



FEATURE

# The futures of mobility after COVID-19

Scenarios for transportation in a postcoronavirus world

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PART OF A DELOITTE SERIES ON THE FUTURE OF MOBILITY

The pandemic has shut millions of people in their homes and disrupted every part of the transportation domain, but leaders can't simply wait to see how tomorrow's reshaped mobility ecosystem turns out. We offer four possible scenarios for the future of mobility.

## Introduction: The mobility world remade

For roughly a decade, we have witnessed incremental but rapid progress toward a new paradigm for moving people and goods. Powered by quickly evolving technologies, new business models, and shifting societal expectations, a future of mobility that is more sustainable, equitable, efficient, and convenient than today seemed inevitable, even if the precise timing and nature of that transformation was uncertain.

And then the mobility landscape was seemingly upended.

As the world grapples with the twin crises of a global pandemic and the potential for a severe and prolonged economic downturn, the imminent emergence of a new mobility ecosystem appears in doubt. Worse: The situation is so fluid, uncertain, and complex that acting with certainty or even conviction can feel less bold than reckless.

But leaders can't sit back and wait to see how it all plays out, and that's where scenario thinking comes in, clarifying the choices before us—and their implications. To that end, this article explores four possible *futures* of mobility over the next three to five years. These scenarios take as their starting point a set of high-level scenarios developed by Deloitte and collaborators, which describe the contours of the world based on how severe the pandemic turns out to be and on the degree of cooperation between and within governments in their response.<sup>1</sup> From these descriptions, which are industry-agnostic, we explored how the crisis is likely to affect the movement of people and goods, including

potential implications for players across the mobility landscape.

Unsurprisingly, we found wide variance across—and within—scenarios. But we also found important commonalities, such as an increased emphasis on hygiene in vehicles, or the growing importance of last-mile delivery and e-commerce, upon which companies can act today with at least a modicum of confidence.

Our hope is that business leaders can use these scenarios to begin to identify the central sources of uncertainty, lay out the strategic choices facing different actors, sketch out potential pathways to the future, and highlight the indicators that players across mobility domains should be watching. Doing so now will put us on firmer footing as the environment becomes clearer over the next several months, helping stakeholders from across the transportation spectrum make better-informed choices as they chart a course that accelerates our collective journey to a better future of mobility.

## The contours of an emerging mobility ecosystem

As we have chronicled over the last five years, the entire way people and goods travel from point A to point B has been changing, propelled by a series of converging technological and social trends: the rapid growth of carsharing and ridesharing; the increasing viability of electric and alternative powertrains; new, lightweight materials; and the growth of connected and, ultimately, autonomous vehicles.<sup>2</sup> The result is the emergence of a new ecosystem of mobility that promises faster, cheaper, cleaner, safer, more efficient, and more customized travel.

While uncertainty abounds, in particular about the speed of the transition, a fundamental shift is driving a move away from personally owned, driver-driven vehicles and toward a future mobility system centered around (but not exclusively composed of) seamless multimodal travel and enabled by driverless vehicles and shared mobility. Far beyond automakers and transit, industries from insurance and health care to energy and media have been considering how to create value in this emerging environment.

As this ecosystem matures, its center of gravity along four key dimensions—*leadership*, *priorities*, *markets*, and *personal data*—has come into sharper relief.<sup>3</sup> These elements move beyond particular technologies or modes and instead describe the fundamental choices and trade-offs with which mobility players are grappling; they provide a rough way to characterize the ecosystem's essential features.

1. **Who's leading? Public sector vs. private sector.** Nearly every aspect of mobility involves a complex interplay between government and business actions, and there are a range of activities on which either party can lead. In some cases, agencies might actively seek to shape a mobility vision, priorities, and behavior. In others, they might empower the private sector, allowing companies to lead.
2. **What's the priority? Systemwide vs. individual outcomes.** Should leaders look to manage mobility to maximize individual consumers' freedom, flexibility, and diversity of choice, or should individual behaviors and outcomes be actively shaped to benefit the overall network? In cities, agencies might use policy and regulatory tools (including fees and pricing) to encourage greater overall throughput and reduced congestion, for example, or to incentivize or mandate access to underserved communities. In a freight supply network, companies or organizations might limit delivery speed, transparency, and

flexibility to better match loads to vehicles across the network.

3. **How are markets structured? Government regulated vs. market-led.** New services and technologies—in mobility and elsewhere—have often outpaced regulation. Should governments proactively create policy, legislation, and regulation that set guidelines within which the private sector must act, or allow businesses a more open market-based approach to drive the pace of innovation and let regulation follow? Note that there is a positive correlation but not a necessary linkage between public sector leadership (*Who's leading?*, above) and a regulated approach. Governments can set the agenda and articulate a vision but look to the private sector for the best way to realize that vision using a light-touch regulatory approach.
4. **How is personal data handled? Collection and aggregation vs. privacy and security.** Data is at the heart of the future of mobility, requiring the private and public sectors to align on standards, legal frameworks, and financial terms for secure, robust data exchange. At the same time, concerns about personal privacy and cybersecurity are growing and remain a priority.

## THE STATE OF MOBILITY BEFORE THE PANDEMIC

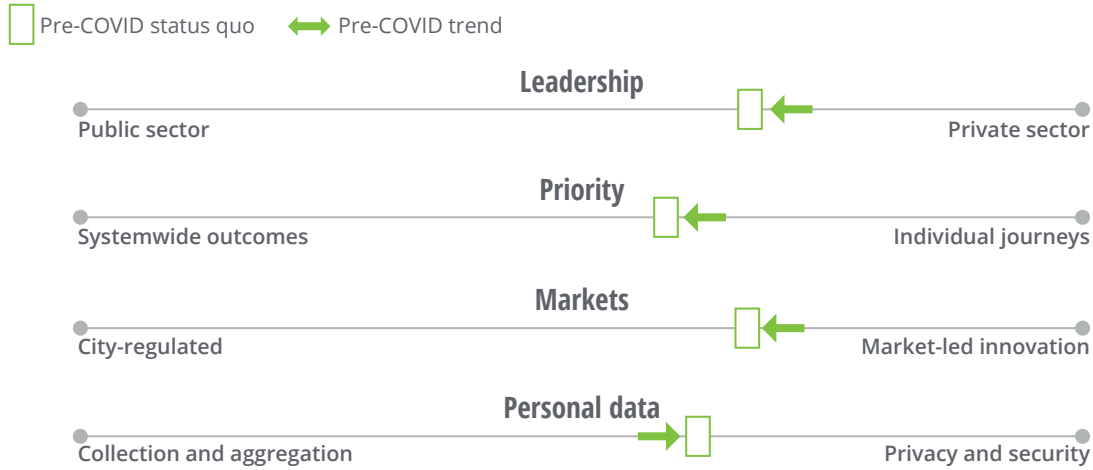
The center of gravity in mobility was in a very different place just months ago. Notwithstanding considerable variation across geographies, modes, technologies, and mobility domains, at the broadest and most aggregated level, our team of experts characterized the precoronavirus mobility landscape in line with figure 1.

**Leadership** has tended toward the private sector, driven by the rapid pace of technological innovation (for example, electric powertrains and automated driving systems), new business models (transportation network companies), an expanded

FIGURE 1

## The state of mobility, precoronavirus

Mobility center of gravity



Source: Deloitte analysis.

set of modalities (drones and electric scooters and bikes), and powered by a steady influx of investment capital. In recent years, the balance has begun to shift toward the public sector, as many cities and others have sought to more actively guide their mobility future.

**Priorities** have tended to emphasize individual journeys, with many technology and mobility providers (ride-hailing and micromobility but also retailers and shippers/carriers) offering services that increased consumers’ options but with the side effect of worsening systemwide challenges such as congestion, emissions, and clutter in the public right of way. As those systemwide issues have grown more acute, both the public and private sectors have shown increasing interest in addressing them. The dynamic extends to freight, where efforts have increased to connect disparate components, reducing friction and inefficiency.<sup>4</sup>

**Markets** tended toward a less regulated environment, with relatively few constraints on businesses and others exploring new forms of mobility. With some exceptions, the development and deployment of autonomous vehicles and advanced driver-assist features, vehicle connectivity,

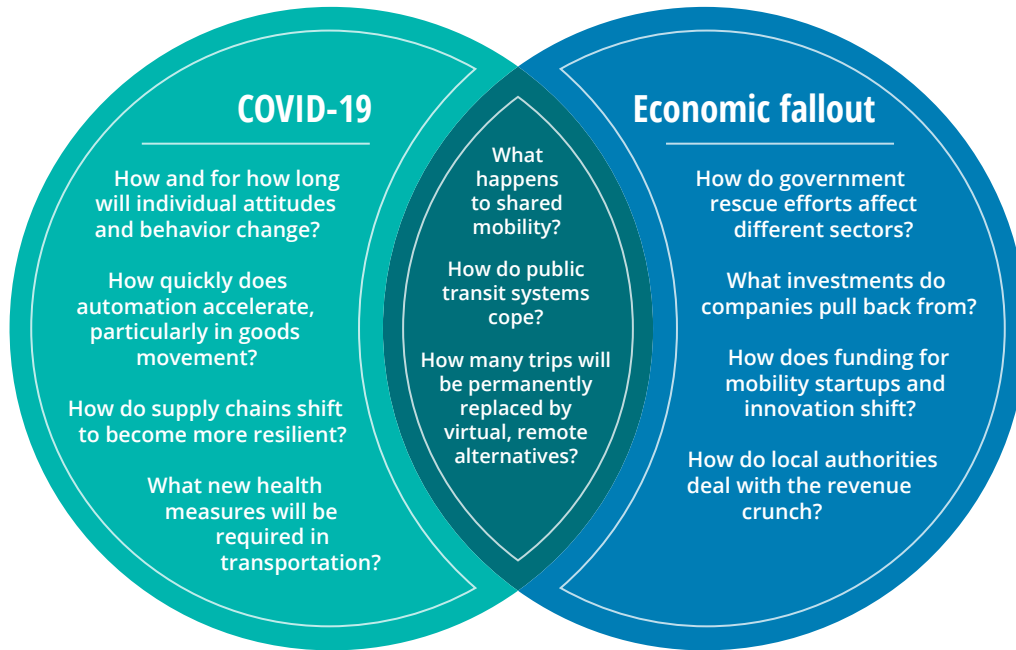
and new modes and business models were not overly hindered by widespread heavy regulation. That, too, had started to shift in recent months, as regulators in multiple jurisdictions began to promulgate more explicit and binding rules.

**Personal data** tended to favor individual privacy and security, albeit with wide variations across geographies; contrast Europe’s General Data Protection Regulation or the California Consumer Privacy Act with China’s extensive system of monitoring. Amid an emerging “techlash” and increasingly contentious battles over mobility data between cities and the private sector,<sup>5</sup> the trend seemed to be moving toward greater emphasis on individual privacy and security.

This assessment of the *status quo ante* is admittedly impressionistic, albeit informed by our long experience engaging deeply with mobility players across the ecosystem. Even before COVID-19, there was wide variation in how different cities and companies were balancing these different dimensions, as our work with the World Economic Forum on Seamless Integrated Mobility Systems illustrated.<sup>6</sup> We expect to see similar variability in a postcoronavirus world, although

FIGURE 2

## COVID-19 and the economic fallout pose fundamental questions across the mobility spectrum



Source: Deloitte analysis.

the pandemic and the global response could drive convergence on some issues.

### Twin crises and their uncertain impacts on mobility

Against this backdrop of innovation and contestation, twin crises are buffeting the future of mobility. The first is COVID-19 itself and the measures that have been put in place across the

globe in an attempt to slow its spread and manage the public health repercussions. The second is the resulting economic fallout, which seems likely to push the world into a recession of unknown severity and duration. These crises, alone or in combination, raise serious, even existential questions for players across the mobility landscape (figure 2).

The trajectory of the future of mobility and the impacts on players across the ecosystem is highly

#### HOW TO USE SCENARIOS

Scenarios are stories about what the future may be like, created through a structured process to stretch thinking, challenge conventional wisdom, and drive better decisions today. They are not predictions about what *will* happen—they are hypotheses about what could happen, designed to open our eyes to new opportunities or hidden risks.<sup>8</sup>

We have chosen a three-to-five-year time frame, as it offers a window wide enough for significant change to take place but narrow enough for executives to take practical action now to build their organizational resilience.



uncertain and could vary dramatically depending on how the pandemic evolves, the health of the overall economy, and on the collective decisions made by governments, businesses, and individuals over the coming months. To explore those alternatives, we look at four possible scenarios for a postcoronavirus world.

## Four possible futures of mobility

Deloitte and Salesforce assembled renowned scenario thinkers to develop a series of possible long-term (three-to-five-year) outcomes for a post-COVID-19 world. At the highest level, the postcoronavirus landscape will likely be shaped by the evolution of two key factors: the duration and severity of the pandemic itself, and the degree to which governments collaborate within and between themselves in the response. Based on the key uncertainties, we developed four notional scenarios:

- **A passing storm.** The COVID-19 pandemic shakes society but, after a slow start, is met with an increasingly effective health system and political response. The virus is eradicated earlier than expected due to coordinated measures by global players to spread awareness and share best practices. Their competence in the crisis renews trust in public institutions. Despite being relatively short-lived, the pandemic causes long-term economic impact. Fiscal and monetary stimulus help blunt the shocks but cannot reverse the losses that small businesses and lower- and middle-income individuals have begun to experience. Tensions sharpen between socioeconomic classes.
- **Good company.** The COVID-19 pandemic persists past initial projections, placing a growing burden on governments around the world that struggle to handle the crisis alone. Public-private partnerships surge as companies step up to be part of a global solution. New “pop-up ecosystems” arise as companies across

industries partner to respond to critical needs and drive much-needed innovation. Social media companies, platform companies, and tech giants gain new prestige. Ultimately, companies shift further toward *stakeholder capitalism*, with a more empathetic stance on how they can best serve their customers, shareholders, and employees in rebuilding after the crisis.

- **Sunrise in the east.** The COVID-19 pandemic is severe and unfolds inconsistently across the world. China and other East Asian countries manage the disease more effectively, whereas Western nations struggle with deep and lasting impacts—human, social, and economic—driven by slower and inconsistent responses. The global center of power shifts decisively east as China and other East Asian nations take the reins as primary powers on the world stage and lead global coordination of the health system and other multilateral institutions. The ability of China, Taiwan, and South Korea to contain the outbreak through strong, centralized government response becomes the gold standard.
- **Lone wolves.** The COVID-19 pandemic becomes a prolonged crisis as waves of disease rock the globe for longer than anyone was prepared for. Mounting deaths, social unrest, and economic free fall become prominent. The invisible enemy is everywhere, and paranoia grows. As isolationism grows, nations put strict controls on foreigners and force supply chains home in the name of local security. Government surveillance is commonplace, with tech monitors on people and their movements.

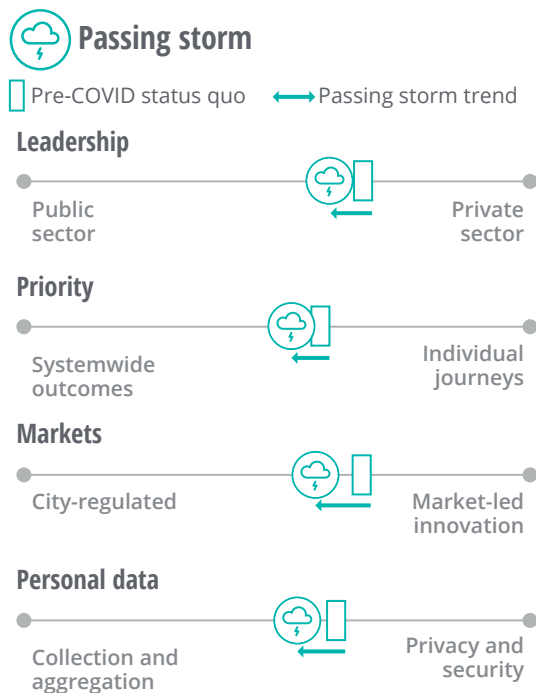
Each scenario offers a high-level description of the state of technology, society, the economy, the environment, and politics. Building off of those general characteristics, we dove deeper into what mobility might look like in each.

Of course, even in narrowing our focus to transportation, these scenarios largely and necessarily omit the near-infinite variations we

will see across geographies. And while these scenarios can be roughly characterized as *optimistic* or *pessimistic* based on the course of the pandemic and how governments respond, those labels do not neatly translate to the mobility environment in each future.

### SCENARIO 1: A PASSING STORM

*Acute but brief public health and economic crises accentuate some enduring shifts in mobility trends, including increased reliance on e-commerce and home delivery and greater emphasis on sanitation and safety. Despite a temporary pullback, most providers and governments return to their status quo ante roles. “Typical” business cycle downturn dynamics play out, with consolidation taking place across the board, from small mobility startups to larger incumbents.*



The COVID-19 pandemic, while relatively brief, alters the mobility landscape in enduring ways. Consumers place greater **emphasis on vehicle sanitation** in cars, buses, trains, and shared bikes and scooters, prompting new self-cleaning materials, certification programs, and form factors—for example, passenger partitions. The

turn to **e-commerce accelerates, as does the importance of last-mile delivery networks**, increasingly enabled by autonomous vehicles and digitization of the logistics value chain. The in-transit experience benefits from advances in digital entertainment and productivity prompted by the pandemic, including, potentially, AR and VR applications.

### The mobility ecosystem hits “pause.”

Advances in new technologies, modes, and business models come to a temporary standstill as near-term government relief and relaxed regulation in some markets provide a lifeline and legacy incumbents (automotive OEMs, suppliers, and dealers, along with airlines, mass transit agencies, major freight carriers, and others) revert to familiar products and services; government funding aims to restart the economy by getting people back to work. American and European automakers reduce investment in electric vehicles and/or autonomous vehicles, while transit agencies forgo modernizing legacy infrastructure and fleets; the push toward automation is temporarily slowed as governments stress getting people back to work. In parallel, venture funding for riskier, longer-term innovation slows down as the time frames to realize ROI get elongated. The mobility business ecosystem sees a winnowing, as poorly capitalized startups fold and even some well-established players see their businesses threatened. Some well-capitalized technology companies are able to strengthen their market positions.

As travel restrictions ease, some organizations maintain work-from-home options, but in insufficient numbers to affect overall mobility patterns; old habits quickly return, as does congestion and reduced air quality in many cities, potentially exacerbated by the reluctance of some to use mass transit. Growth in at-home delivery clogs streets further. That said, some cities that have embraced more progressive, sustainability-focused approaches may try to lock in new mobility patterns by repurposing infrastructure toward active modes (biking, walking) and could

represent the vanguard for implementing mobility innovation. The net result could be an increasingly bifurcated mobility landscape, with low-density cities and rural areas even more reliant on

internal combustion engine-powered personal cars and crowded metropolises moving closer to seamless integrated mobility anchored in public transit and active modes.

FIGURE 3

### A passing storm: Mobility domain impacts

Sector/ domain	Implications
<b>Automotive</b>	<ul style="list-style-type: none"> <li>• Immediate stimulus to the auto industry helps OEMs, Tier 1s, and dealers stay afloat, and there are insufficient economic incentives to fundamentally restructure businesses.</li> <li>• Near-term investment shifts away from mobility innovation around autonomous vehicles and advanced driver assist as well as mobility services, particularly in the United States and Europe and among OEMs with weaker balance sheets. In Asia, government incentives for electrification and new mobility spur faster development and adoption.</li> <li>• The sector overall could cede leadership to tech companies on self-driving systems, mobility-as-a-service, city operating systems, or other innovations. Automakers with strong cash positions that continue to push R&amp;D may emerge as leaders.</li> </ul>
<b>Technology</b>	<ul style="list-style-type: none"> <li>• Venture capital funding dries up in the near term, and the pace of mobility innovation slows but eventually recovers.</li> <li>• Digital mobility tools—e.g., trip planning apps—incorporate health and safety features, enabling consumers to make more informed choices about how, where, and when they travel.</li> <li>• Initial pullback on R&amp;D funding slows advancement of autonomy, vehicle connectivity, and digital technologies for seamless integrated mobility, particularly in the movement of people (rather than the movement of goods), although the focus resumes post-crisis, most notably in Asia.</li> <li>• Autonomous vehicles gain support from citizens as use cases in personal mobility and goods movement become more apparent.</li> </ul>
<b>Freight/ logistics</b>	<ul style="list-style-type: none"> <li>• Rapid expansion in e-commerce and home delivery drives a need for increased last-mile capacity.</li> <li>• Growing emphasis on automation throughout the movement-of-goods network—including in warehouses and the use of tele-operation, autonomous vehicles, drones, and digitization across the value chain to remove friction and inefficiency from legacy (paper-based) systems—speed delivery times. Investment capital shifts to goods movement in response.</li> <li>• Data standardization and exchanges are increasingly deployed to create visibility and accountability.</li> </ul>
<b>Shared mobility</b>	<ul style="list-style-type: none"> <li>• Some consolidation, particularly in the micromobility space.</li> <li>• Providers see growth in areas where city leaders pursue new infrastructure conducive to bikes and e-scooters.</li> <li>• Ride-hail companies continue to diversify into goods delivery, perhaps promoting subscription plans to reduce reliance on per-trip revenue.</li> </ul>
<b>Public transit</b>	<ul style="list-style-type: none"> <li>• Transit suffers a severe crisis, exacerbating preexisting challenges for many operators around declining ridership, maintenance and modernization, and uncertain funding, leading to diminished service and foregone improvements.</li> <li>• However, the public develops a newfound appreciation for transit’s role as an essential service, and the rapid economic recovery prompts cities to attempt to increase funding and prioritize sanitation and other upgrades, with uneven success.</li> </ul>
<b>Local government</b>	<ul style="list-style-type: none"> <li>• Overall, city authorities enjoy increased public trust and greater support for policies aimed at reducing congestion and emissions and improving equity and access.</li> <li>• Constrained budgets during the crisis create a lull in new and innovative programs even as the recovery takes hold.</li> <li>• Public-private models developed during the pandemic are ported to mobility domains.</li> <li>• There is wide variability across geographies, as each government sees the brief crisis as validation of its respective approach to governance.</li> </ul>

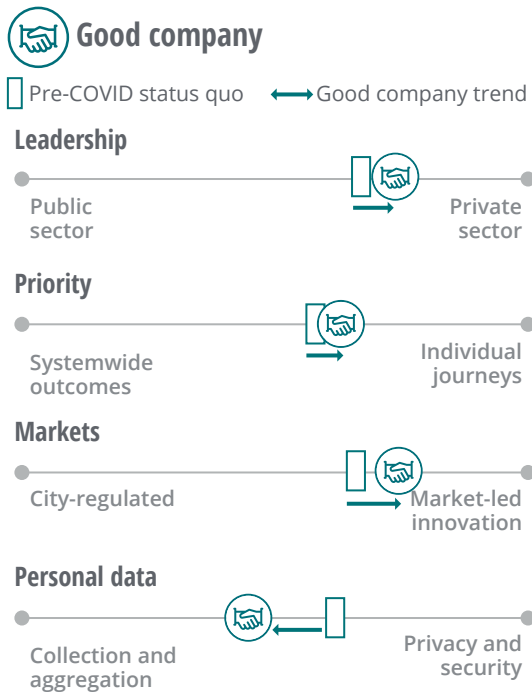
Source: Deloitte analysis.



Given the modest effect of the pandemic and economic fallout, we continue to see **wide variation in approaches to mobility**. In many places, successful efforts to combat the virus invigorate governments, prompting them to **redouble initiatives around sustainability**—in Europe and Asia, in particular, public authorities work to accelerate the shift to electric and alternative fuel vehicles via expanded charging infrastructure, incentives, and bans on internal combustion engines.

### SCENARIO 2: GOOD COMPANY

*Public goods, including transportation, are increasingly provisioned by the private sector. Mobility businesses, especially the largest tech-based providers, step in where government-provisioned services struggle to keep up, offering seamless transportation for their customers. Seeing mobility data's utility in managing the pandemic, individuals are increasingly open to sharing information with the private sector; mobility technology advances quickly.*



The private sector increasingly fills the voids left by the public sector in provisioning of services. **Large, technology-based mobility companies thrive and take a leading position in mobility**, collaborating with governments and legacy incumbent businesses, which find themselves with diminished leverage and relegated to junior-partner status. Privately owned **on-demand flexible mobility (ride-hail, microtransit, micromobility) supplants public transportation** in some routes and markets—or even becomes subsidized and acts as public transit. While privatized transit offers improved movement of people and goods for a portion of the population, it **increases inequality**, potentially tempered by a redoubled focus on stakeholder capitalism.

Large technology and mobility companies dominate the space, forging **public-private partnerships and launching an array of innovation zones** and “smart districts” in cities. The success of data-enabled businesses in monitoring and mitigating COVID-19 outbreaks translates to **increased willingness of individuals to share mobility data** with the private sector. That in turn fuels new mobility innovations and solutions around travel routing and planning and mobility-as-a-service. Cities suffer disproportionately and face a revenue crunch, ceding authority and regulatory power around mobility cost, access, and personal privacy and use of data.

**EV adoption accelerates**, driven by public attitudes, business innovation, and a regulatory environment increasingly shaped by socially conscious enterprises. Autonomous vehicle development accelerates, with more on-street testing.

FIGURE 4

## Good company: Mobility domain impacts

Sector/ domain	Implications
<b>Automotive</b>	<ul style="list-style-type: none"> <li>Increased partnerships and collaboration between large automotive and technology companies to advance electric powertrains, in-vehicle and in-transit systems, and self-driving capabilities—with tech companies increasingly defining the terms of the arrangements and ultimately earning disproportionate returns from the data generated and service businesses associated with managing the entire end-to-end experience.</li> </ul>
<b>Technology</b>	<ul style="list-style-type: none"> <li>Technology giants grow increasingly dominant across a range of mobility fields: autonomous driving, connectivity, freight management and logistics, multimodal integration and trip planning, and others.</li> <li>Expanded access to data speeds advances in some mobility services, boosts integrated mobility-as-a-service offerings, and enables the eventual emergence of company-led mobility operating systems in regions.</li> <li>Accelerated automation could lead to job displacement, particularly among ride-hailing and truck drivers.</li> </ul>
<b>Freight/ logistics</b>	<ul style="list-style-type: none"> <li>At-home delivery for an even wider range of goods grows increasingly commonplace.</li> <li>A handful of large, technology-enabled players dominate logistics and delivery networks.</li> <li>The middle mile “shrinks” as warehouse-to-retail runs decline. Warehouse automation increases.</li> <li>The industry accelerates piloting and deployment of drone and robot delivery, tele-operation/ remote piloting of trucks, and mobile lockers. Remote piloting and driver assist for long-haul trucking and new modes of last-mile delivery increase capacity and productivity to keep pace with growth.</li> </ul>
<b>Shared mobility</b>	<ul style="list-style-type: none"> <li>Consolidation as larger, more established providers absorb underfunded players. Surviving micromobility providers use their clout to push cities to expand supporting infrastructure (e.g., bike lanes) and ease area-of-service requirements, allowing them focus service on more-profitable and densely populated areas.</li> <li>Ride-hail leaders push to ease regulatory requirements around worker status and per-trip fees.</li> </ul>
<b>Public transit</b>	<ul style="list-style-type: none"> <li>Ridership and revenue crunch lead some operators to partially or fully outsource service to vendors.</li> <li>Private mobility services such as on-demand shuttles (microtransit), ride-hail, and micromobility plug gaps, but overall coverage declines to the detriment of underserved communities.</li> </ul>
<b>Local government</b>	<ul style="list-style-type: none"> <li>Weakened cities join partnerships with the private sector, where they are very much junior partners.</li> <li>Local regulations around mobility data-sharing, service to disadvantaged communities, emissions, and congestion are weakened.</li> <li>A light-touch approach to setting mobility standards in some cases speeds time-to-market for particular modes—for example, drones and eVTOL passenger aircraft.</li> <li>Governments grapple with growing displacement of entry-level jobs tied to more rapid automation of driver-driven transportation models.</li> </ul>

Source: Deloitte analysis.

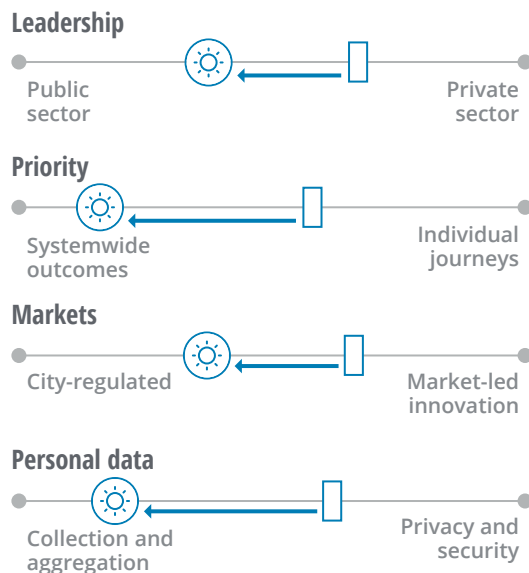
## SUNRISE IN THE EAST

*The East Asian model's perceived success extends from managing the pandemic to mobility. China, Singapore, Japan, and others become the leading hubs for mobility innovation and R&D, overshadowing Silicon Valley and Tel Aviv. The physical and digital value chains for electric vehicles, autonomous vehicles, and other technologies consolidate in the east, to the detriment of European and North American businesses. Active mobility management to address systemwide challenges around congestion and air quality becomes the norm, enabled by robust government data collection and analytics.*



### Sunrise in the east

□ Pre-COVID status quo   ← Sunrise in the east trend



**Asian companies across automotive, technology, and new mobility become globally dominant**, supplanting their American and European rivals, serving both their booming home markets and consumers abroad. China increasingly dominates the battery supply chain, including key raw materials such as lithium and production technologies. Asian companies' investments go global, buying stakes in emerging mobility technologies and securing key IP. Some

Western governments, prodded by the private sector, enact additional protectionist measures to limit the adoption of foreign products, technologies, and solutions such as digital mobility platforms for cities and telecommunications hardware.

**Cities globally embrace a more hands-on approach** to managing mobility, with increased willingness to use policy tools championed in China and Singapore, such as license restrictions for new cars and dynamic road pricing. More **expansive surveillance and data collection by government** is increasingly seen as necessary and beneficial. Together, they enable multimodal trip planning with real-time traffic and transportation information to become the norm, along with more visible public health measures such as temperature checks and mandatory contact tracing.

Major investments in public transit are also seen as desirable, even as many governments struggle to fund them on the heels of an extended economic downturn; China backs some countries' projects via its Belt and Road Initiative. **Consumers gravitate toward long-term leasing, subscription, and rent-to-own models**, pioneered in East Asia, as people shy from big-ticket purchases.

**In this scenerio, cities globally embrace a more hands-on approach to managing mobility, with increased willingness to use policy tools championed in China and Singapore, such as license restrictions for new cars and dynamic road pricing.**

FIGURE 5

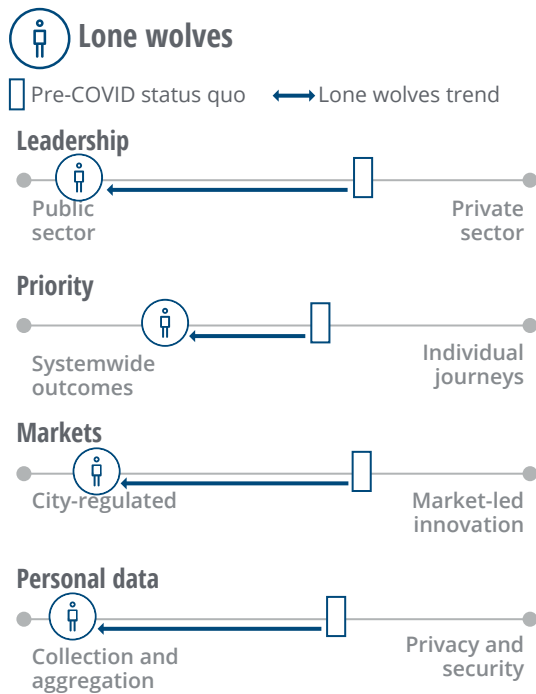
## Sunrise in the east: Mobility domain impacts

Sector/ domain	Implications
<b>Automotive</b>	<ul style="list-style-type: none"> <li>• Severe economic contraction disproportionately affects Western auto companies with portfolios dominated by SUVs, pickups, and luxury vehicles; Asian companies, some with government backing, invest in Western firms.</li> <li>• Smaller vehicles grow increasingly prevalent, as do electric vehicles.</li> <li>• Automakers increasingly offer more diverse financing and leasing products, both B2B and B2C, and enter more partnerships with other ecosystem stakeholders such as lenders and used car dealers.</li> <li>• European and American OEMs lose technological parity and seek protectionist measures but eventually cede market share to Asian automakers.</li> </ul>
<b>Technology</b>	<ul style="list-style-type: none"> <li>• Mobility technology development shifts to the east and accelerates, with advances in battery storage, high-speed charging, smart-grid technologies, autonomy, and vehicle connectivity.</li> <li>• Asian technology giants accelerate efforts to export and deploy their solutions globally, including in-city mobility management and telecommunications.</li> <li>• Western companies seek protection, which may buy some time to catch up.</li> </ul>
<b>Freight/ logistics</b>	<ul style="list-style-type: none"> <li>• E-commerce accelerates, enabled by autonomous last-mile delivery and all-in-one platforms that enable personal travel (mobility-as-a-service) as well as online shopping and delivery, powered by Asian hardware and IP.</li> <li>• China seeks to export its leading capabilities in this space, which were already present before the epidemic hit.</li> </ul>
<b>Shared mobility</b>	<ul style="list-style-type: none"> <li>• Significant consolidation, with large Asian ride-hail and micromobility providers increasingly dominant across the globe.</li> <li>• Some users embrace shared modes to avoid the costs of car ownership following the protracted economic downturn, but uptake is tempered by lingering virus fears.</li> </ul>
<b>Public transit</b>	<ul style="list-style-type: none"> <li>• Many transit agencies endure a severe crisis amid diminished ridership and decreased public funding, especially in the West.</li> <li>• Still, following the example of China, Japan, Singapore, and others, investment in transit is increasingly seen as worthwhile; China steps in to fund some of these programs in exchange for infrastructure, equipment, and services contracts.</li> </ul>
<b>Local government</b>	<ul style="list-style-type: none"> <li>• Asian cities become the leading test beds for adoption of systemwide, integrated approaches to new mobility innovations.</li> <li>• Leveraging widespread data collection and advanced analytics, cities take a more assertive approach to managing and optimizing mobility, taking cues from East Asian megalopolises.</li> <li>• East Asian governments are emboldened, partnering with private-sector “champions” to export these mobility advances globally, even as some Western cities balk over privacy and security concerns.</li> </ul>

Source: Deloitte analysis.

## LONE WOLVES

*National, regional, and local governments accrue greater authority as they lead efforts to combat the coronavirus. Cities force data-sharing and actively regulate mobility via top-down monitoring and control (for example, pricing), first as a way to control COVID-19 and then as a way to meet other, systemwide goals. Data privacy and cybersecurity give way to increased government oversight.*



**Cities, counties, states, and regions seek to exert increasing authority over the movement of people and goods** in their jurisdictions, prompting numerous legal challenges from the private sector and other levels of government. Governments exert strong influence over capital flows, directing it toward “national champions” in traditional industries with an emphasis on job creation. Growing geopolitical tensions and virus-related readiness concerns

make militaries a leading source of investments in mobility innovation. Energy and battery markets fragment and shift to local production, prompting some (for example, the United States) to continue to rely on internal combustion engines while others (China) double down on electric powertrains; absent robust battery supply chains, the development and deployment of some vehicle types (electric vertical-takeoff-and-landing craft and drones, for example) lags in particular markets.

There is a **significant and sustained but uneven decrease in individual travel** across all modes as waves of outbreak lead to shelter-in-place orders, permanent work-from-home arrangements for those able to do so, and increased use of telemedicine and digital services. Use of shared modes declines in favor of private, owned options, and remaining shared options adapt to provide new options for riders (for example, partitioned vehicles, self-cleaning interiors, and certified sanitized rides) as virus fears linger.

**Personal autonomous vehicles see limited deployment to the few who can afford them.** Commutes for some lengthen as people with means flee dense cities for exurbs and shift to telework. Unprofitable or ill-funded mobility providers fold or are absorbed by better-capitalized competitors; in some cases, **governments take stakes and microtransit, ride-hail, and micromobility providers become quasi-public transit.**

Supply chains are dramatically shortened as **countries force production to return onshore.** There is a boom in e-commerce and last-mile delivery as brick-and-mortar retail collapses under the combination of persistent economic hardship and disease transmission fears, resulting in accelerated deployment of autonomous-vehicle technology for logistics.



FIGURE 6

## Lone wolves: Mobility domain impacts

Sector/ domain	Implications
<b>Automotive</b>	<ul style="list-style-type: none"> <li>• Demand for new vehicles falls drastically amid prolonged economic pain. However, OEMs benefit from a growing preference for personally owned vehicles over shared transit options.</li> <li>• The global auto market is fractured as countries raise barriers to trade, with national champions serving local and regional markets.</li> <li>• The combination of smaller markets and limited purchasing power leads OEMs to shift to low-cost, decontented vehicles.</li> <li>• The pace of electric vehicle deployment slows amid depressed oil prices, and efforts to preserve cash curb AV development.</li> <li>• Some automakers enjoy some relief from emissions standards and other regulations.</li> </ul>
<b>Technology</b>	<ul style="list-style-type: none"> <li>• Government priorities—not only virus management but broader mobility objectives, such as influencing travel behavior to manage congestion—increasingly drive solution development.</li> <li>• Heightened international tensions and concerns about readiness and mobilization lead militaries to become an important source of funding for mobility technology development.</li> </ul>
<b>Freight/ logistics</b>	<ul style="list-style-type: none"> <li>• Localized supply chains proliferate, with an emphasis on resilience and redundancy.</li> <li>• Major domestic parcel delivery players continue to grow in their home markets; deemed essential industries, they are given regulatory support to expand operations and accelerate introduction of drone deliveries.</li> <li>• Partial or complete nationalization of some critical supply chains is possible.</li> </ul>
<b>Shared mobility</b>	<ul style="list-style-type: none"> <li>• Ride-hail, microtransit, and micromobility face steep declines in ridership.</li> <li>• Companies able to diversify move into other areas—for example, delivery. Many collapse or are absorbed by competitors, leading to consolidation. Survivors adapt vehicles, with partitions, contactless systems, and self-cleaning surfaces.</li> </ul>
<b>Public transit</b>	<ul style="list-style-type: none"> <li>• Many operators face a severe financial crisis, forcing service cutbacks, layoffs, and foregone maintenance and upgrades.</li> <li>• Many regional transit systems degrade, with outages and route elimination, disproportionately affecting lower-income families and those who live further away from city centers.</li> </ul>
<b>Local government</b>	<ul style="list-style-type: none"> <li>• Cities and regions grow increasingly assertive in managing their mobility environment, compelling cooperation from private-sector providers.</li> <li>• Compulsory data-sharing and enhanced surveillance give public authorities new insights into mobility behavior at a highly granular level.</li> <li>• Priorities in economic rescue funding vary widely globally: Some emphasize new modes and technologies; others bail out incumbent industries.</li> </ul>

Source: Deloitte analysis.

## “No regret” moves—and a fundamental choice

Uncertainty should not be synonymous with inaction. It is too soon to know which, if any, of these potential futures is most likely—or if we may end up in a hybrid world exhibiting features of one or more of them. It is not too early, however, to begin weighing the strategic and business model

consequences of these scenarios and laying the groundwork for whatever mobility world ultimately emerges from the pandemic. As government recovery funding and regulatory changes start to be enacted, organizations will start to make investments and choices. These actions will begin to shape *where they will play* and *how they will win* in the future. It is critical that leadership teams evaluate the trade-offs associated with these

choices now, before it may be too difficult, costly, and potentially late to alter the organization's trajectory.

In the midst of the uncertainty, there are also some trends that we expect will take hold and persist, irrespective of which scenario plays out, specifically:

- **Trip substitution via digitization.**

Telework, telemedicine, and e-learning are likely to become permanent fixtures for some portion of the population, reducing their need to access mobility. Some travel-heavy industries and functions, such as professional services and sales, may never return to precoronavirus levels of movement as people and organizations grow increasingly adept at conducting business virtually. The magnitude of these shifts, and whether it creates a material change in overall demand (for example, miles traveled or mode choice), will depend largely on how long the pandemic and associated stay-at-home orders persist.

- **Action:** Companies and mobility operators should assess their customer base and gauge the potential long-term impact on travel patterns. What proportion are likely to be able to shift to a permanent work-from-home arrangement? Do you rely on commuting or leisure travel? In-depth consumer data, including surveys and demographics, should be used to create a detailed picture, as trends are likely to be highly idiosyncratic.

- **A new focus on—and expanded definition of—safety.** Safety in mobility has long meant avoiding car crashes or preventing crime on buses and subways. As people begin to travel again, a “safe” trip will likely also mean one that is sanitary and hygienic. We can expect a wide range of measures to be deployed where people gather to travel together: health checks or

thermal scans before boarding a shared vehicle or entering a terminal, improved cleaning procedures, reconfigured seating and partitions to create physical distancing, cashless systems to reduce the exchange of money, and more. We anticipate greater use of easy-to-clean materials for vehicle interiors, including self-cleaning ones, and new certification standards to verify cleanliness.

- **Action:** Every organization needs to undertake a comprehensive assessment of its end-to-end operations and interactions with customers through the lens of health and sanitation. Deploying best-in-class measures—and communicating them effectively to users and the public—is likely to become the price of admission for doing business in a postcoronavirus world. That's likely to be doubly true for shared mobility (ride-hailing, on-demand shuttles, bikeshare, shared e-scooters) and mass transit.

- **Growing reliance on e-commerce and home delivery.** The perceived health risks of venturing into crowded stores coupled with stay-at-home orders is accelerating the rapid shift toward online retail and home delivery. We will likely see increased attention to, and innovation around, supply chain optimization, long-haul trucking, and last-mile freight movement, with expanded testing and deployment of automated delivery via robots and drones, as well as remote operation and autonomous drive for long-haul trucking.

- **Action:** Explore ways to capitalize on e-commerce and home delivery. Online retail and last-mile fulfillments were already growing rapidly precoronavirus, and the pandemic will likely accelerate the trend. Companies across the mobility spectrum should consider how they can best move into the space. That could mean

a renewed emphasis on commercial vehicles, accelerating deployment of delivery solutions (such as autonomous robots or drones), or shifting resources from the movement of people to the movement of goods, as some ride-hailing providers have done.

- **A reconfigured mobility landscape.** Few if any across the transportation ecosystem will survive these crises unscathed. Some players will exit, new entrants may rise, partnerships will be forged, and investments will ebb, flow, and be reallocated. New consumer preferences, new use cases, and new business models are likely to emerge. Mobility, already a highly dynamic space, looks set to be even more fluid over the coming months.

- **Action:** Take stock of your current ecosystem partners and assess what new collaborations might be needed. Develop a robust and active market, competitor, and ecosystem sensing capability to inform the effort. Public-private engagement and cooperation will likely feature prominently in any mobility future, so actively building those relationships now could pay dividends.

Beyond these “no regret” considerations, each scenario has room for a wide spectrum of mobility outcomes. There is a world in which the virus passes relatively quickly and the economic damage is acute but short-lived—and which sees people retrench into old movement patterns, dominated by private cars, powered by fossil fuels, and with even fewer viable alternatives than what we’ve known over the last several years. Likewise, a scenario that sees ongoing waves of infection, the breakdown of governmental cooperation, and the rise of more intrusive surveillance could nonetheless find pockets of a new mobility landscape, with reinvigorated public transit, a rekindled enthusiasm for walking and cycling,

cleaner vehicles, and the use of technology to enable more efficient and convenient journeys for people and goods.

Which of these outcomes is most probable hinges critically on the decisions made by myriad stakeholders—including readers such as you—over the coming months. *The fundamental choice, which will manifest in a thousand variations across the mobility ecosystem, is simple: Do they fall back on old ways, abandoning new modes and services and focusing on legacy businesses or departing the mobility landscape altogether? Or do they maintain and even redouble efforts to forge new approaches that propel us to a reimagined mobility system?* The latter path takes courage, conviction, and, yes, a greater tolerance for risk, and may be beyond the wherewithal of many. As we have written about extensively, this future is dependent upon a new ecosystem emerging, where roles shift, as do the sources of value creation. Like all crises, this one offers opportunities to conceive of different ways to establish success in a mobility landscape undergoing significant change.

As you consider that essential choice and these scenarios, challenge yourself to imagine how the things you were certain would happen could now be on a different course. Avoid the temptation to conclude that the crisis will accelerate the changes you already expected or believed were inevitable. Ask yourself:

- Which of your **previous expectations** need to be rethought? What prospects that seemed unlikely or years away could be accelerated, such as shifts in travel behavior and preferences or the deployment of autonomous vehicles?
- What might **consumers value** in these different worlds: cost, convenience, speed, safety, privacy? How might that vary across key variables—for example, region and demographics?

- What are the **biggest threats** to your current business in these worlds?
- How does the different **roles of government** in these scenarios influence your strategy and freedom to operate?
- What new **providers, companies, business models, and ecosystems** might emerge? Which existing companies are best positioned to succeed?
- What **capabilities, relationships, and assets** are important in these worlds?

Stakeholders will need to closely track both the overall situation (pandemic severity and how governments react) and their specific mobility environment to gauge which future—or combination of futures—is beginning to emerge and be prepared to pivot their response accordingly. *Agility* is a trait many organizations

aspire to but few attain<sup>9</sup>—and it may be the most important capability of all going forward.

## Conclusion: Making the world in which we want to live

In forthcoming articles, Deloitte will be exploring the implications of coronavirus on the future of mobility in greater depth, including diving deeper in the potential future scenarios, their key drivers, and their implications for different players in the mobility space.

While the ability to shape which mobility future comes to pass is beyond any single actor's control, we are hardly bystanders. Every participant in the mobility ecosystem—down to every individual—can influence its direction through the choices we make in the coming months. And collectively, by convening and activating that ecosystem, we can create monumental change for the betterment of society.

**The fundamental choice is simple: Do they fall back on old ways, abandoning new modes and services and focusing on legacy businesses or departing the mobility landscape altogether? Or do they maintain and even redouble efforts to forge new approaches that propel us to a reimagined mobility system?**

## Endnotes

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## Acknowledgments

The authors would like to thank many colleagues for their insights, including **Sam Abidi, Andrew Blau, Justine Bornstein, Ashok Divakaran, Adam Mussomeli, Yvonne Rene de Cotret, Chris Starks, Joe Vitale, Philipp Willigmann, Kellie Nutall, John Moavenzadeh, and Klaus Entenmann.**

The authors would also like to thank **Megha Bansal, Govind Awasthi, Jose Berruecos, Ellen Carter, Chin Wei Gan, Jessica Liss, Larry Rakhlin, Tejus Shankar, and Jodie Yuen Ying Loke**, who were instrumental in fleshing out the scenarios.



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The entire way we travel from point A to point B is changing. This transformation is creating a new ecosystem of personal mobility, with implications affecting more than just the automotive industry. Our Future of Mobility practice serves the entire ecosystem of companies working in and around mobility to actively shape its emergence.







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