GLOBAL INFRASTRUCTURE INITIATIVE
By McKinsey & Company

Voices on Infrastructure

Reimagining transit in a post-COVID world

June 2021

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Introduction

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Welcome to the June 2021 issue of *Voices on Infrastructure*, a collection of insights on **reimagining urban transit in a post-COVID-19 world.**

Before the pandemic, public transit was already on a path of change, driven by evolving technologies and consumer behaviors. A prime example is the rise of ridesharing, which added new companies to the urban transit mix and created a need for regulatory revisions.

Then the pandemic brought urban transit to a halt—literally. Transit leaders were faced with maintaining service while contending with new safety and financial challenges. On the latter, concerns centered not only on short-term operations equilibrium but also the need to rethink future investments in infrastructure and equipment, including fleets and rolling stocks.

As some parts of the world open up this summer and urban transit picks up steam, it's crucial to consider the ways in which commuters may have also changed long term: they're more digitally savvy, more aware of sustainability, more concerned with safety, and perhaps reverting to a preference for personal vehicles.

We hope the following three underlying themes in this issue of *Voices* help inspire leaders globally to reimagine urban transit:

- **Safer operations:** As commuters return, assurance of their personal safety is top of mind. Perspectives from leading cities offer insights on what transit leaders could incorporate into their own strategic planning and operations.

- **Sustainability:** Operators across the globe are pursuing a variety of approaches to improve sustainability of transit, from electrification of buses to more efficient energy consumption and entirely new modes of transport. These efforts are now being adjusted to account for lifestyle changes driven by the pandemic, such as an increase in flexible and hybrid working models that are changing commuting patterns in many cities.

- **The role of technology:** In urban transit's next phase of growth, ridesharing, multimodal transport, and mobility-as-a-service will find their seats. Not to be left behind, railway infrastructure is also entering an exciting phase of renewal and innovation.

In a period of uncertainty and big transformational changes, now is the time for all transit players across the ecosystem to act: Operators can rethink their business models to balance new demand volumes and an evolving passenger mix. Investors can find opportunities in new offers in response to changing consumer behaviors. OEMs can reevaluate vehicles to offer a better customer experience, such as adding Wi-Fi connectivity. There is no single recipe for success; it strongly depends on local conditions, regulations, and the economic health of operators and the cities and countries in which they operate—and on the aspirations and vision of executives. The revolution has just begun.

News from the Global Infrastructure Initiative

Tony Hansen

Director of the Global Infrastructure Initiative, McKinsey & Company

We are excited to publish the June edition of *Voices on Infrastructure*, the first of our shorter, monthly issues designed to cover a broader range of topics at a more regular cadence. This edition focuses on **reimagining transit in a post-COVID-19 world.**

Over the past 20 years, urban mobility has seen significant challenges, such as the growth of cities, changing user preferences, decarbonization imperatives, and fiscal constraints. The COVID-19 pandemic has compounded these challenges for transit operators, with sharp declines in ridership and fare revenue imperiling their economic viability. This edition of *Voices* shares perspectives on reshaping the industry for the next normal, including technology platforms, changing customer preferences, sustainability, and ways to win ridership.

With the 2021 GII Summit behind us, we are developing focus areas for the next 18 months of GII programming, which will culminate in our eighth GII Summit in Tokyo in 2022. Based on the best ideas from our Summit Recap, our theme will focus on taking the necessary steps to achieve sustainable infrastructure. We will address some of the industry's biggest challenges, including decarbonization, the energy transition, social equity, resilience, digital transformation, and securing talent.

Starting with our July *Voices* issue on preparing for the energy transition, these topics will guide our publications, roundtables, and site visits. Bold commitments and strong collaboration across the public and private sectors will be essential in solving these challenges. The pandemic recovery has demonstrated what we can accomplish when we come together as a global community in a disciplined manner. Organizations that step up their game now will be better prepared to confront future challenges—and contribute to building a more resilient, inclusive world.

We hope you enjoy this issue, and we welcome your thoughts on how GII can continue to be a catalyst for meaningful change in the industry. If you have comments or would like to subscribe a colleague to *Voices*, please contact us at info@giiconnect.com.

The future of urban transit: A conversation with leaders from Uber and Via

Countless realities—changing customer expectations, the COVID-19 pandemic, technology—are reshaping urban transit. David Reich and Chris Snyder share their visions for the future.

David Reich
Head of transit
Uber

Chris Snyder
Europe CEO
Via

Urban transit looks quite different today than it did before the COVID-19 pandemic. Open-air options, such as bikes and scooters, have grown in popularity while cities have had to suspend some bus and train routes. Cleanliness and safety have been top of mind for the riders who remain, though overall demand has diminished significantly. Where do we go from here? What will urban transit look like going forward? And what role will mobility as a service play? We spoke with David Reich, head of transit at Uber, and Chris Snyder, Europe CEO at Via, to get a sense of the future of urban transit from a technology perspective.

McKinsey: How have customer needs and preferences changed over the past year, and what will it take to meet customers' urban transit expectations?

Chris Snyder: Amid pandemic mobility restrictions and a massive increase in the number of people working from home, the overall demand for commuter transit has plummeted. Not surprisingly, urban riders have also expressed a clear preference for transit modes that are perceived as safer: buses, with their open windows and smaller capacities, have fared better than subways.

At the same time, public microtransit services in both rural and urban communities have seen strong growth despite lockdowns.[1] In fact, more than 70 percent of surveyed riders in rural Sevenoaks in the United Kingdom claim to have reduced their personal car use since the city's on-demand transport service launched in early 2020.[2] A similar service in Jersey City is now providing twice as many rides as it did prior to the pandemic, given its flexibility and the volume of low-income riders who've come to depend on the service to get to work and access essential services.[3] And the bicycle "highways" of Berlin and London bear witness to the boom in popularity of open-air transit modes such as cycling.

Successful vaccination campaigns and a return to work, school, and social events may make safety concerns relatively short-lived. What will remain as the key challenge for public-transit providers is to attract riders back to the modes of mass transit they once relied on. Riders may soon be trading expectations of safety for expectations of convenience, efficiency, and reliability. For some agencies, this shift will require replanning their network in order to deliver service where it is most needed; for others, it will mean adopting new digitally enabled services to better serve post-COVID-19 ridership.

David Reich: When people decide to leave their homes to go anywhere, they're taking into account many different factors at once. What are they optimizing for? Is it the fastest route to their destination? Is it cost? Is it comfort? But now, safety is number one for a lot of folks, and it's important that transit recognizes that people need to feel secure in their travel. Security starts with keeping social-distancing standards up to date and focusing on cleanliness within transit. But it also extends to making sure people have all the information about their ride at their fingertips. If they're going to take a multimodal trip, they need to know that the bus is going to show up when it's supposed to. And if something goes wrong—if that bus breaks down—they need to know that there's a backup plan.

During the pandemic, many transit agencies reduced or suspended service, and we were able to partner with cities to offer subsidized rides as a stopgap solution. In some cities, including Innisfil in Canada, Uber has actually been their entire form of public transportation. This arrangement has been a lifeline for some people, particularly in low-income areas and places where people did not have access to other means of transportation.

[1] Microtransit is tech-enabled, shared transportation that lives in the space between traditional fixed-route transit and ride-hailing technology; for more, see "What is microtransit?," Via, August 13, 2020, ridewithvia.com.
[2] "Data shows how demand-responsive transport can shift people away from private vehicle use," Via, March 10, 2021, ridewithvia.com.
[3] "Jersey City improves access to affordable and reliable transit through on-demand service," Via, February 9, 2021, ridewithvia.com.

It's so important that we work together to offer new and innovative ways for people to get where they need to go.

McKinsey: What will be the defining features of urban transit in a post-COVID-19 world?

David Reich: Along with a continued focus on safety and reliability, I think resiliency is going to be a theme of the postpandemic world. Transit providers are going to need to bring a new mindset to how they set goals and think about user experience, harnessing technology to bring more dynamic and resilient options into their network.

Equity will also be a defining feature. Transit exists as a public service for everyone, but it's often difficult to service sparsely populated areas and areas that tend to be lower-income. We did studies that showed that most Uber trips in the New York metropolitan area were within outer boroughs—communities that did not have access to rides from their doorstep previously. It might not be cost-effective to service such areas with a fixed-route bus, for instance.

By leveraging tools like rideshare and harnessing the multiple modes available to them, transit agencies in cost-effective ways will be able to serve vulnerable populations and paratransit markets that have been left behind by fixed-route public transportation. And by operating in a way that works for these communities, cities will change for the better.

Chris Snyder: Post-COVID-19 urban transit will be defined by the extent to which individual cities are able to embrace the opportunities—and the challenges—that life during COVID has revealed. This will likely manifest in the following shifts:

— A permanent redistribution of street space from cars to people, in the form of new sidewalks, bike lanes, and green spaces. The bicycle superhighways and shared streets of 2020 will become lasting fixtures of the urban landscape.

— New investments in public transport as systems move from a survival mentality to a growth and recovery mindset; attracting riders back to transit will be seen as a key enabler of economic recovery.

— A new focus on integrating digital technologies into public transit offerings. This move will both facilitate greater levels of trust and transparency among passengers—allowing them to understand, for instance, how full their bus is—and enable data-driven planning and operations, ultimately allowing for a more equitable distribution of transit access.

McKinsey: Where are the greatest opportunities for digital innovation to mount a distinctive mobility-as-a-service (MaaS) offering?

David Reich: I think MaaS has a ton of potential. And it's important to recognize that it's really nascent. By pulling different modes together and leveraging technology, both in terms of planning and operating their networks, transit agencies can provide a great user experience and make it easy for people to leave their cars at home—instead taking some combination of vehicles, including public transportation, to their destination.

Of course, it's difficult because the same person could change their preferences for getting around the city multiple times within the same day. You want to have many different offerings that can work the way individual riders want at any point and optimize for their preferences—for instance, if they value time over cost or are willing to pay a bit more to save 20 minutes on the commute.

In order to bring the best digital innovations to market, we need many different MaaS providers competing. That way, multiple technology companies, transit agencies, and app providers can bring to market great user experiences and algorithms that string together multiple modes to provide riders with their best public and private travel options. On the regulatory and policy front, then, it's

important that we let innovations come to market—and even provide incentives for these innovations.

Chris Snyder: MaaS—which promises to put the entire universe of mobility at our fingertips by offering an exhaustive menu of travel options—has been overhyped, but thus far it has also underdelivered. After all, we are creatures of habit. Most of us find ourselves taking the same trips over and over again, despite there being faster or more efficient ways of reaching our destination depending on the time of day or immediate availability of various modes of transit.

The real promise of MaaS is not in providing 100 ways to make a trip but in identifying the two or three best choices—for instance, with one option prioritizing speed, another value, and another human-powered modes. And because almost every trip we take involves a combination of travel modes, such as walking and public transit—perhaps with a transfer in between—it's clear that the value of a MaaS offering is in its ability to intelligently combine multiple travel modes into a single, integrated journey, rather than offering the simplistic choice of train, bike, or cab.

McKinsey: What trends in urban mobility are you most excited to see play out over the next five years?

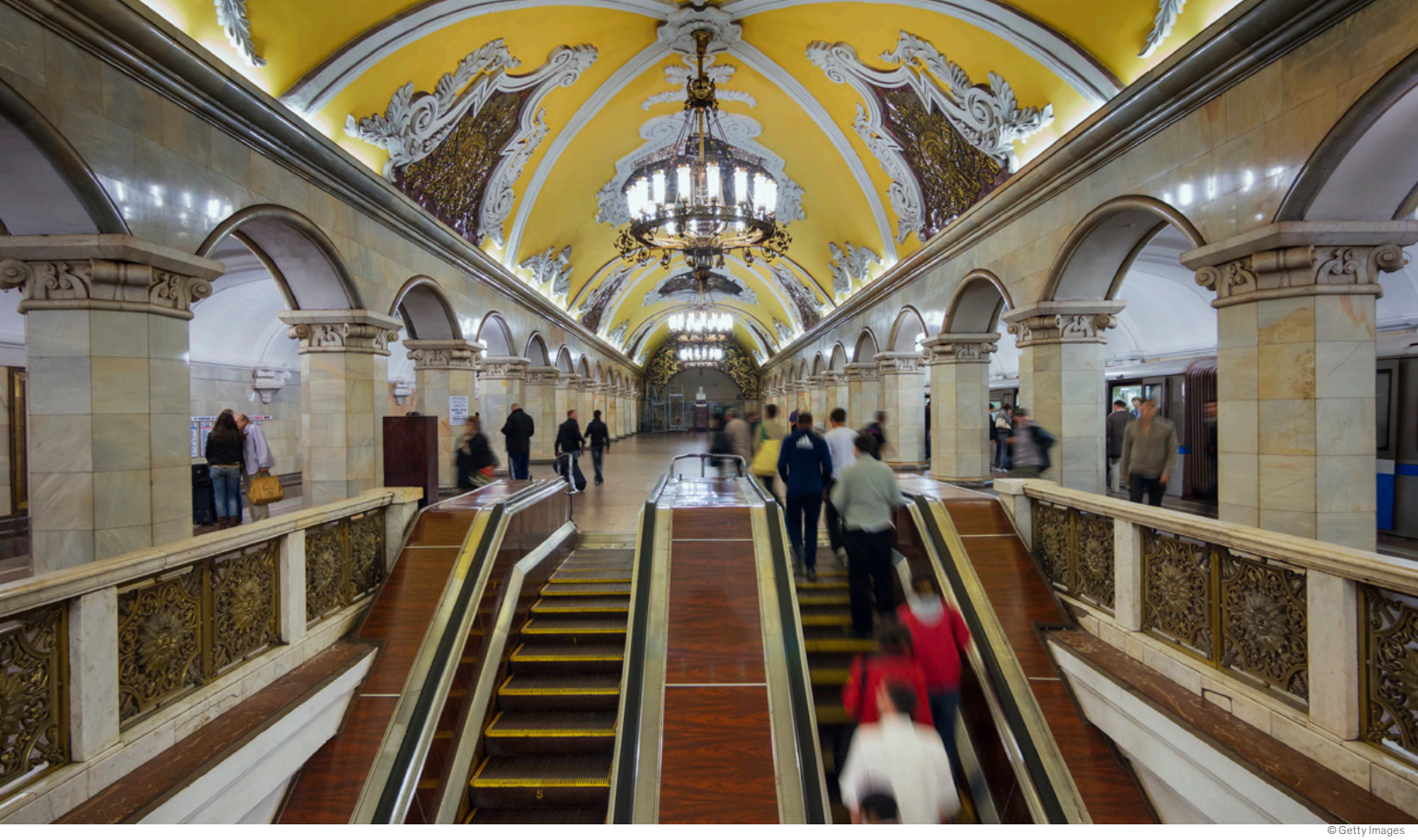
Chris Snyder: One of the most consequential impacts of the COVID-19 pandemic on public transit will be the redesign of urban transit networks to address new travel patterns and to account for updated equity and accessibility goals. The potential to better serve urban and rural communities alike in the period of economic rebuilding is simply massive. In the past, network redesigns have typically happened once or twice a generation. But new digital planning tools make it possible for cities and transit agencies to make network planning an ongoing process, allowing transit to adapt far more fluidly to changing needs. The next five years will also see the first group of cities take steps to roundly reject the private car as a major component of urban mobility. Cities may do so by creating Barcelona-style "superblocks," neighborhoods of nine blocks in which car traffic is limited to the outside roads; charging motorists significant congestion fees to enter city centers, as in London; or reorienting neighborhood development around the "15-minute city," where everything a resident needs is accessible within 15 minutes on foot or bike—a model Paris is pursuing. This is a hugely promising trend that could signal one of the most fundamental reimaginings of urban life in 100 years.

David Reich: We see public transit's role evolving to become mobility managers, orchestrating movement throughout their cities. That includes more modes of transportation, such as dockless scooters, e-bikes, rideshare, and microtransit, in addition to fixed-route public transportation like buses and subways. When you put all these modes together, you serve people better—getting people to work on time and providing vulnerable populations equal access to their cities. We are really excited about how technology can help to further that movement—analyzing and measuring movement throughout a city, seeing where it's falling short, and then optimizing that.

Over the next five years, we're also going to see more happening around autonomous vehicles. It's going to be really interesting to watch this progression and see how they can help provide better transportation. And I am personally excited about the open streets, pedestrian thoroughfares, and bike lanes that have emerged through the pandemic; these are great for cities, and I hope to see them stick around.

Few moments in history have held so much potential for change. It's going to be fun to watch that play out—and to have a role in making it happen.

David Reich is head of transit at Uber, and **Chris Snyder** is Europe CEO at Via.



Building a transport system that works: Five insights from our 25-city report

We benchmarked urban-transport systems in 25 cities around the globe to find out what goes into the making of a smooth commute.

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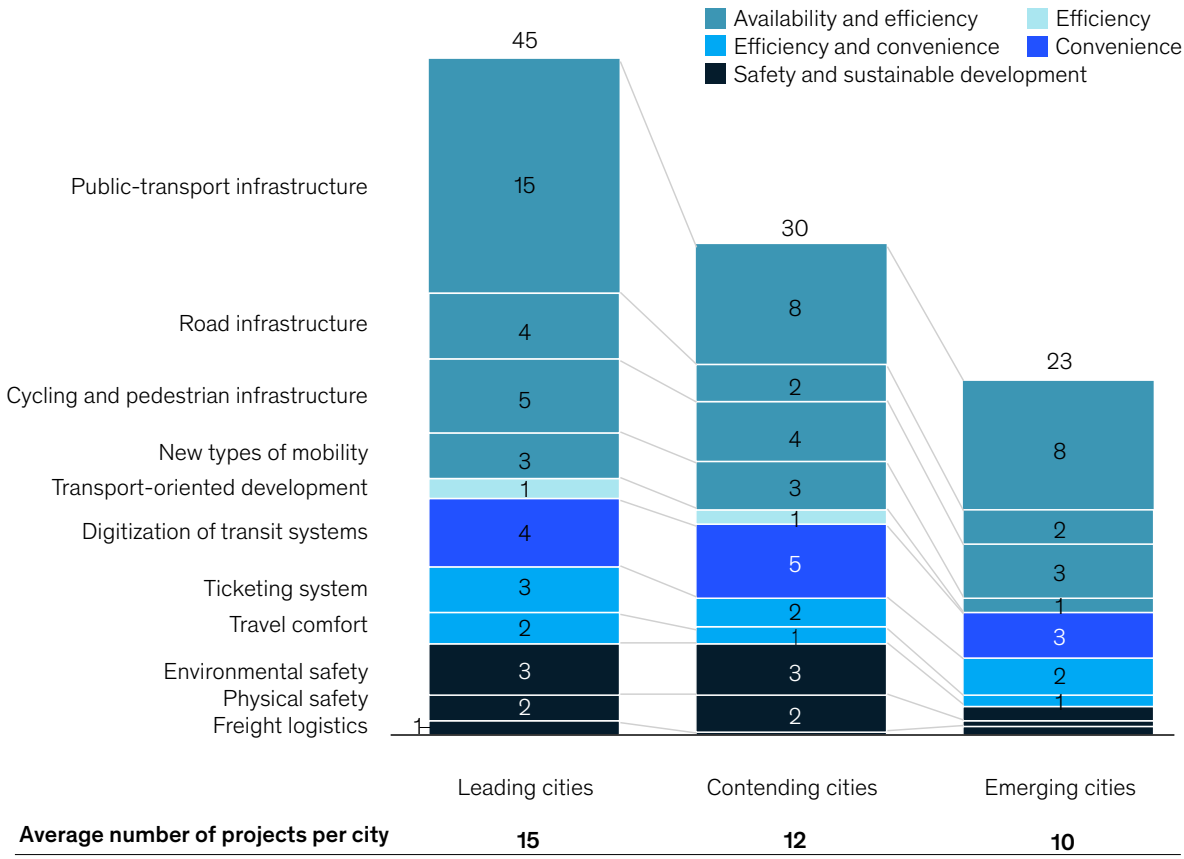
A city's transportation network is its cardiovascular system, enabling the continuous flow of people and goods. Municipal authorities, city councils, urban planners, and transport-infrastructure owners and operators around the world are well aware that the quality and efficiency of such networks are crucial for the economy and for the well-being of citizens.

To help stakeholders make informed decisions, we've benchmarked the transport systems in 25 cities around the world in our forthcoming report, *Key elements of success in urban transportation systems.* We ranked the cities and grouped them into three categories: leading (first to tenth place), contending (11th to 18th place), and emerging (19th to 25th place).

All 25 cities we tracked have increased the volume of projects to enhance their transport systems since 2018 (Exhibit 1). Leading cities invested more in improving the availability of their public-transport infrastructure, while emerging cities invested relatively less in safety and sustainability than they did in the other categories. These decisions could impact residents' willingness to use public transport.

Exhibit 1

Residents' willingness to use public transport may be affected by the types of investments made by cities.



Note: Figures may not sum, because of rounding.
Source: Public information on key project; team analysis

While decision makers should delve into the full report for the complete rankings and details, this article distills the report's findings into five key insights that stakeholders should pay attention to, highlighting best-in-class practices in cities around the world.

Keeping service and safety standards high assuages pandemic-related fears of using public transport

Unsurprisingly, COVID-19 lockdown restrictions impacted lifestyles and commuting patterns in 2020. Many stopped traveling to work completely. People who already relied primarily on private cars and those who mainly used public transport both increased their use of private cars, even as the overall number of trips decreased (Exhibit 2). In some cities, staff shortages and declining revenue from lower passenger usage also led to reductions in service frequencies to avoid having to raise fares.

If these trends persist beyond the pandemic, traffic congestion in many cities could be exacerbated, and more road accidents and pollution could also be likely. As such, public-transport operators and authorities should actively find ways to restore confidence in shared modes of transportation and to reduce reliance on personal cars. Our research found that the safer people feel about using public transport, the more they'll use it (Exhibit 3), suggesting that the visibility of biological safety measures has a significant influence on perceived risks.

There is a lower perceived risk of infection on public transport in Chinese cities thanks to a mandatory mask and physical-distancing regime, regular disinfection, and other epidemiological safety measures that citizens visibly adhere to. These measures are heightened as needed (for instance, when sporadic outbreaks happen), and commuters may have to present an all-clear, green health code

Exhibit 2

While the overall number of trips decreased with the pandemic, private-car trips increased among both public- and private-transport users.

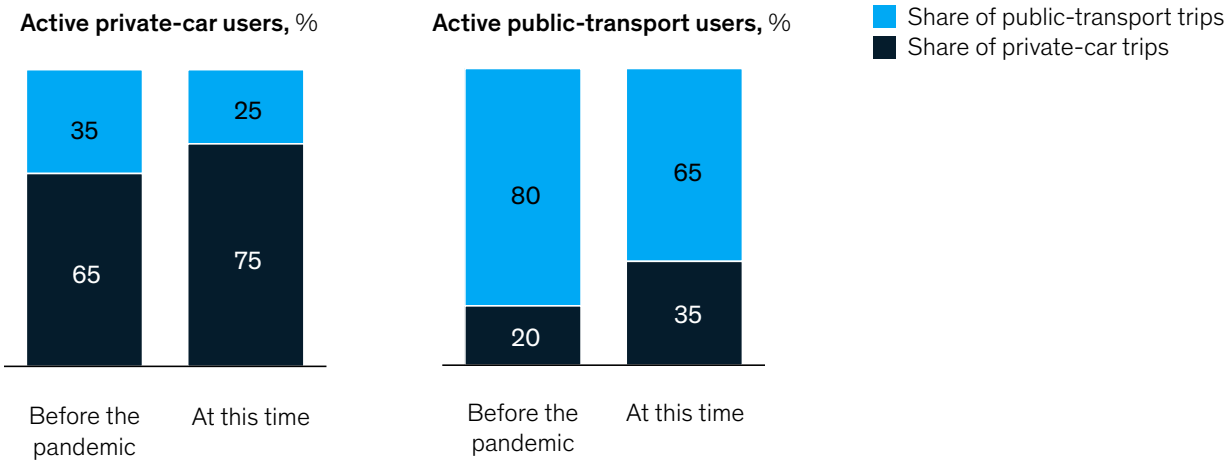
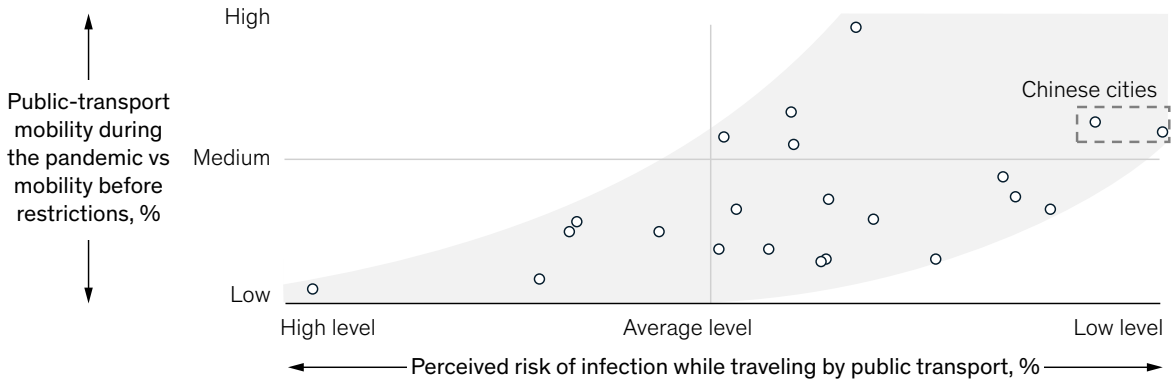


Exhibit 3

Due to the visual nature of safety precautions on public transport in Chinese cities, the transport has a lower perceived risk of infection.



on a mobile app and have their temperatures taken before entering paid areas. As such, Chinese cities experienced higher-than-average levels of public-transport mobility during the pandemic.

Expanding transport networks and infrastructure, as well as smart policies, keeps travel options available and affordable

The top-scoring cities in terms of transport availability—London, Madrid, and Paris—share some common characteristics: they are major railway hubs and offer good road networks, bike lanes, and pedestrian infrastructure. Beijing, Moscow, and Madrid jumped up in the transport-availability rankings by expanding their metro and rail lines. They also improved their road infrastructure and increased the number of bicycle lanes and pedestrian streets, investing heavily in shared-transport schemes such as rental bikes and carsharing services (Exhibit 4).

In Madrid, about 3,000 bicycles were purchased and 50 new bike rentals were opened in 2020. Moscow's bike-share program increased its supply of two-wheelers by 3,000, and the city also opened new underground lines, resulting in 700,000 more people gaining access to the Moscow Metro. Three new underground lines have been opened in Beijing over the past several years.

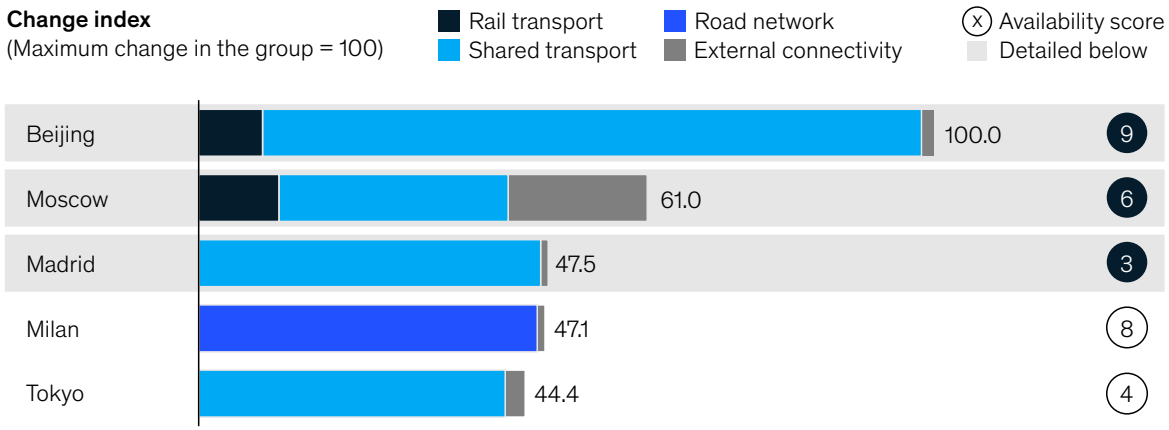
Public policies play a critical role in keeping transport affordable, whether it's by regulating bus and subway fares or by encouraging competition between legacy transport operators and rideshare companies. High rates of private-car ownership tend to constrict revenue flows for the public-transport system. Thus, policies that discourage private-car ownership often prevent public-transport operators from either raising fares or reducing service standards.

The Asian cities of Seoul, Shenzhen, and Singapore top the rankings for public-transport affordability. Their authorities actively make car ownership more expensive to offset the environmental and societal costs of personal-car use.

Public-transport systems in Buenos Aires, Mexico City, and Shanghai are also becoming much more affordable because of government policies that stimulate economic competition and technology. Cars registered outside Shanghai are barred from

Exhibit 4

Cities scoring highest in transport availability have invested heavily in shared-transport schemes.



certain districts, and self-driving-taxi technologies are being piloted, which may lead to lower costs in the future. The availability of multiple rideshare options also translates to cheaper fares. The widespread implementation of paid-parking systems in Buenos Aires and Mexico City is making private-car ownership more expensive, in turn easing traffic congestion.

Dedicated public-transport lanes and digitalization can make the commuter experience more efficient and convenient

Efficiency refers to how quickly and predictably one can move around the city, while convenience measures how easily commuters can switch from one mode of transport to another. Increasing the number of dedicated public-transport lanes, optimizing bus routes, completing road construction or modernization projects, and upgrading digital systems all help improve the commuter experience.

Moscow, Shenzhen, and Singapore score well for transport efficiency. Moscow's transport system has low underground waiting times, high speeds during rush hour, and a significantly above-average proportion of dedicated bus lanes. Shenzhen also has a high share of dedicated bus lanes, which helps with rush-hour predictability. Singapore's electronic-road pricing system is powered by a digital device that automatically charges the driver the road toll when the car passes through a gantry, making road travel for both private and public vehicles frictionless even during peak times.

Our convenience index assesses the ease of switching from one transport mode to another. High performers have invested in upgrading their ticketing systems, increasing Internet access, and improving the proportion of wheelchair-accessible buses and underground stations. Some offer convenient mobility-as-a-service (MaaS) applications to plan routes and to verify and pay fines and penalties.

Toronto delivers high levels of travel comfort, courtesy of a $934 million upgrade of its bus fleet, which is now 100 percent wheelchair-friendly and located closer to subway stations. Hong Kong also revamped its public-transportsystem. Ninety out of 93 metro stations are outfitted with elevators

and wheelchair ramps, making it easier and quicker for passengers in wheelchairs to board and disembark. Meanwhile, Istanbul rose in the convenience rankings with a significantly improved ticketing system using QR-code payments. The city also introduced the Ulasim Asistani app that helps travelers plan journeys across multiple forms of transport, leading to a considerable improvement in satisfaction ratings among its citizens.

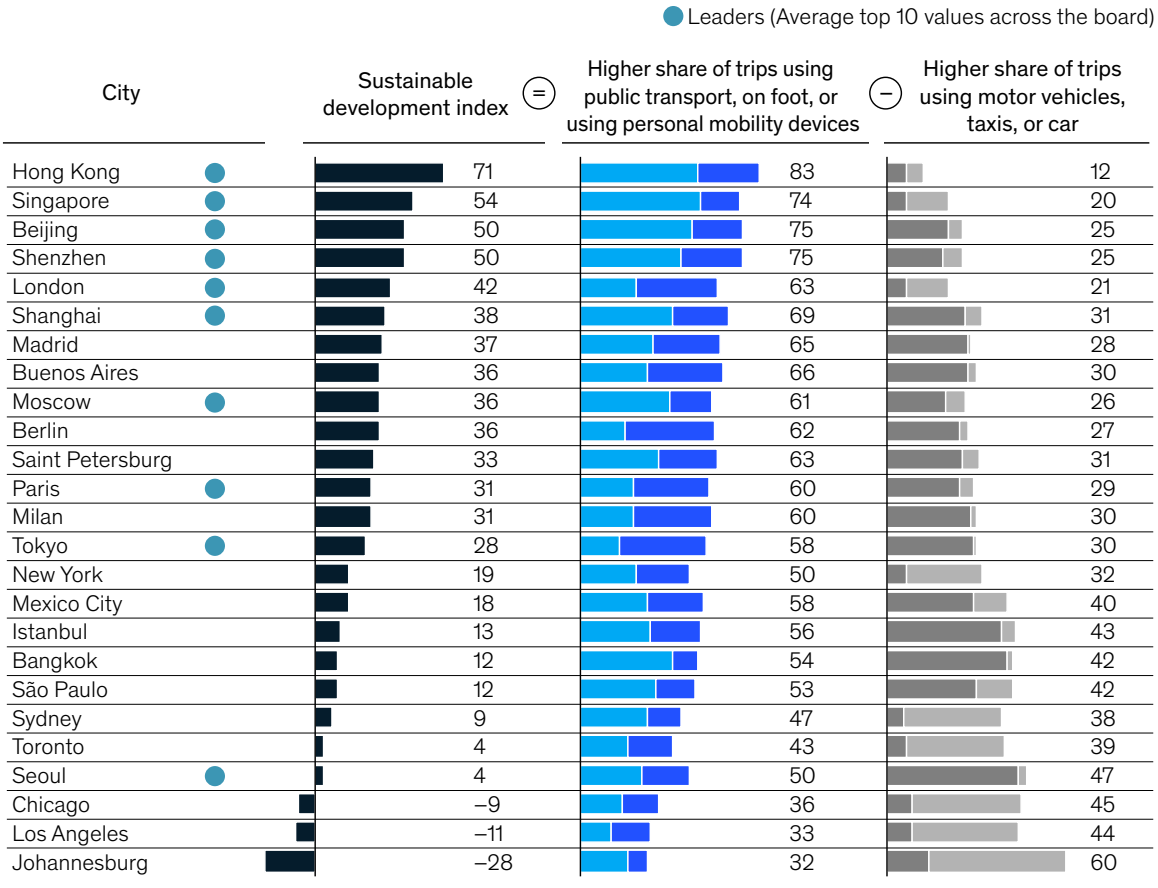
Sustainability matters—in terms of both investment and policy

Both commuter safety and the environment cannot be neglected in a city's efforts to improve its transport system. In our 2018 and 2021 surveys, respondents cited safety as their number one priority, so it's right that city planners and authorities are constantly looking to minimize accidents and fatalities while reducing the city's carbon footprint. Leading cities tend to invest more in sustainable mobility options than contending and emerging cities (Exhibit 1), which has resulted in greater use of their public-transport systems (Exhibit 5).

Active efforts to ensure compliance with safety requirements are important—as are more stringent restrictions on the use of petrol and diesel engines, measures to reduce pollution, and incentives to switch to electric vehicles.

Exhibit 5

Cities investing more heavily in sustainable mobility options tend to have greater usage of their public-transport systems.



Note: Figures may not sum, because of rounding.

Tokyo boasts one of the world's lowest levels of road fatalities—9.6 deaths per one million citizens. Over the past several years, the government has deployed the data-driven Smart Transport Systems to monitor and analyze information on people's commuting patterns and traffic violations to inform decision making. As a result, road fatalities have decreased, and more people are complying with traffic rules. The government is also using new toll-management technology to decrease vehicle traffic and improve road safety.

In China, Beijing and Shanghai are aggressively curbing the negative environmental impact of their transport systems. Both cities have mandated in 2021 that only vehicles that adhere to the China-6 environmental safety standards (roughly equivalent to the Euro-6 standard in the European Union) can be sold.

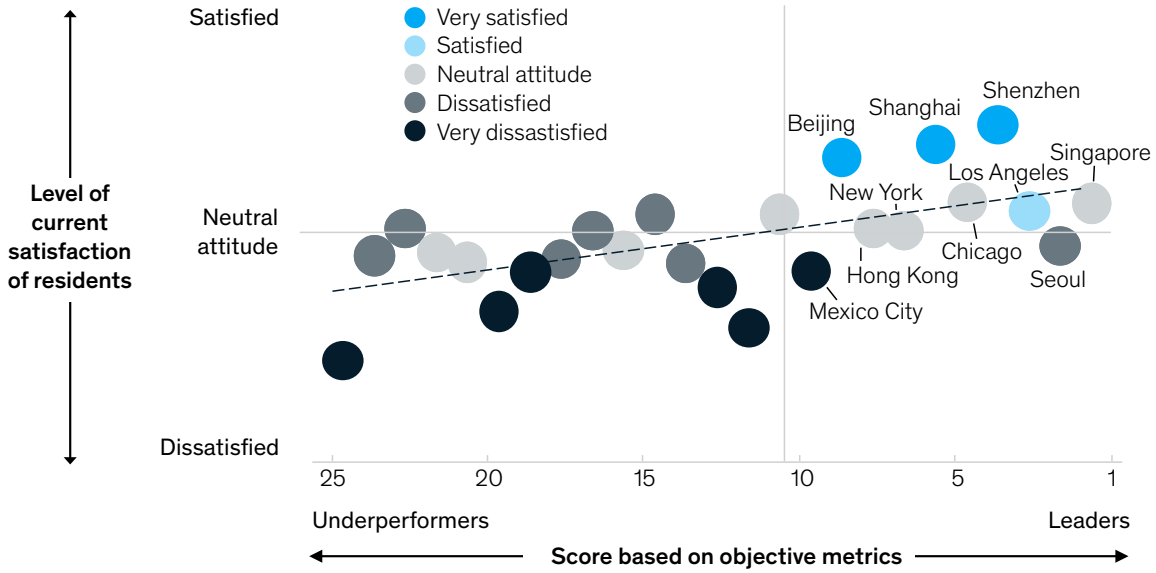
In some cases, better communication is needed to bridge gaps between perception and reality

We tracked how satisfied residents are with how their local transport system is doing according to specific metrics and based on changes implemented since 2018. Residents appear to appreciate the hard work urban authorities have put into those projects, but in a few cases, their perception may not be aligned with reality. For instance, most citizens feel that public transport is too expensive in their cities (Exhibit 6). Even though Seoul stands out as a leader in public-transport affordability based on objective metrics, its citizens remain very dissatisfied.

This suggests that authorities need to ensure that they keep residents informed of all positive

Exhibit 6

Perception of public transport is not always aligned with the objective metrics of those transport systems.



changes and continue their efforts to improve public perceptions in those areas. It is highly likely that additional restrictions on personal motor vehicles will be introduced in the coming years and environmental regulations will become more stringent; to improve public perception, city authorities must be able to achieve tangible successes and clearly articulate them.

Our full progress report, which benchmarks the transport systems in 25 cities around the world, will investigate in greater depth the five themes outlined in this article and includes other findings that are relevant to key stakeholders. Overall, while there's reason to celebrate the many improvements around the world according to the majority of our metrics, there's still much work left to be done. We hope that our conclusions help stakeholders make informed decisions regarding the further development of city transport systems.

Detlev Mohr is a senior partner in McKinsey's Tokyo office, **Vadim Pokotilo** is a partner in the Moscow office, and **Jonathan Woetzel** is a senior partner in the Shanghai office.

Image courtesy of Tokyo Metro

A more personalized world: An interview with the CEO of Tokyo Metro

Improved technology with better data, more attractive destinations, and increased harmony with infrastructure show how public transportation can help riders spend their days doing what they like.

Akiyoshi Yamamura

CEO
Tokyo Metro

The COVID-19 pandemic led to a significant drop in the use of public transit the world over. Tokyo was no exception. In the months after the outbreak, the city's rapid-transit system saw a marked decline in ridership. In response, operators adopted new digital technologies to prevent congestion, improved ventilation on train cars, and began envisioning a more harmonious relationship between subway stations and communities. These changes offer a glimpse of what public transit—in Tokyo and in other cities and countries around the world—may look like in the years to come.

The following lightly edited interview with Tokyo Metro CEO Akiyoshi Yamamura was conducted in April 2021.

What are the biggest challenges for metros and other forms of public transit after COVID-19?
Metros and other forms of public transit are industries as well as places where people gather together, yet COVID-19 has instilled the idea that people should not gather. In Japan, the experience of riding packed trains every morning and night is disappearing, and people are becoming accustomed to not having to spend time commuting each day.

As a result, people will start personalizing the times and locations of their travels, and transportation revenue will decline dramatically. In fact, we are prepared for a post-COVID-19 reduction in sales of around 15 percent. But if we think over the long term, this simply means that some of the predictions around depopulation are materializing ten years earlier than originally expected. The number of trips per person was steadily decreasing even before COVID-19, so the pandemic essentially accelerated a shift in behavior that was already in motion.

Regarding the drop in ridership, what steps did the system take to restore traveler confidence, and how did customers respond?
After March 2020, we took measures to open windows in our train cars. We also took antivirus measures in stations by November and in train cars by summer. We've heard from customers that these changes made them feel safer, and I think creating a safe environment is our primary duty.

Recently, even though passenger load factors have reached 120 percent during peak hours, there have been no COVID-19 clusters, so we have been successful in creating an environment with low risk of infection. We have also started to visualize ridership congestion and now provide a route-searching service via smartphones to support customer behavior to avoid slowdown.

How have you adapted your approach to meet evolving customer needs?
Changes in customer behavior are clearly reflected by the numbers. Commuter-pass usage is down 30 percent, and employees at many companies in the metro area are working from home. As an example, traffic at the Ōtemachi Station is down 46 percent. Furthermore, there is a tendency for customers to be dispersed before and after the rush.

The trend toward reduced commuting is unavoidable, so we're encouraging people to use the metro in their free time rather than for work. Until now, we have been supported by commuter-centric rail demand, but moving forward we want riders to focus on enjoying the city. We call this "city tourism." In other words, there are a lot of green, versatile spaces in Tokyo, allowing people to have all kinds of memorable experiences. I think of this as a kind of mobility as a service.

On the topic of operations, Tokyo is one of the smartest cities in the world. What does digital leadership in public transportation look like today?
Japan has always been too focused on providing extremely good service. Unless this focus shifts, we won't be able to make better use of digital technologies.

That said, one way we can take advantage of meticulous service and digital technologies is using historical railway-traffic data. Although we've been doing this for a long time, we can now tell the

location of each car, predict how much a particular car will be delayed at a particular time, and use that information to optimize operations.

We've also started using condition-based management-maintenance strategies, which involve installing sensors in train cars to assess their operational status, communicating that status via the Internet of Things, and analyzing those data to predict failures. On the Marunouchi Line, for example, brake and air-pressure readings are constantly relayed to maintenance workers.

Our most recent innovation is the development of a so-called congestion-measurement system that uses cameras and AI to identify which cars are crowded and then create routes to avoid them. This system is the first of its kind in Japan and was installed in stations in April of this year. It can accurately grasp the number of people, not unlike the human eye—even while a train is passing by.

Finally, as a digital leader in the railway industry, we plan to continue actively engaging in similar efforts. We want to leave repetitive, high-volume work to digital technologies or AI [artificial intelligence], while putting human beings in charge of decision making and more creative work.

How can public-transit operators respond to the ongoing competition posed by ridesharing services as well as the eventual advent of autonomous vehicles?
Although public transit and ridesharing services are often thought of as competitors, together they can bring about positive changes for Tokyo Metro. Taxis, shared bicycles, and buses all have their own mobility characteristics and their own advantages, and it's best if they are combined to complete a trip.

I think it's important to personalize things, so when commuting to the office, it's fine to walk there, to walk past a couple of stations instead of just one, or even to cycle. As long as people are encouraged to go out into the world and take advantage of these options, it will make everyone's lives richer than they were before. I think that's a positive thing.

Taking advantage of shared mobility options on weekdays and weekends—or even holidays—for enjoyment or relaxation could cancel out any negative effects stemming from a decrease in the overall number of metro trips. As a result, we will see a positive effect on our revenues.

What will Tokyo Metro look like in ten years?
I think COVID-19 has given us an opportunity to change society for the better. We can reevaluate a variety of services and allow people to freely choose times and locations for travel that may have never occurred to them in the past. In this sense, the post-COVID-19 era could lead to increased happiness for people and society. But if that's all that happens, the transportation industry could die out, so we can't just stand idly by and do nothing. We must create a more personalized world.

We must think of metro stations and communities as being in harmony with one another. Toranomon Hills Station, our newest station, is a good example of this harmony. Same with Nihombashi Station.

At Tokyo Metro, we want to be a company that builds appealing stations in appealing neighborhoods. Doing so can hopefully satisfy many different needs, such as ensuring riders can easily reach their offices after leaving the station. Part of this vision of stations in harmony with communities is creating access to green spaces and building offices that are not cold and inorganic, as well as providing people with options for entertainment, supermarkets, and other shared spaces nearby.

Overall, if people are relaxed and spending their days doing what they like, then we will see urban travel as a positive thing. I think careful cooperation between the government and urban real-estate developers will be an important part of accomplishing this.

Akiyoshi Yamamura is the CEO of Tokyo Metro. This interview was conducted by **Noriko Kuya**, a partner in McKinsey's Tokyo office.

Winning ridership for the next normal

Transit agencies may need to win over former and new riders. Eight ideas can help them better meet rider needs.

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In March 2020, transit ridership plummeted across the world—for example, ridership in the United States fell to less than 10 percent of prepandemic levels in many systems. As more countries approach the functional end of the pandemic, some riders who had been working from home will begin to return, and many will likely test new hybrid working models over the coming months.[1] Therefore, the rest of the year could be a critical time for transit agencies to bring back former riders and add new riders to the system. But customer needs and expectations have changed—and there's no guarantee riders will come back without bold moves by agencies.

Transit agencies can consider carrying out a high-intensity campaign over four to six weeks to help bring riders back in significant numbers and ensure they have a positive experience. It's a pivotal moment, and transit agencies have an opportunity to establish their mode of transportation as the top choice in their service territories.

The campaign

A campaign to bring back riders and meet their changing needs and expectations could include eight actions, from thoughtful marketing efforts to novel approaches to payment and service offerings.

Targeted marketing efforts

Many former riders are out of the habit of using transit and have grown accustomed to making trips via other modes. Inspiring them to reintegrate transit into their work commutes and leisure transport may require a marketing campaign.

Transit agencies can segment their ridership base using email addresses of monthly or weekly pass holders (who account for about half of former riders), survey data, and third-party ridership data. But to get a deep understanding of riders, agencies may have to go beyond the typical ridership survey—for example, by using analytics to understand important buying factors for different ridership segments. Agencies can then augment these analytics with specific ethnographic research to understand the most important elements of how people use transit and the desired experience across that group's set of transportation options.

From there, agencies can conduct microtargeted campaigns, promoting innovations to each of these segments. These marketing campaigns can be based on an understanding of the root causes of transit hesitancy, such as concerns about health, personal safety, and crowds. And user research could explore the mindsets, concerns, and behaviors of past and current riders, allowing agencies to test a variety of incentives to see how well they alleviate concerns and influence behavior.

Large-employer engagement

Transit agencies can reach out to major employers in their area to learn about their reopening plans and brainstorm ways to encourage employees to come back to the office using transit. For example, agencies can work with employers to provide potential riders with information onsite about transit options, special fare subsidies, and employer-funded fare passes. They may also increase service on certain routes or propose that employers stagger workday start times to minimize crowding. By working together, transit agencies and employers can help facilitate a return to the office and ease the implementation of hybrid work models.

Promotional payment schemes

Payment models that were popular before the pandemic, such as monthly or weekly passes, are unlikely to attract workers who have shifted to hybrid work schedules or riders who are hesitant about taking transit and unsure of their future

[1] Andrea Alexander, Aaron De Smet, Meredith Langstaff, and Dan Ravid, "What employees are saying about the future of remote work," April 1, 2021, McKinsey.com.

usage patterns. Several actions could help get people back onto the system:

— *Going fare-free:* Agencies could eliminate fares for an initial period, such as a few weeks following the end of the summer holidays, to encourage riders to make transit part of their new routine. The Los Angeles County Metropolitan Transportation system, for instance, offers free rides on Christmas Eve and around the new year to encourage transit usage.[2]

— *Providing deep discounts during off-peak hours:* This move can help alleviate crowding by encouraging riders to travel at different times. In Australia, Transport for NSW, for example, offered 50 percent off rides outside peak times during the summer of 2020.[3]

— *Offering flexible pass and pricing arrangements or fare capping:* Agencies could replace monthly or weekly unlimited passes with more flexible arrangements, or institute fare capping. For example, the New Jersey Transit Corporation supplemented its existing monthly pass by creating FLEXPASS, an option to buy 20 one-way tickets between one origin and one destination; these tickets are offered at a 20 percent discount and are valid for 30 days.[4]

— *Instituting loyalty programs:* Such programs reward and provide incentives for ridership by offering riders discounts on, for example, food, drinks, museums, and other entertainment. Philadelphia's SEPTA Perks provides riders with rewards they can redeem at local institutions.[5]

More—and faster—service

As they work toward providing the fastest, most competitive service, transit agencies can ask themselves a series of operational questions: Could peak service be increased by 10 to 25 percent to help alleviate potential crowding during the morning and evening rush? Could peak-level service—or close to it—run most of the day to accommodate the more flexible schedules that riders may now have? Could agencies work with local departments of transportation to establish pop-up interventions (for example, use paint to create bus bulbs or exclusive lanes) to make transit competitive with personal-vehicle travel? Could new service routes or interagency collaborations help bring in new riders in addition to attracting lapsed riders?

Easing first- and last-mile issues

Improving first- and last-mile issues will be critical in winning back riders, particularly for commuter rail systems, which have suffered some of the largest and most enduring ridership declines. Agencies can consider easing intermodal transfers (for example, by providing pulse scheduling, free transfers, or fare credits) or forming promotional partnerships with private partners, such as rideshare or micromobility companies, to mitigate this issue and create an incentive for riders to return to transit.

For example, in 2020, Via worked with Jersey City, New Jersey, to create an on-demand public bus service. The service directed people to "virtual bus stops" and charged a flat fee to get to and from the city's central zone, where most of its transit stations are.

Tokyo also offers an example of such integration: faced with many transport operators in the city, Tokyo Metro launched a mobility-as-a-service initiative with a mobile app to integrate multiple transportation modes while linking to various destination services. Indeed, scaling in the new transportation economy requires transit systems to focus on increasing the value of the ecosystem—not just on their own role in it.

Highly visible health and safety measures

Users may also have new expectations about what constitutes acceptable levels of sanitation and air quality. Transit agencies can address

[2] *The Source*, "Get home safely during the holidays," blog entry by Anna Chen, December 21, 2020, thesource.metro.net.
[3] "Half price off-peak travel on public transport," NSW Government, June 22, 2020, nsw.gov.au.
[4] "FLEXPASS," NJ Transit, njtransit.com.
[5] "Perks for all!," SEPTA, iseptaphilly.com.

potential concerns through high-visibility cleaning and by showcasing efforts to increase air-filtration frequency in enclosed spaces. For example, Moscow Metro implemented a series of highly visible initiatives to ensure passengers were aware of safety protocols, including daily disinfection of trains and stations. Agencies will likely also want to review their enforcement of health and safety measures adopted during the pandemic, such as universal mask wearing. While some customers may want these policies to continue, others may be eager for them to end. Navigating competing preferences will require a deep understanding of customer needs and finesse in communicating the reasoning behind the decisions the agency makes.

New rider-focused apps

Real-time monitoring apps can detect the level of crowding in stations, thereby helping people enter the system at less congested points and maintain distance from other riders. Moscow Metro is using a smart monitoring system to track passenger flow in real time, which helps enable greater physical distancing among passengers. As the vehicle arrives at the station, real-time apps can also help direct passengers to the least crowded parts of the vehicle and help passengers plan their trips around crowd levels they are comfortable with. Riders on the Long Island Rail Road in New York, for instance, can use the TrainTime app to see real-time crowding levels in each railcar.

Station ambassadors

Agencies could employ more transit workers in ambassador-type roles, positioning them prominently throughout stations to answer questions as riders regain familiarity with the system. These ambassadors can also provide "eyes on the platform" to create a sense of safety and security. Singapore MRT, for example, employs transit ambassadors to direct passenger boarding and alighting, helping smooth vehicle entry and exit and providing a sense of safety.

Getting started

To get started on a strategy to become the mode of choice, transit agencies can answer a series of questions:

Marketing

— Who should be targeted for returning to the system, how can they be reached, and what messages will be most effective?

Operations

— Who are potential partners in the campaign (for example, major employers and private transportation providers), and how should they be engaged?

— How can the agency increase operational agility (for example, reduce absenteeism or harness advanced analytics to staff the right number of extra-board employees) to ensure the workforce is able to execute such a campaign?

Funding

— Where might funding for additional service or personnel hours come from? Can any existing sources of funding be repurposed for these efforts?

— What are the economics behind critical funding decisions (such as going fare-free or running extra service)? How can management evaluate these decisions?

Maintaining momentum

— How can the agency take a "test, learn, and scale" approach to quickly expand the interventions that are working?

— After the campaign, what interventions should be maintained?

Once they've answered these questions, agencies can conduct scenario planning to test the impact of the campaign. By hosting discussions

about the elements of the campaign with all major stakeholders—including riders, local police departments, other transit agencies in the area, major employers, local department of transportation officials, local city officials, and major real estate developers—transit agencies can gather relevant input and optimize the campaign accordingly.

Transit agencies have a unique opportunity to proactively shape the role of transit in the next normal, keeping riders at the core of their efforts. If executed well, ridership campaigns could put transit agencies in an even better position to fulfill their missions of ensuring safe, reliable, affordable, equitable, and sustainable transportation across their service territories.

For more on reimagining transit in a post-COVID-19 world, see the roundtable discussion that was part of 2021 GII Summit: Project of the future.

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Virgin
hyperloop

Video: Tapping into the future of transport with the hyperloop

As cities grapple with population growth, climate change, and rapid urbanization, the case to embrace mass transit is clear. A system that converges the personalization of cars, the capacity of mass transit, the speed of air travel, and ambitious sustainability goals would be an exciting prospect for the future of transport. The Virgin Hyperloop, presented as an “Inspiring Idea” at the 2021 GII Summit, has the potential to offer an efficient, clean-energy-based mass-transportation system—one that, if fully realized, could serve tens of thousands of passengers per hour, on-demand, with no direct emissions. In this video, Virgin Hyperloop CEO and cofounder Josh Giegel outlines his vision for mass adoption by the end of the decade.

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