change. The benefits and drawbacks of mobility are most apparent in cities. This is where we must address how to continue to enjoy the benefits that mobility offers while minimising its negative impacts.

The Covid-19 pandemic has caused immense disruption to urban mobility. The pandemic will have significant short-term and possibly medium-term impacts on transport. The extent of these impacts is uncertain, but the pandemic has reinforced the need to choose mobility policies that create resilient transport systems. A broader offer of mobility services, and deeper integration of these, will contribute to resilience by creating modularity and adaptability and by fostering cohesion among mobility system stakeholders.

The growing world population, combined with fast-paced urbanisation, will increase transport demand in cities. Total urban passenger demand is projected to grow 59% by 2030 and 163% by 2050 compared to 2015. This, even accounting for the effects of the Covid-19 pandemic. In most cities, individual motorised transport represents a significant share of all trips and the majority of passenger kilometres travelled. Globally, 51% of urban passenger-kilometres travelled in 2015 were made with private vehicles. Under all scenarios, Asia remains the highest generator of urban transport demand.

Public transport, active mobility, shared mobility and Mobility as a Service all are essential to mitigate carbon emissions from growing transport demand in cities. The ITF has looked at alternative scenarios that could deliver considerable decarbonisation of the transport sector. These scenarios suggest that, in addition to electrification, integrated land-use planning and transit-oriented development are particularly effective in reducing emissions by shifting shorter trips away from private cars. These scenarios assume strong growth in active modes, shared mobility and public transport. The pathway to lower emissions builds on increases in load factors and fuel efficiency, which contribute to halving emissions by 2050. There are limits to vehicle technology-led emissions reduction; self-driving cars and electric vehicles alone are no panacea for curbing emissions. ITF modelling indicates that new forms of shared mobility services have great potential to reduce the need for private cars and reduce emissions. These shared modes also allow for the faster adoption of clean technologies. Integration of services is an important component to realising a lower carbon future for urban transport. Enhancing the uptake of shared mobility and MaaS could contribute to 5% of overall CO₂ savings from urban mobility by 2050 compared to scenarios with less shared mobility and MaaS.

A one-size-fits-all approach to addressing the benefits and challenges of urban mobility cannot work. People's mobility needs vary by geography and population. Global regions display significant differences in transport mode shares and travel behaviours. Urban areas differ in levels and distribution of wealth, as well as in the scope and scale of technology deployment and uptake. Mobility services deployed in these different contexts will not have the same impact on travel demand; they may give rise to either synergies or competition among modes, depending on local conditions. A number of factors, including

population, income, density and the presence of, and interplay between, public transport and informal transport services, will define the impact of new mobility services.

A new approach to mobility encompassing, but moving beyond sole dependence on, the car is necessary. Everyday mobility is the result of interconnected, durable and deeply embedded factors that extend far beyond the confines of the transport sector or the urban context. This is especially true when considering the role of the car in urban areas. Addressing global urban mobility challenges will require rethinking the link between urban mobility and car use. This will not be straightforward. A significant share of the world population aspires to having access to a car, though most still do not. Conversely, countries that motorised earlier and where car penetration rates are high are starting to shift away from a singular focus on car use in urban areas.

The mobility landscape in cities is evolving rapidly and is characterised by new layers, more choices and more digital components. Established incumbents and emerging mobility services share the same urban mobility landscape, leading to synergies as well as tensions. Most cities lack a unified framework addressing all urban mobility services, exacerbating tensions.

Efforts to change mobility must account for entrenched practices and system inertia. It is unlikely that simply offering an alternative to existing practices will trigger a shift in individual behaviours or a change in macro-level trajectories. The “system of provision” that results in the current car-orientated urban mobility practices is deeply embedded and must be accounted for in seeking to facilitate the uptake of new mobility options. Effectively charting a way forward will involve an arbitration among different views held by urban mobility stakeholders. These differing views reflect, among others, the optimism some have for technology-led approaches – electromobility in particular –, the prominence of the role others believe collective transport must play in urban areas, and the emerging view that better planning can maintain access to opportunities in urban areas with lower overall travel volumes.

Shared mobility is not necessarily green mobility. Calibrating the regulation of new mobility services

requires an understanding of the external impacts these services impose. The operational profiles of mobility services, in addition to the vehicle technology used, has a strong effect on the sustainability impacts of these services. Ride sourcing services and taxis have higher CO₂ emissions per passenger-kilometre than all other options. Shared electric micromobility and motorised moped services have a much lower impact than ridesourcing, taxis and individual car use; they are about on par with private mopeds and bus-based public transport. Privately owned bicycles, e-bikes and e-mopeds have the lowest lifecycle emission profiles per passenger-kilometre, followed by various forms of rail- or bus-based public transport (at typical load factors) and privately owned mopeds.

Total urban passenger demand is projected to grow 59% by 2030 and 163% by 2050 compared to 2015.

The impact of the broad uptake of new mobility services is directly linked to whether these substitute or complement other services. The evidence base for this is still developing but these effects are highly context-dependent. Ridesourcing likely contributes to increased vehicle travel and congestion under current contexts and models. Other interaction effects between ridesourcing and other modes are not clear but ridesourcing seems to compete with, rather than complement, public transport. Shared electric micromobility trips mostly replace walking, public transport and taxi trips. These are important effects to bear in mind when considering how and where it makes sense to integrate such forms of

transport into the urban mobility mix.

Mobility as a Service promises significant benefits from integrating mobility offers. It does so by proposing a more user-centred mobility paradigm to travellers, by facilitating a more efficient use of underutilised transport assets and public space, and by creating new opportunities for firms and other actors to find and develop new markets.

Mobility as a Service should be seen as a distribution model for mobility, not as an app nor as a travel mode. MaaS is a model for supplying passenger transport services through a digital customer interface that allows users to source services from a variety of operators, either privately or publicly operated. At its core, MaaS seeks to provide a smooth and reliable customer experience. MaaS involves identifying clients and operators, gathering

information about the availability of services and capacity, and managing payment and revenue allocation within a common digital framework. It requires the production of mobility services by public and private actors, joining these into an integrated offer and a means to communicate this offer to potential travellers.

Mobility as a Service is characterised by levels of operational, informational and transactional integration.

MaaS is an evolving concept. Its implementation falls along a continuum of operational, informational and transactional integration. MaaS implementations and ecosystems may evolve as they grow or achieve greater integration. There is considerable heterogeneity in MaaS service levels and offers – sometimes even in the same market. MaaS integration need not cover all the mobility market; there may be models for MaaS that only provide partial integration within these three domains or full integration only among some mobility service providers.

Mobility as a Service may enable new value creation in low-margin urban mobility markets. Urban mobility is a capital-intensive, low-margin network market in its current form. Current market structures limit the amount of economic value commercial actors can capture while still delivering on public policy outcomes. Up-front investments in infrastructure and rolling stock, the provision of networked services that cover a broad geographical area and the cost of meeting high environmental and social standards while offering affordable and universal coverage all put pressure on margins. This pressure leaves little room for MaaS providers to find sustainable revenue streams under current market configurations. Commercial success for MaaS providers will require creating new value propositions. This value may be in addition to what is currently in the market and may be derived from people or employers who are willing to pay for the benefits MaaS would confer to them. It may also come from reducing costs for public authorities or it may extend to non-mobility offers that allow operators to achieve remunerative margins leveraging multiple revenue streams.

Mobility as a Service business models are evolving.

Business models for MaaS are nascent, involve interactions among settled service delivery models and emerging ones, and are developing under unclear, longer-term market dynamics and regulatory frameworks. They also create a new category of mobility actor – the MaaS service provider or aggregator – which has implications for the organisation and regulation of these markets. The economics and business models for mobility service

providers are better understood than those of MaaS aggregators.

Multiple MaaS market configurations exist and it is too early to tell what final configurations the market may have. These configurations cover business-to-consumer, business-to-business and business-to-government-to-consumer interactions. Of these, the business-to-business configuration seems to have a more immediate pathway to achieving returns but requires government action with respect to company mobility management policies.

Market organisation models for MaaS may involve closed and vertically integrated services, or “walled gardens”, that may deliver innovation but stifle competition. A Public MaaS Aggregator model may leverage strong public transport services but comes with risks of protective incumbency positions. A model based on open but publicly regulated back-end data sharing framework serving the entire MaaS ecosystem (or a platformless ecosystem built on direct and instantaneous transaction clearing leveraging distributed ledger technology) may provide a common data infrastructure while enabling stakeholders to create their own customer-facing offer. Other models still may develop as the market matures.

People must choose Mobility as a Service over other travel options if it is to grow.

Individual characteristics matter, though they alone do not determine travel choices. MaaS uptake should also address cognitive decision-making processes, real or perceived mode and service attributes, and the framing context for travel decisions. Evidence suggests that it may be unreasonable to expect that MaaS will provide a compelling substitute to car ownership to a broad segment of the population at the outset. Rather, it may be that MaaS may serve as a complement to prevailing car use by providing a real alternative for some, but not all trips, made by car.

Mobility as a Service alone is not sufficient to deliver on the public policy aspirations it inspires.

MaaS alone, without a supportive built environment and high-quality public transport system, will likely not succeed in changing behaviour. On the other hand, improving the built environment and transport system may lead to changes in travel behaviour even without MaaS. Furthermore, and paradoxically, when the built environment and the level of quality of public transport and active travel modes are high, there are likely smaller potential returns on investments in support of MaaS, thus limiting the commercial appeal of deploying such services.

The outlook and scaling challenges for Mobility as a Service differ across regions. Good, quality public transport is not as widespread in North America as it is in Europe or in some Asian cities. This will likely shape the rollout of MaaS in North America. The conflation of Mobility as a Service into a broader “service as a service” ecosystem and “super-apps” is rapidly developing in Asia. Another MaaS-related development in Asia is the uptake of diversified and hybrid passenger-goods delivery mobility services based on motorised two- and three-wheeled vehicles. The deployment of these services highlights the tension that exists between the affordability of public transport systems and the limited scope for public transport to provide adequate levels of access in sprawling and congested cities. Japan presents a unique case where national government policy has sought to explore and adapt different MaaS models to specific targeted outcomes. The motivations for seeking to develop MaaS in Japan are diverse and typically go beyond simply wanting to mitigate the traffic, equity and environmental impacts of car use in urban contexts.

Mobility as a Service will require a framework that encompasses regulation of mobility services and operators and digital services as well as a supportive policy framework. The regulation of MaaS ecosystems involves two components – the regulation of mobility services and operators, and the regulation of digital platforms and MaaS aggregators. The former is a challenging, yet familiar terrain for transport authorities. But many aspects of the digital market regulation are uncharted at the regional and local levels, where much of the regulatory framework for MaaS will be set. A well-functioning market will also require a supportive policy framework and flanking measures (e.g. addressing data regulation, pricing, urban access management and adapted multi-modal infrastructure).

Mobility as a Service requires a regulatory foundation that enables innovation and delivers on policy outcomes. MaaS is an evolving concept that has the potential to create value for people and to deliver on public policy outcomes while enabling healthy market opportunities for various

stakeholders. It requires adapted forms of regulatory guidance but where and how much has yet to be determined. In this context, it seems premature to talk about what the regulatory framework should look like as both MaaS and its regulation is likely to evolve over the near term. What that regulatory framework will eventually look like will differ across countries and urban contexts. Nonetheless, MaaS regulation should be guided by principles that are tested and well understood in other, analogous markets, even though their direct transposition to MaaS may not be suitable without adjustment.

Aspects of digital service markets in Mobility as a Service raise challenges that mobility regulation has yet to address.

There are aspects of the digital economy that mobility regulation has yet to address effectively. These relate to characteristics of digital markets including extreme returns to scale, network externalities and incumbency advantages, the role of data and the regulation of digital platforms. Some of the competition policy risks that stem from poorly addressing these issues in regulation are somewhat tempered by the fact that MaaS services have physical components (vehicles,

infrastructure and their uses) that are regulated. Nonetheless, the regulation of MaaS aggregator services will require specific approaches.

Revenue sharing in Mobility as a Service markets is difficult. Revenue sharing models for public transport are not straightforward. There are risks that strong lobbies representing incumbents may resist integration. Revenue sharing in a MaaS ecosystem appears substantially more complex than revenue sharing among public transport operators. Furthermore, the fairer an attribution model, the more complex and expensive it gets. The diversity of business cases operating models among mobility service operators contributes to diverging interests in key areas. Revenue attribution models that could guarantee an acceptable distribution would likely be inefficient and expensive. Service providers’ willingness to engage in such schemes is limited by the tight profit margins of transport services.

MaaS alone, without a supportive built environment and high-quality public transport system, will likely not succeed in changing behaviour.

A way forward

Anchor the governance of Mobility as a Service in a strategic vision, applied to the whole functional urban area and informed by effective digital monitoring. MaaS should be integrated into a broader vision addressing public welfare, transport and urban development outcomes. This vision would help define the strategic outcomes to which MaaS contributes. Sustainable Urban Mobility Plans in Europe and the comprehensive MaaS pilot assessment process in Japan are examples of the vision required. This strategic vision should extend to the effective urban mobility catchment area, which may require adjusting institutional responsibilities across administrative boundaries. Finally, MaaS governance should be informed by a comprehensive mobility-monitoring framework that not only includes but extends beyond digitally-enabled mobility services.

Seek greater understanding of how Mobility as a Service can add value for the user. Several MaaS market configurations have the potential to deliver value to users though commercially viable business cases are still elusive. For example, in Belgium, companies are required to offer “mobility budgets” to employees. This regulation has facilitated the uptake of Business-to-Business MaaS in the country. In another example, Japan has several MaaS offers that focus on tourist markets. “Services as a Service” type models have also appeared, incorporating the MaaS offer into wider lifestyle services focused on shopping or banking. These user-focused models could serve as a starting point for better understanding what constitutes viable mass-scale MaaS models and the ways in which these create value for users.

Guide Mobility as a Service where necessary to achieve agreed societal outcomes. Public authorities should monitor and retain oversight of the MaaS ecosystem and guide it, if necessary, to deliver on public policy objectives. This may mean that public authorities adapt their governance practices to address specific risks that emerge in digital markets. In an environment where MaaS becomes the main interface to access mobility, public authorities will need options allowing them to ensure that societal outcomes are met. This will include things like ensuring that MaaS platforms are operated fairly and adapted data governance rules implemented.

Adopt a flexible and light-handed regulatory approach towards Mobility as a Service platforms. Given the

substantial potential benefits of MaaS for accessibility and mobility, transport authorities should regulate only as necessary to facilitate the development of MaaS in line with public policy goals. Authorities should carefully monitor that MaaS developments do not hinder policy objectives. Regulatory or other appropriate interventions may be needed to ensure that the development of MaaS contributes to, rather than impedes, sustainable urban mobility and accessibility policies. In a MaaS system with commercial actors, a flexible and light-handed approach is likely to be required if the commercial viability of MaaS models is not to be undermined as the market matures. Regulators should only adopt new regulatory requirements where a clearly identified public policy justification exists.

Adopt a predictable regulatory approach and allow for evolution. Trying to legislate ex-ante or too early in an evolving and maturing MaaS ecosystem risks locking in regulation that is not fit for purpose, or suppressing innovation entirely. A flexible approach to regulation, with built-in review periods and robust monitoring requirements, allows space for the market and its actors to mature while still enabling the evolution of the ecosystem. In parallel, mobility operators and MaaS providers require legal certainty and a clear and dependable regulatory framework to make investments in low-margin mobility markets. Regulators should facilitate the deployment of MaaS ecosystem building blocks – like common digital identifiers, interoperable data exchange standards and data sharing rules that support market development – rather than trying to define a comprehensive and definitive MaaS model. They should also work to increase predictability around how, and under what conditions, regulatory frameworks might evolve.

Enhance public transport authorities’ and operators’ ability to negotiate terms of sale and re-use of tickets with Mobility as a Service providers. In order to facilitate mode shift from private cars, the MaaS ecosystem should make public transport as accessible as possible. The relationship between public transport and MaaS can be symbiotic if the MaaS platform is able to increase public transport ridership. Public transport authorities and operators could benefit from greater freedom to negotiate fair and reasonable terms of sale and re-use of public transport services with MaaS providers. These negotiated outcomes

should allow public authorities to retain their ability to achieve policy goals via their fare policies. This will require specific competencies on the part of public transport authorities and operators as well as oversight to ensure that negotiated outcomes do not erode public policy outcomes.

Base data sharing frameworks on the principle of “as open as possible, as closed as necessary”. Some data must be shared for MaaS to work. Setting a transparent and fair basis for this sharing helps market actors build trust in the system. Minimum data sharing requirements can help limit the amount of data required for participation in the market. Conditional reciprocity should be part of data sharing frameworks so that parties in the market gain some value in return for the data they share. Open access to market players should be encouraged as much as possible, but there must be fair commercial terms.

Build data portability into the MaaS ecosystem by default.

Digital service markets depend greatly on data. This raises the risk of data-related lock-in of consumers to specific services providers. Enforcing data portability requirements in the MaaS ecosystem facilitates consumers switching from one service to another or using multiple services. Data portability mitigates the competition policy risk of consumers being locked into one service provider only. As there is no natural incentive for any single operator to push for this, there is a clear role for public authorities to define minimum data portability requirements. These requirements should be limited to data about the data subject (as defined in the EU General Data Protection Regulation) but not to data inferred about the subject and should be conditioned on data subject consent.

Consider common building blocks for sharing data. While a single, mandated standard for data exchange may prove restrictive, the absence of a common syntax hinders interoperability. The lack of a common syntax could also create a financial burden on smaller operators to comply with larger providers’ bespoke standards, or impose costs on all market actors to comply with multiple standards. Some form of standardisation and shared definitions would help to overcome or mitigate these risks. In the absence of a single standard, ensuring that syntaxes share similar functional architectures enhances interoperability.

Establish data reporting requirements that are proportionate and targeted to outcomes. Governments have the power to compel stakeholders’ actions, by setting conditions on market entry and exit or by imposing penalties, for example. This should be counter-balanced

with purposeful and limited data reporting mandates that are aligned with achieving specific public policy outcomes. Doing so will build trust between partners who are assured they are only being asked to share data that is necessary and proportional to its end-use. This will require a mapping of what data is needed, for what action and for how long it must be retained.

Adopt complementary policies in other areas to ensure that the Mobility as a Service ecosystem contributes to policy outcomes. MaaS is not a silver bullet for mode shift to sustainable alternatives from the private car. Improving existing infrastructure and services, and complementing the “pull” of MaaS with “push” policies in other areas are necessary preconditions to MaaS’ broad-scale success. Users need a reliable, high-quality transport system as a baseline before the convenience of using it becomes relevant. Users would further benefit from knowing what are the real costs involved in the available transport choices. Authorities could introduce complementary measures that more clearly signal the externalities of driving for drivers – e.g. via congestion-pricing, environmental charges or differentiated parking prices. These complementary policies foster the development of viable MaaS business models and their contribution to improved welfare outcomes.

Invest in the built environment and interchange facilities. MaaS can only be as attractive as the transport services that underpin it. High-quality services are needed, but so are comfortable, safe and attractive surroundings, if people are to be enticed out of private cars. In particular, the role of interchange hubs and facilities are key. Authorities should recognise this as part of their planning in support of MaaS.

Public authority skill sets will need to evolve to improve their capacity to regulate and assess digital markets. Local and transport authorities have primarily been concerned with the management of physical networks. Digitalisation, including that brought on by MaaS, challenges these skills and requires new institutional capacity to better manage digital markets. These skills include better digital literacy, more data-driven and flexible decision making and a more commercial mindset. Up-skilling may also be required for SMEs including taxis and bus service providers when these have not already digitised their service offering.

The Innovative Mobility Landscape

The Case of Mobility as a Service
A Summary

This brochure summarises the findings of the homonymous report, which reviews changes in today's urban mobility landscape and the potential of Mobility as a Service (MaaS) to improve travel in cities. For more information, visit <https://www.itf-oecd.org/innovative-mobility-landscape-maas>

International Transport Forum
2 rue André Pascal
F-75775 Paris Cedex 16
+33 (0)1 73 31 25 00
contact@itf-oecd.org
www.itf-oecd.org



Funded by  wbcSD