



# Solving the Mobility Challenge in Megacities



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# Solving the Mobility Challenge in Megacities

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## AT A GLANCE

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The migration of the global population from rural to urban areas is accelerating. By 2030, over 750 million people will inhabit a megacity (containing at least 10 million residents). This urban population expansion—coupled with rising car ownership and aging infrastructure—is placing transport networks under increased strain.

### **INTEGRATED NETWORKS**

To solve their transportation problems, cities will need to orchestrate the mobility ecosystem and create more integrated and efficient networks. By coordinating the activities of different players, they will bring order to the urban transport chaos. But to deliver a truly effective solution, planners must first understand what consumers want from their transportation system.

### **CONSUMER PRIORITIES**

BCG questioned more than 2,000 people in Beijing, Boston, London, and Moscow in late 2019. We found that consumers want solutions that enable them to be more productive, offer greater independence, and are environmentally sustainable. While COVID-19 has altered consumers' short-term mobility decisions, we believe our findings will hold true over the medium to longer term. To create enduring transport systems, orchestrators need to place these priorities at the heart of their plans.

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**U**RBAN TRANSPORT NETWORKS IN megacities from Los Angeles to Delhi are close to the breaking point. And many of the new mobility modes that were supposed to fix fundamental issues, such as traffic congestion or air pollution, and improve quality of life are instead compounding these problems or creating new headaches for city planners.

Around the world, megacities are trying to balance the benefits and drawbacks of these new modes of transport. China opened its cities to bike sharing in order to make urban transport systems greener. But authorities in Beijing were forced to restrict the use of shared bicycles after their huge popularity resulted in discarded vehicles clogging up already busy city streets. Several megacities, including Paris and Singapore, have banned the use of electric scooters on sidewalks following pedestrian collisions and fatalities.

Despite these challenges, e-scooters, ride hailing, and other emerging mobility modes that have the potential to tackle city problems are set to be essential components in the urban transport system of the future, gradually replacing automobiles.

But urban mobility will continue to deteriorate as long as most private companies are allowed to pursue their profit-oriented goals unchecked. Virtually all megacities urgently need an orchestrator to bring order to the transport chaos. Municipal authorities will have to take some responsibility for this. But private players can play an important part too.

Whoever takes the lead in orchestrating urban mobility must ensure that public and private operators in the fragmented mobility ecosystem work together effectively. The orchestrator must also understand what consumers truly want from their transportation system.

Boston Consulting Group's in-depth survey of more than 2,000 people in Beijing, Boston, London, and Moscow, conducted prior to the COVID-19 outbreak, discovered that consumers want transportation solutions that enable them to multi-task, allow them to use their time more productively, and are consistent with their values. Although the pandemic has dramatically changed consumers' transportation decisions in the short term, we believe that our survey findings will hold true over the medium and longer term once the novel coronavirus has been brought under control. To succeed in creating viable and sustainable transport systems, orchestrators must place these key consumer priorities at the heart of their plans.

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Virtually all megacities urgently need an orchestrator to bring order to the transport chaos.

## The Urban Mobility Challenge

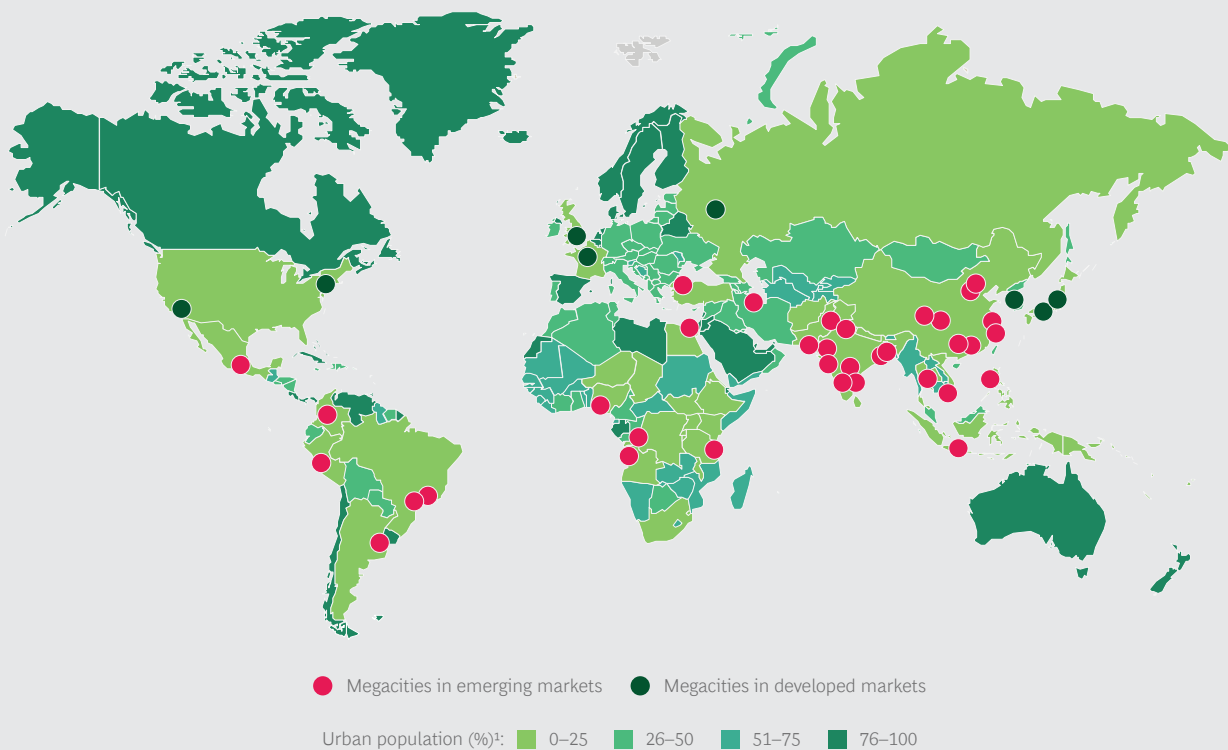
Urbanization is continuing at a rapid clip. By 2030, the United Nations estimates that megacities (metropolises with at least 10 million residents) will be home to more than 750 million people, a 35% increase from today. Meanwhile, cities with over 1 million inhabitants are projected to have an aggregate population of 2.3 billion people, with much of that population concentrated in emerging markets. (See Exhibit 1.)

Growing populations, aging and inefficient transport systems, and rising car ownership in the world's biggest cities are leading to greater congestion and reduced productivity. According to the World Economic Forum, the number of cars worldwide is set to soar in the decades ahead, climbing from 1.1 billion in 2019 to 2.0 billion by 2040. Inadequate transport systems are also a significant cause of poor health (from emissions and road accidents) and exacerbate social inequality in cities by restricting access to education, jobs, and health care.

The answer to urban transport problems was supposed to be on-demand, shared mobility solutions. But in the absence of municipal intervention, many cities today

### EXHIBIT 1 | Megacities Are on the Rise Worldwide

By 2030, 35 out of the 43 megacities will be located in emerging markets



Source: UN 2014 World Urbanization Prospects.

Note: A megacity has a population of at least 10 million inhabitants.

<sup>1</sup>Shows the urban population as a percentage of a country's total population.

are swamped with rival offerings as multiple players compete for market share. This state of affairs has resulted in significant private-sector investment and greater choice for consumers but has not produced better transport systems. Instead, urban mobility has deteriorated owing to the overabundance of modes.

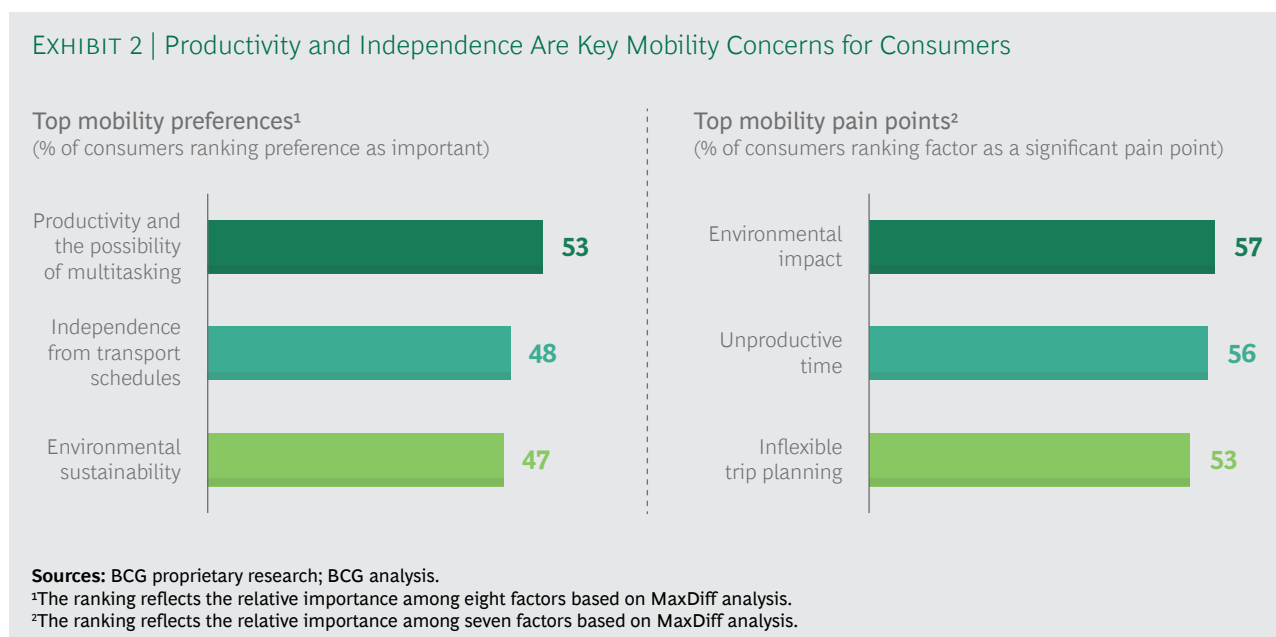
Creating an effective, integrated urban mobility system starts with understanding consumers' expectations. To analyze what consumers want from urban mobility—and where transportation systems are failing to deliver—BCG asked survey respondents in our four cities about their mobility priorities in late 2019.

Our findings show that, first and foremost, consumers want the following from their transport experience: mobility that enables them to be productive and multitask during their journeys, independence from rigid schedules so that they can travel when they want, and solutions that are environmentally sustainable. These preferences are reflected in the main pain points that consumers said they encounter when they travel, underlining the gap between consumer expectations and reality. (See Exhibit 2.) Pollution and congestion, both direct impacts of having too many vehicles on the road, were also seen as major mobility pain points.

Significantly, most respondents said cost of travel, ease of use (for example, simple ticketing processes), and comfort are less important to them than the three preferences above. This finding is likely to come as a surprise to many mobility operators and city planners.

## How New Mobility Modes Shape Up

Emerging mobility options like ride hailing and micromobility are an improvement on traditional cars and mass transit when it comes to meeting consumers' mobility priorities. But they solve only some user pain points.



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Cost, while an important consideration, is not the primary concern for consumers.

Consumers are still forced to make tradeoffs. For example, ride-hailing services allow riders to travel when they like and be more productive in transit. Most operate with conventionally powered vehicles, however. Provided the weather is fair, micro-mobility options such as shared e-scooters offer consumers greater independence and an enjoyable, leisurely travel experience. But they too face sustainability challenges arising from their relatively short lifespans as well as the need for vehicle collection and charging.

The popularity of these new transportation modes also supports our finding that cost, while an important consideration, is not the primary concern for consumers. They are often willing to pay a premium to secure a means of transport that meets their preferences better than traditional mobility modes. Naturally, price still counts: riders are prepared to adjust their transport spending but are not willing to pay several times more. The lower the premium, the greater the number of consumers that will switch modes.

Viewed through the lens of our survey findings, new mobility options such as ride hailing and e-scooters are not an effective solution for urban mobility problems on their own for two reasons: they are typically priced at a level well above that of traditional modes and meet only some, not all, consumer priorities. Consequently, in the city of the future, an orchestrator will still be needed to put the interests of consumers first and impartially coordinate the activities of mobility operators in order to produce the best overall outcome.

## Car Ownership and Changing Priorities

Contrary to the often touted shift away from car ownership that dominates press coverage and public debate, our research discovered a growing desire to possess an automobile among our respondents: 37% indicated that they had become more willing to own a car over the past 12 months, while only 12% were less willing to own one. The figures were even more marked for existing car owners. (See Exhibit 3.)

But by digging a bit deeper, we found some good news for critics of cars. The top reasons that our respondents gave for owning a car were practical concerns (such as speed and flexibility) and necessity due to a lack of better alternatives. Less than one-quarter of respondents cited personal preferences (including emotional attachment, the car's importance as a status symbol, or the joy of driving) as a key reason for car ownership. This suggests that consumers are willing to give up their automobiles provided that cities create more effective transportation systems (that are better at meeting users' mobility priorities) to take their place.

Because our survey was conducted before the COVID-19 outbreak, it does not reflect potential shifts in consumer sentiment driven by the pandemic. Over the next year or so, we expect consumers to be more inclined toward car ownership because private cars offer greater protection against the virus than shared forms of mobility. But in the longer term, consumers will favor transport solutions that support their core values.



### EXHIBIT 3 | Consumers Favor Car Ownership for Practical Reasons, Not Personal Preferences

Motivations for car ownership  
(% of consumers)<sup>1</sup>



**Practicality**  
(e.g., speed, flexibility): **47%**

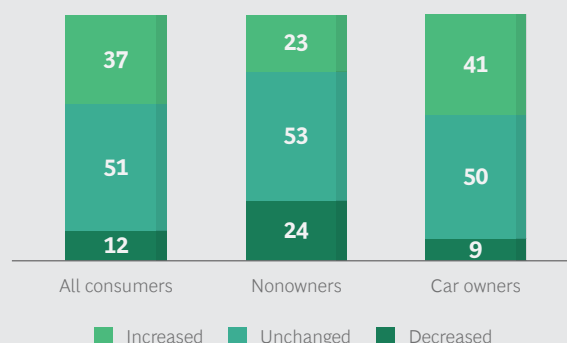


**Necessity**  
(e.g., a lack of alternatives): **45%**



**Personal reasons** (e.g., an emotional attachment to cars, the joy of driving): **23%**

Willingness to own a car  
(% of consumers)<sup>2</sup>



Source: BCG analysis.

<sup>1</sup>Respondents were asked what prevents them from giving up their car and asked to rank their three most important reasons.

<sup>2</sup>Respondents were asked how their willingness to own a private car had changed over the past 12 months.

## What Our Findings Mean for Industry Players

Our research has implications for mobility players across the board. The knowledge that multitasking is more important to consumers than a comfortable seat can be useful for vehicle designers, whether they are creating subway cars or self-driving taxis. By prioritizing high-speed internet connectivity or sound-insulating seats offering increased privacy, they could gain a competitive edge over rivals.

The demand for greater productivity could also provide a boost for mass-transit operators in cities' strategic transport plans, since the inconvenience of rigid travel schedules becomes less important to riders if they can get work done or use media while traveling. But the relatively low importance of cost to consumers means that public transport players should not be complacent. They could face stiff competition if ride-hailing firms—which already provide better convenience, privacy, and connectivity—lower their fares.

Automotive OEMs are using new technologies to meet some top consumer preferences. For example, improvements in drive trains are making conventional vehicles more environmentally sustainable. At the same time, the number of electric vehicles is increasing. But fundamental changes in how transport systems are organized will be needed if they are to truly deliver what consumers want.

## The Increasing Fragmentation of Mobility Ecosystems

Cities are not just swamped by new offerings and players. A fundamental shift in transport is underway that has big implications for how mobility ecosystems function. As recently as 2017, each player had a clearly defined role: automotive OEMs made their money selling personal vehicles and components, other private companies operated taxis or provided adjacent transport solutions such as bikes and scooters, and city authorities operated mass-transit and traffic management systems.

But that's starting to change. In 2017, the sale of vehicles powered by internal combustion engines still accounted for a large share of the value pool in personal mobility. Fast forward to 2035 and we expect to see a shift in profitability from traditional areas such as new car sales, parts, and maintenance to on-demand mobility, data, and connectivity. The impact: OEMs and tech players will increasingly compete in the same markets.

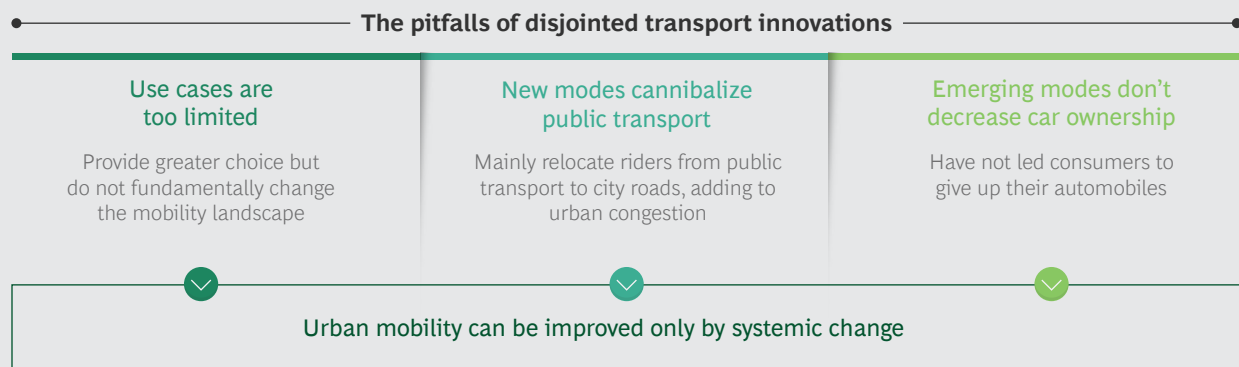
We expect new business models and technology innovations, including shared autonomous vehicles, to further disrupt urban mobility in the years ahead, eroding the viability of traditional models and fragmenting mobility ecosystems. As part of this transformation, urban mobility solutions will be delivered and consumed as a service via digital devices, accelerating the shift away from personal-vehicle ownership (our survey findings already suggest that consumers are open to new forms of transport provided the alternatives meet their priorities). But despite these trends, mobility infrastructure in megacities will come under increasing strain from the weight of surging populations, rising car numbers, and chronic underinvestment—unless cities intervene to stop the rot.

All these factors will pressure municipal authorities to step up and create more integrated and coordinated urban transport solutions. The lack of systemic direction is a key reason that the influx of new mobility modes into cities has increased the complexity but not the overall performance of today's urban transport. (See Exhibit 4.)

## A Need for System-Level Change

The key to solving the urban mobility challenge is to imagine a city's transport network as an ecosystem that has an orchestrator at its center. The orchestrator will impose order on the system by deciding who can play, what role each player should have, and what the rules are. It will identify the optimal mix of different mobility modes, create an overarching vision, and set target KPIs (including travel times, emissions, and safety levels). The leaders in urban mobility will differ by region. In some areas, the orchestrator may take the form of a public-private partnership or it

EXHIBIT 4 | New Modes Add Complexity but Don't Improve the Performance of Mobility Ecosystems



Source: BCG analysis.

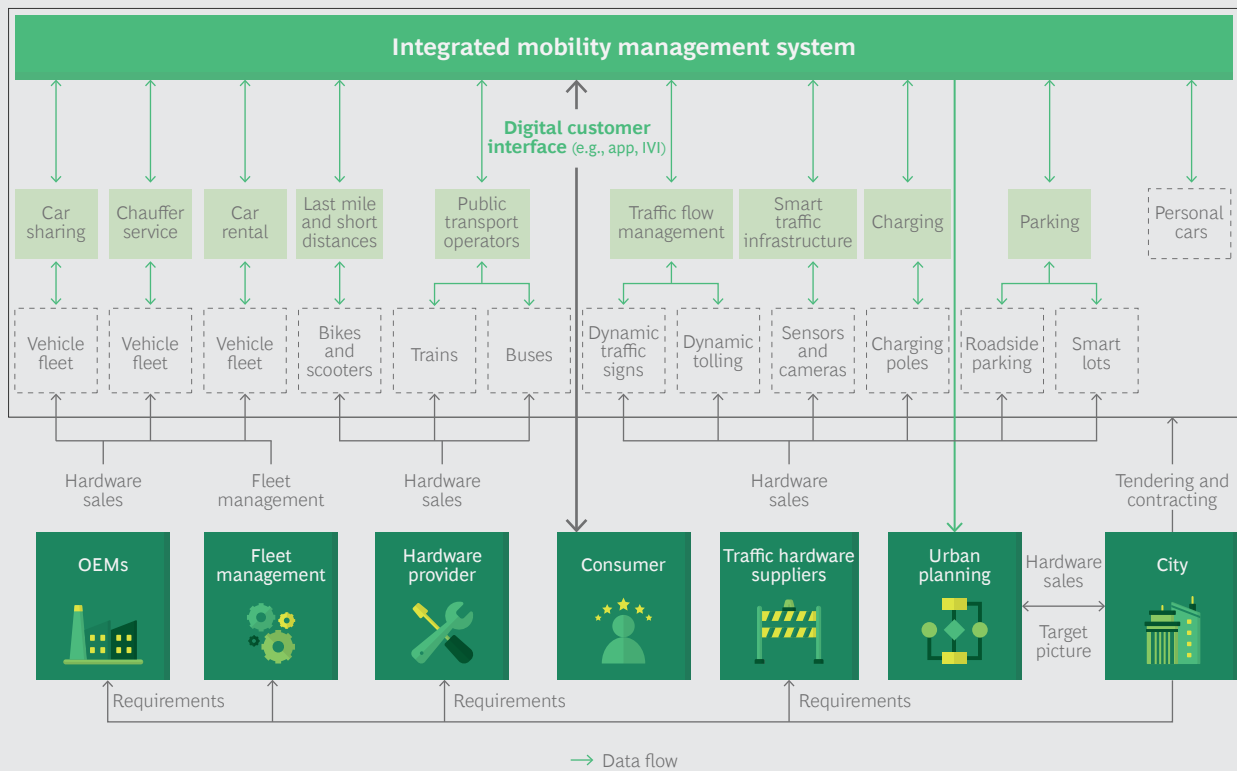
could be a city that contracts out orchestrator services, such as simulations, to the private sector.

Crucially, the orchestrator will own or direct two key elements of the urban transport system (see Exhibit 5):

- An **integrated mobility management system** that consolidates the data from all public and private travel modes as well as from the city’s transport infrastructure (via smart traffic management, parking, and tolling systems)
- A **digital customer interface**, also called a mobility platform, that combines all transport options in the city

In some cities, software firms are developing and operating bespoke platforms for the municipal mass-transit agency. In Berlin, for example, the public transport company *Berliner Verkehrsbetriebe* (BVG) is partnering with Trafi, a Lithuanian technology startup, to run the city’s Jelbi platform. We believe interfaces similar to Jelbi or Helsinki’s app-based Whim platform, which can provide individualized travel plans using real-time information, will be at the heart of the customer mobility experience.

EXHIBIT 5 | An Integrated Transport System Can Optimize Urban Mobility



Source: BCG analysis.  
 Note: IVI = in-vehicle infotainment.

Control over the two key elements will enable the orchestrator to optimize the city's transport system and help meet consumers' mobility requirements. Users will be able to book a customized trip involving multiple modes through a single interface, with the most efficient journey possible designed on the basis of data from the integrated mobility management system.

With this control, orchestrators will be able to make transformative system-level changes to transport networks in four areas.

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Bundling will increase independence from schedules because it will enable users to change seamlessly between transport modes.

**Cross-Modal Bundling.** Consumers will be able to purchase bundled, multimodal fares on a pay-as-you-go or prepay basis or by buying a monthly subscription. Bundling will increase independence from schedules because it will enable users to change seamlessly between transport modes. By facilitating switching, it may also improve consumers' productivity. And by combining public transport with ride-hailing or car-sharing options, bundling could reduce reliance on private cars.

**Seamless Connectivity.** The introduction of citywide connectivity across mobility modes will deliver significant benefits. Consumers will be able to spend their travel time more productively. And mobility operators could maximize the use of their assets, reducing dead time. What's more, smart connected vehicles will be able to automatically reserve a parking space, improving convenience and ease of use for consumers.

**Enhanced Traffic Management.** Data-driven traffic management systems will optimize the flow of traffic on city roads, reducing congestion and shortening travel times. For example, the systems could curb the number of cars allowed into urban centers while boosting the volume of buses, after taking into account external factors such as weather conditions, highway maintenance and construction, and the time of day. These benefits would depend on seamless connectivity increasing the transparency of traffic flows and transportation assets, however.

**Cross-Modal Optimization.** Going beyond pure traffic management, cross-modal optimization balances demand and supply across all mobility assets. One way it does this is by giving consumers an incentive to travel by underutilized modes, thereby taking the pressure off transport bottlenecks. For example, the orchestrator could encourage the use of a subway route that has free capacity in real time (by applying preferential pricing at certain times of the day or some other incentive) to reduce car and ride-hailing traffic on a crowded street. Such optimization has the potential to cut travel times, use mobility assets more efficiently, and—by preventing overcrowding—deliver a more private and comfortable travel experience for consumers.

## The Importance of Building Scale

Getting consumers and private mobility operators to join or consistently use a single digital interface or, in the case of companies, to share their back-end data is difficult. End users are unlikely to stick to one platform simply because of ease of use and can easily switch to a rival app or platform that aggregates travel information. In fact, it's only when an orchestrator controls both the front-end interface and the

back-end data that the interface will become an essential feature of day-to-day travel for a city's residents. This will allow the orchestrator to provide travel options and recommend the optimal route on the basis of all available data, including historical information and real-time factors such as weather conditions and road work.

Similarly, if a private company runs the urban mobility platform, mobility operators may be reluctant to join in the belief that they will be disadvantaged if the system is not run impartially. For example, platform providers could use the software, and the data it yields, to favor their own transport offerings. Alternatively, they could expand into new areas, such as restaurant recommendations and similar location-based services, at the expense of other companies on the platform. These companies could eventually end up being mere contractors to the platform provider, lacking the means to promote their own services.

In some megacities, such as Los Angeles, municipal authorities are requiring operators to join the city's mobility platform or share their travel data if they want a "license to play." But while that might work in some cities, this approach is unlikely to be adopted in all metropolises and will depend on the culture of each city.

One way to overcome these challenges for would-be platform providers is scale.

First, they need to develop scale in their user base. They are more likely to attract new consumers, retain existing users, and establish a leadership position if they have a significant user base already. For this reason, transportation network companies with an existing travel app, such as Uber or Lyft, are well placed to become the de facto platform providers in cities across the US.

Second, providers will increase their chances of success if they already have a significant number of mobility offerings on their platform. This also benefits more established players since newer operators are more likely to join them. For example, after eight years of independent growth, the electric-bike operator Jump integrated its offering into the Uber app because of its large installed customer base.

For private players, the challenge of becoming a platform provider is a bit like turning a flywheel. It's hard to begin but becomes progressively easier as the wheel gains speed. The momentum comes from building scale both in companies' user bases and in the mobility modes on the platform.

## No-Regrets Moves for a Successful Mobility Future

To maximize the opportunities and benefits of urban mobility in the city of the future, private players and city planners need to prepare and take several essential steps.

**Define the ambition.** Private companies must decide where they want to play in the future mobility ecosystem. A key decision will be whether to remain suppliers of hardware and services or take responsibility for managing a core capability for the orchestrator, such as running demand simulations for municipal-transport planners. Some players will need to switch away from their traditional roles in order to avoid being marginalized by changes in urban transportation.

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Private companies must decide where they want to play in the future mobility ecosystem.

To improve their transport systems, cities first need to create a vision of what they want them to look like several years from now. They should develop a comprehensive mobility plan that includes overarching objectives (such as affordable transport for all residents) as well as specific and measurable KPIs (for example, keeping journey times within the city center to no more than 30 minutes). The plan should also include detailed proposals to turn these ambitions into reality, covering topics such as where to allocate capital, what the future modal mix should look like, and what policy initiatives are needed. Some cities are already taking these steps. Singapore, for example, is leading the way by creating a viable master plan for how its transport network will function in 2040.

**Invest in new competencies.** Companies will need to build technological capabilities and skills to achieve their goals for the future. For example, if a private firm is to run a city's traffic management system, it will require capabilities in data analytics, simulations, and scenario planning in order to understand and model traffic flows. Other players will need staff who are skilled in consumer research and insights so that the companies can deliver products that meet travelers' preferences for greater productivity and sustainability.

City officials should also invest in new areas. They will need data scientists to analyze the impact of changing transport requirements and understand the economics of new mobility ecosystems. By studying these factors, cities can decide which areas they can orchestrate on their own and where they need to contract out capabilities to private companies. They will require strong strategic and procurement skills to negotiate with private players.

**Create effective governance.** Many companies will be expanding into new mobility-related areas that are far from their core business. In addition, these fields are unlikely to deliver significant returns for some time. They will have to decide whether to create a unit within their existing organization or establish an entirely separate business. Whichever course they take, they will have to institute effective governance procedures in order to ensure that the unit or business performs effectively, make certain that it receives sufficient resources, and create a realistic roadmap to maintain momentum.

**Develop effective partnership models.** Successful collaborations will be essential to deliver better and more integrated transport solutions in the future. Cities will turn to private players to access their skills, expertise, or technologies. Because the goal—a radically transformed transport system—is several years away and is still in a state of flux, new partnership models that work for both the public and the private sectors will be needed. These could take the form of mutually beneficial arrangements, similar to those in collaborative research, whereby the two sides share expertise and learning, without giving a firm commitment to use a particular product or outcome at the end.

**M**UNICIPAL AUTHORITIES MUST become orchestrators of the urban transport ecosystem if they are to avoid mobility mayhem. By reinventing themselves and coordinating public and private players, they will be able to create more

integrated transport networks. And by developing digital interfaces and using back-end data, they will provide a seamless travel experience for city dwellers. But to achieve enduring success, cities should prioritize solutions that deliver greater productivity, independence, and sustainability for consumers.

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