National Transit Adaptation Strategy

The transfomation of public transportation

Preparing to face the future

IFTF
Institute for the Future

SFMTA

What if the future of public transportation is already here?

Now is the time to anticipate the future of public transit and work with provocative visions of possibility to take bold action in the present and build resilience in the system.

By identifying the potential impacts of future forces now, public transit agencies can avoid being blindsided by change and take steps toward a preferred future. Doing nothing is not an option, as system collapse is within the realm of possibility.

Just as the pandemic revealed and exacerbated the cascading and intersecting crises of climate change, racial reckonings, and economic and social inequalities in society, it also intensified challenges transit systems were already facing.

One key metric for public transit is ridership. As ridership and revenues decline, public transit agencies need to figure out how to regain trust and build ridership as they shift from responding to the pandemic to understanding how public transport can contribute to economic recovery, climate action, and social and racial justice.

Digitization and the dislocation of work from urban centers have shifted mobility patterns, some permanently. As public transit agencies nationwide look to the future of transportation, they will need to consider a range of social, technological, economic, environmental, and political future forces affecting transportation, ridership, and trust. By bringing foresight and imagination together, we can see a wide range of future possibilities and work together towards a preferred future.

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INTRODUCTION

An invitation to explore the future

Institute for the Future (IFTF) collaborated with the San Francisco Municipal Transportation Agency (SFMTA) in producing this map to explore the future of public transportation by considering the forces, challenges, and opportunities shaping the next decade. This map is primarily intended for public transit agency staff, though it can be adapted and modified for use with public audiences (see page 10 for public engagement ideas).

The map organizes future forces into the social, technological, economic, environmental, and political factors that will shape the next decade of public transportation. You can explore each future force and its critical forecasts and signals of change we see today. Each future force points toward potential transformations and the map explores potential impacts across five impact zones. You are invited to tailor details of the future forces, impact zones, or scenarios to the unique characteristics of your agency, city, and public transit system, and use this map and toolkit as a starting point for exploring future possibilities in your own location.

MARKETS
Impacts on different groups of transit riders as defined by their distinct needs and patterns of mobility and movement.

SERVICES
Impacts on the portfolio of products, services, and experiences and their distinct value proposition, design, and delivery.

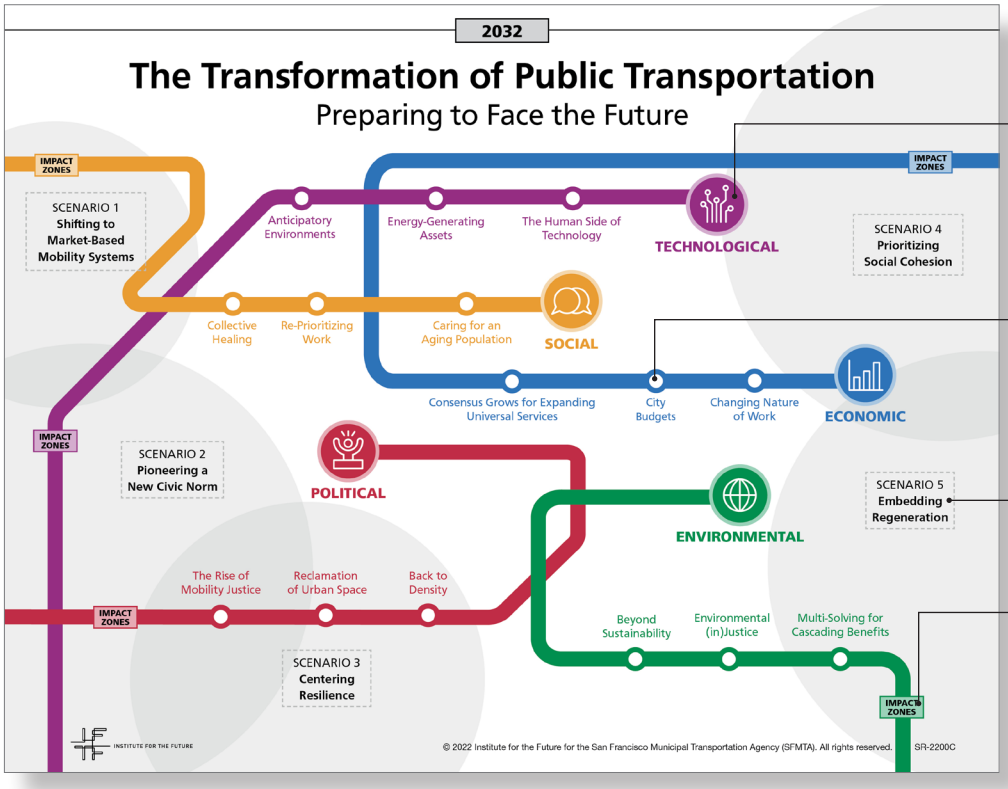
DECISION-MAKING
Impacts on factors that affect transit decisions: price, convenience, seamless connections, and other market alternatives.

RISKS
Impacts on the cost-benefit calculation of risk (actual and perceived), including everything from personal safety to climate risks.

FUNDING
Impacts on funding streams, financial incentives, and assets.

The map also contains five future scenarios for public transportation. Scenarios are stories of possible transformations that may evolve over the next decade. They are inspired by multiple forecasts and signals of change. **These scenarios are not predictions, nor are they necessarily preferred futures.** These scenarios dramatize different and plausible trajectories of change. As a result, they are designed to provoke conversation and identify insights that result in better-informed decisions today. By considering a wide range of future possibilities—each with its own pathway toward transformation, set of implications, and trade-offs—transit agencies can prepare to face the future.

Map structure and legend



FUTURE FORCES | 5 future forces (Social, Technological, Environmental, Economic, Political) driving change in public transportation over the next decade

FORECASTS AND SIGNALS | 15 shifts organized by future force with present-day developments pointing to potential transformations

SCENARIOS | Stories of possible transformations a decade from now

IMPACT ZONES | Potential impacts across markets, services, decision-making, risks, and funding

A toolkit for using this map

This map is a resource for exploring the future forces shaping the next decade of public transportation and contains a set of scenarios charting possible pathways toward transformation. It is designed to provoke you into conversation and calls on you to identify critical insights that could result in better-informed decisions today. Only by facing the future with our eyes wide open can we see our preferred future and move towards it.

What is your preferred future for public transportation?

Moving toward your preferred future starts with immersing yourself in the map and exploring the future forces, forecasts, and signals of change. **While doing this, think …**

- about how each particular future force could impact public transportation in your city or community, and
- through the impacts across markets, services, decision-making, risks, and funding.

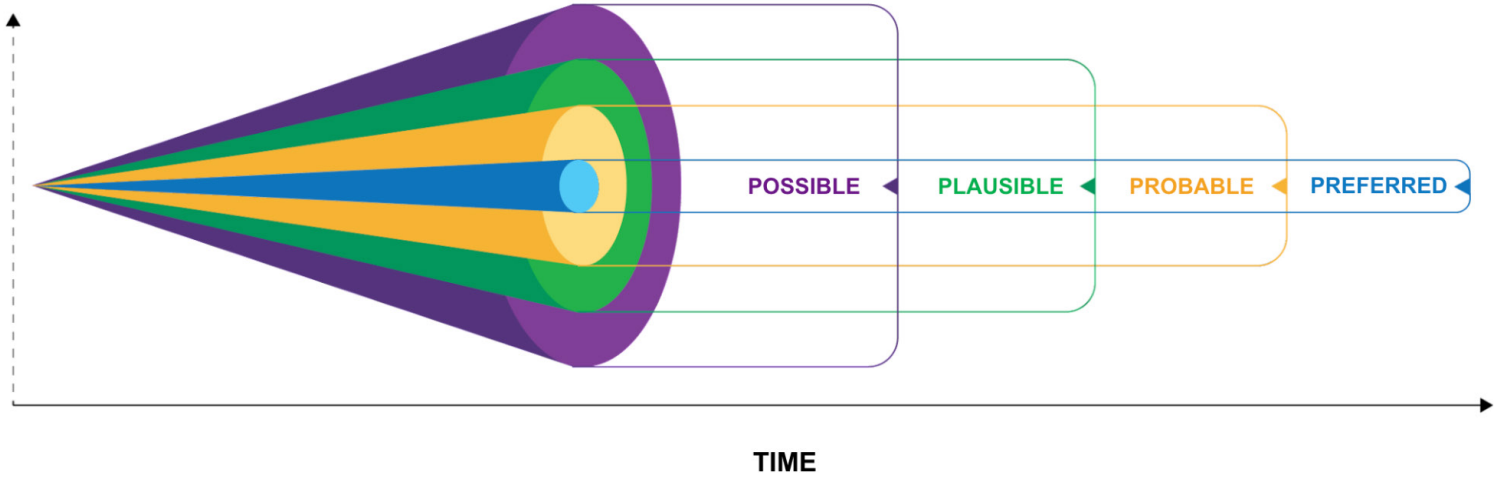
Then, consider each of the five scenarios and imagine how daily life and mobility in your city or community would change. **Ask yourself:**

- Who benefits from these changes?
- Who loses?

Next, **think across all five scenarios:**

- Identify those aspects from each scenario that you think could transform public transportation in your city or community for the better.
- Write these down.
- Share with other stakeholders.

Now, identify your preferred future for public transportation. Your preferred future may contain elements from one or more scenarios, as well as new ideas inspired by the scenarios. A preferred future is the aspirational future we want to implement for ourselves, our organization, our stakeholders, or our community. Preferred futures build a bridge between our practical plans of today and the changing dynamics and possibilities of the future.



To do this you can:

Optimize for the values you want.

Each scenario on the map has a strong throughline that optimizes for a particular set of values as a way to play out distinct directions for the future of public transportation. These values—profit/monetization, human-centeredness, resilience, equity, and regeneration—guide different ways to transform public transportation and public transit agencies.

One way to chart your preferred future starts with identifying the values that matter for your city or community and building your own scenario that optimizes for those values. To identify the values that matter, and see where there is consensus and differences in point of view, you can canvas your stakeholders with a short survey or facilitate an open conversation and hear directly from each other.

Look for the future in the present.

The map contains signals throughout. Signals are specific behaviors, actions, or experiments that have the potential to transform public transportation if it were more widely accepted or adopted.

One way to clarify your preferred future for public transportation is to identify your own signals that inspire change and imagination. Signals can come from the changemakers in your own community or from other communities that are pioneering changes that could transform your future.

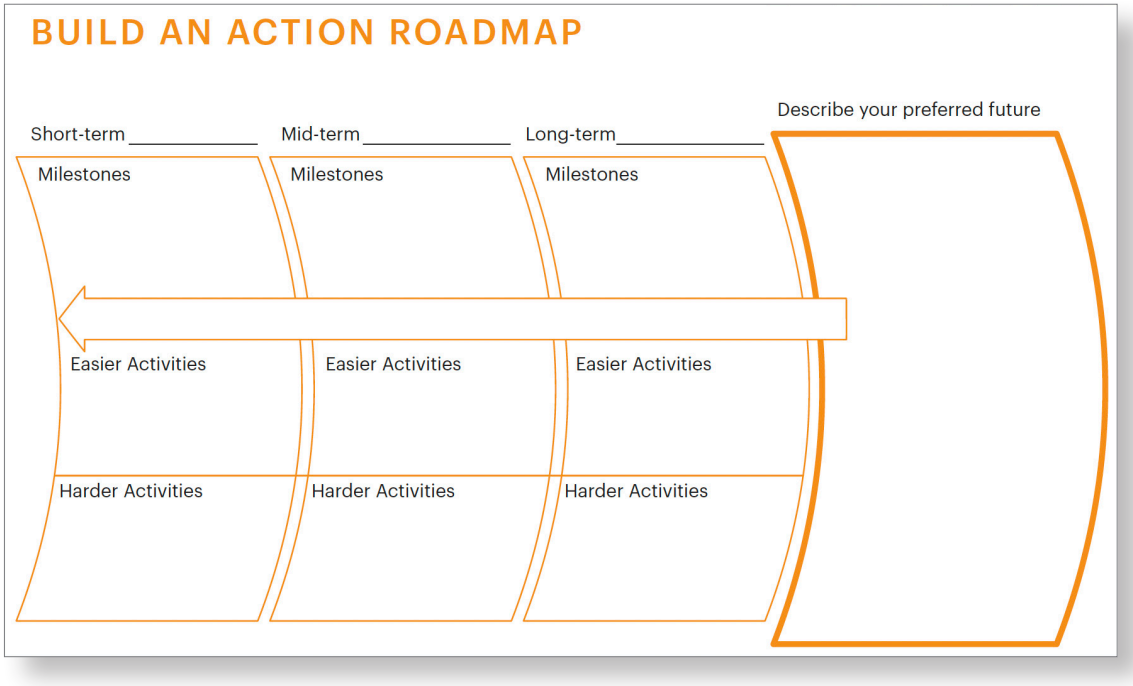
Identifying signals works best as a group effort for collecting—and especially for analyzing and answering the question, so what? Why does this signal matter? Bonus: Look for signals that align with the values that define the through line of your preferred scenario.

Focus on insights and impacts.

After you have immersed yourself in the foresight across the map, you and your stakeholders can focus on identifying insights. Insights are the threats or opportunities that emerge from the foresight and forecasts. You can be systematic by considering each impact zone: markets, services, decision-making, risks, and funding. Or, you can focus on one or two impact zones or on specific critical concerns—such as expanding ridership.

Next, prioritize these insights with your stakeholders and focus on a subset that lines up with an important goal—build ridership, address the climate crisis, etc.—and then map actions to reach that goal across a spectrum, from easy to difficult to accomplish or from high to low impact. This will give you a framework for identifying and prioritizing concrete actions to take in the present. Remember: we can't predict the future, but we can get ready for it.

You can follow this example worksheet to help build your plan for action.



Engage imagination and harness public participation

The future is wide open and all foresight exercises should be participatory. This map contains all the building blocks needed for engaging the larger public in your city or community and creating opportunities for a wide range of stakeholders to imagine the future of public transportation with you. There are many formal and informal ways to do this. Public engagement should be designed for maximum participation and be kept simple. Remember the goal is not feedback on your preferred future but rather to encourage participants to be provoked into sharing stories about how they might feel and what they might do in the future that you share. Here are some ideas for you to consider for harnessing public imagination as you embark on pursuing your preferred future for public transportation.

1 | Host a Town Hall

Host an in person and/or virtual meeting to share the future forces and scenarios and discuss reactions. You can share this map with anyone who signs up or expresses interest in the Town Hall, and then remind people of each scenario with a high level summary during the meeting. Invite people to share in small groups, with prompted questions around how these scenarios would impact them, what they would do, what choices they might make, etc. Capture responses digitally or in person and send a report-back to participants with high-level themes that emerge.

2 | Start a Social Media Campaign #future

Start a public conversation on social media to solicit input, ideas, and reactions from the public. Allow people to build on each others' reactions to create new stories and possibilities. Choose a # (hashtag) and encourage people to share their responses to prompt questions around how these scenarios would impact them, what they would do, what choices they might make, etc. Assign a staff member(s) to engage with the public, prompting them to go deeper or explain a response or reaction.

3 | Create an Augmented Reality (AR) Experience

Place QR codes up around bus shelters, on buses, trains, stations, nearby restaurants, etc that are creative and enticing. The QR code takes people to an AR app (like UrbanAR here and inCitu here) that allows them to see a future possibility from the scenario(s) overlaid on existing infrastructure, either as stand-alone imagery or accompanied by a recorded narrative. Include a feedback or input page where participants can comment, react, or add ideas.

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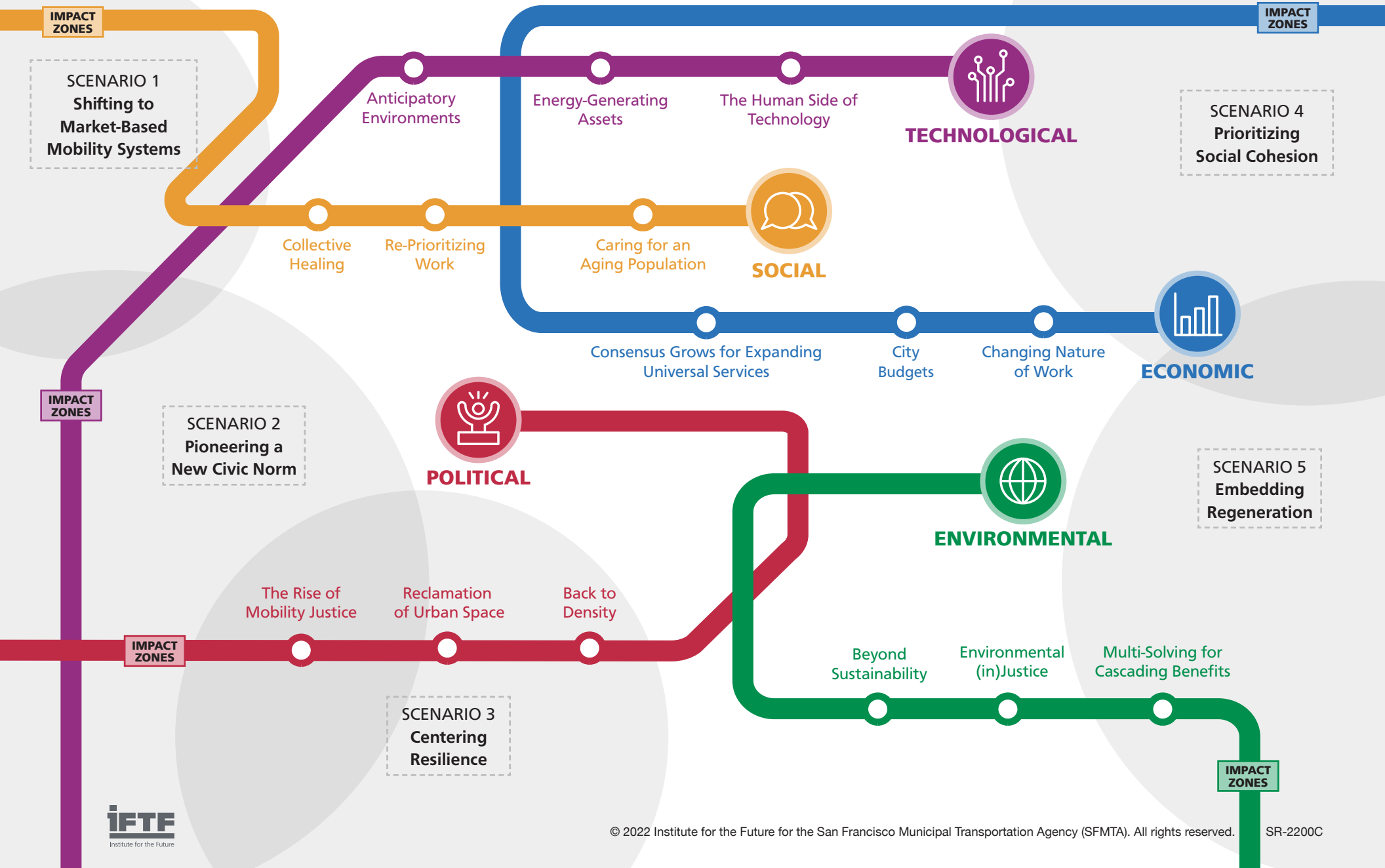
The Transformation of Public Transportation

Preparing to Face the Future



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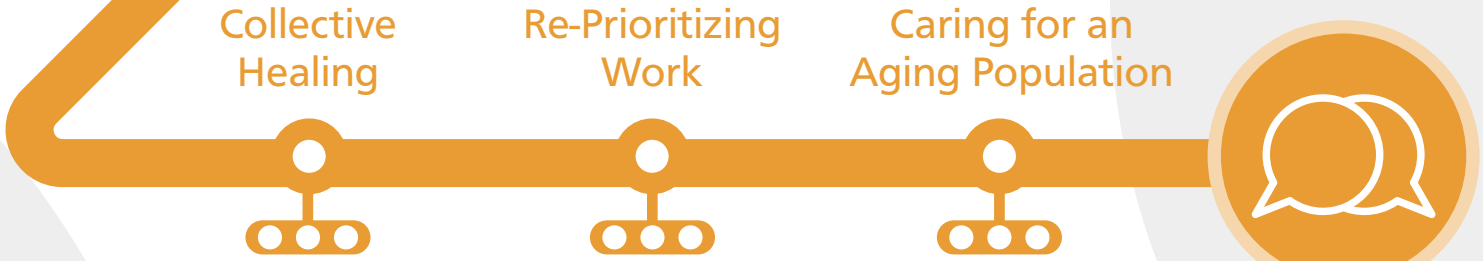
IMPACT ZONES



SOCIAL

SOCIAL

How can public transit agencies help people connect their individual experiences to a collective greater good?

How might public transit agencies support care and healing work?

Radical reshaping of human movement through urban spaces

The need to heal from catalytic events from 2020, a de-prioritization of work in our lives, and evolving demographic changes will continue to shape where and how we move over the next decade. With that shift will come a need for new transit priorities and patterns. As we reshuffle our daily lives over the next decade, transit agencies will need to act with flexibility to anticipate and react to these changes. This will include reconfiguring public transit services and/or opening markets for new private mobility services or partnerships. What does a rush hour commute look like with emptied downtowns, hybrid and flexible schedules, or new demands of a care-oriented workforce? With daily routines and rhythms still evolving, major bus lines or even express routes may decline, while residential-to-residential or leisure routes may experience increasing demand.

An aging population will present new needs to the system. The aging rider will require more attention to their mobility needs, and to their need to connect to an ever-expanding care ecosystem. At the same time, opportunities for the role of transit may expand to be a critical part of the care and healing infrastructure. Our individual and collective mental well-being will continue to weigh on our daily life decisions and choices, amplifying our needs for safety and security, social interaction, and connection.

Collective Healing

From collective trauma to recovery and re-entry

Recent history-making events—including the COVID pandemic, a global movement to support Black Lives Matter, geopolitical conflicts including the Russian invasion of Ukraine, extreme weather events, and the opioid crisis—have added to an already critical mental health crisis that will yield serious health consequences for years to come. David Rock, author and cofounder of the NeuroLeadership Institute, explains that the trauma we've experienced stems from three unmet psychological needs: certainty, control, and connectedness with others. Now two and a half years into the pandemic, people are confronted with imagining a post-pandemic life that includes living with COVID. Rock suggests that before we try to navigate what a new normal is, we must first recover from the trauma of these life altering, stress-inducing experiences at both the individual and collective levels.

Collective healing will require an all-in approach, with public services agencies that are seemingly isolated from mental health being tasked with creative solutions for applying their resources and assets to address this crisis. How can public transportation agencies play a key role in restoring people's trust, control, autonomy, and social interactions?

Source: hbr.org

SIGNALS

Librarians as mental health first responders

WHAT: Through an experimental pilot program, Baltimore leaders are addressing the need to heal the city that has "suffered trauma for decades, including more than 190 homicides [in 2021]." Its answer: convert libraries into community healing centers and train librarians as first responders by teaching them how to spot and assist people dealing with trauma.

SO WHAT: Mass trauma requires massive healing efforts. Baltimore's city-level, healing-centered policy and interventions could serve as a model for other cities on how to turn city facilities into places for healing and connectedness, and retrain city workers to be mental health advocates. Recognizing a pervasive need for mental health support, cities might task every agency—regardless of its core mission—with a different piece of the healing puzzle. What might it look like for transit agencies to add a mental health support lens to their plans and operations?

Source: ajc.com

A prescription for nature

WHAT: Research has shown that time spent in nature can reduce stress and contribute to healing. To this end, doctors in Canada can now prescribe free passes to national parks for patients who might benefit from more time in nature. A similar program exists in the United States, ParkRx.

SO WHAT: Nature prescriptions signal an acceptance of out-of-the-clinic approaches to treating both mental and physical health conditions. Companies, too, might start requiring days in nature to inspire and provide rest to their workforces. In addition to improving health, there may also be benefits to the environment from more people interacting responsibly with nature, so environmental advocates might also push for required days in nature. How might transit agencies support healing through nature, while also ensuring that the ways in which people access and experience nature have a small environmental footprint?

Source: forbes.com

Community sanctuaries for self-determination

WHAT: Propelled to action in the wake of George Floyd's murder and national racial reckoning, The Freedom Georgia Initiative bought land with the vision to develop 502 acres for "the establishment of an innovative community for environmentally sustainable-living, health & wellness, agricultural & economic development, arts & culture," specifically for Black families.

SO WHAT: With various forms of mutualism and co-housing gaining popularity, the Freedom Georgia Initiative's vision of creating their own subdivision as a safe haven for Black families is an example of how new forms of living might look. As new forms of social structures and governance develop, grassroots cities like these will eventually need infrastructure and systems such as transit for their internal use. How might public transportation agencies cater to nascent co-housing communities that are building their own cities outside of dense urban areas?

Source: thefreedomgeorgiainitiative.com

Re-Prioritizing Work

From the dominating force to achieving life-work balance

The fundamental shifts in work during the pandemic, including remote work, health, safety, and work-life balance, have prompted individuals to re-evaluate the role of work in their lives. Whereas work and the workplace previously served as a centering place that fulfilled multiple needs—including economic security, social interactions, and purpose—the dominance of our jobs in our daily lives is being renegotiated. Rather than anchoring life around a rigid work schedule, people are re-configuring how they use their time, such as spending time with or caring for family and finding meaning and purpose. Many are choosing to quit unfulfilling, over-demanding jobs, and in some cases remaining unemployed.

Changing workers' needs and people's need for balance and self-care will alter new life and mobility rhythms. Will calls for the end of the five-day workweek translate into policy? As we renegotiate the role of work in our lives, the systems that support our commutes and daily work lives will likewise be confronted with new needs and demands.

Source: theatlantic.com

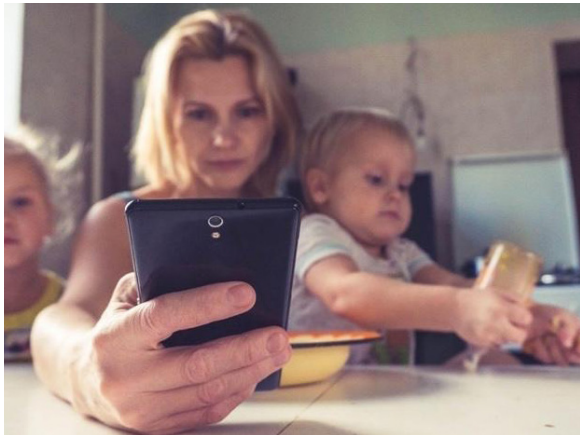
SIGNALS

Reddit 'antiwork' forum booms as millions of Americans quit jobs

WHAT: Amidst the Great Resignation, Reddit's 'antiwork' forum, r/antiwork, ballooned from 180,000 in October 2020 to 1.9 million in April 2022 as the ongoing pandemic led many to re-evaluate their careers. "Idlers," as members of the antiwork movement call themselves, largely believe that people should strive to work as little as possible, and preferably for themselves.

SO WHAT: A growing segment of the population is rethinking the requirement to work for a living. People are realizing that the economy runs on bad jobs and they no longer want to participate. There is a huge opportunity space for what will "fill" the time that was once taken by work, and an opportunity for transit agencies to offer services for residents looking to travel for leisure. How might transit cater to "anti-workers"? How might careers in public transportation appeal to those leaving their jobs?

Source: ft.com

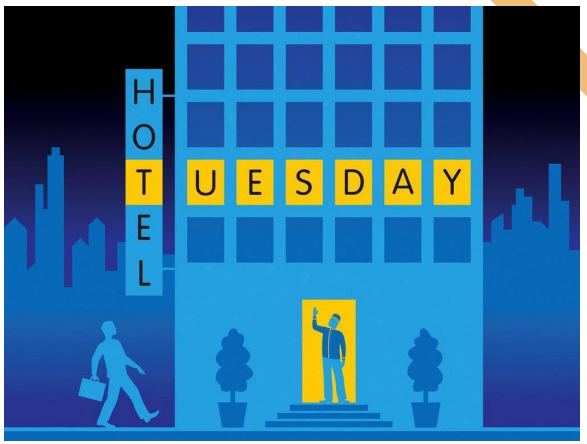


Parents quitting jobs for more flexibility

WHAT: A multinational study by McKinsey & Company found that parents were more likely to quit their jobs compared to their non-parent counterparts. Two of the top reasons included caring for family and ability to work remotely. To address their needs for flexibility, these parents have moved on by either starting or planning to start their own business and turning to gig work.

SO WHAT: Working parents are taking drastic and concrete actions up to and including resigning to meet personal responsibilities. New types of flexibility in both place and time may open up new daily patterns for parents and their families, including where and how they move. How might transit agencies focus on the needs of families, and anticipate what routes, services, or accessibility parents and their children might need?

Sources: mckinsey.com; wsj.com; pewresearch.org



Suburban super commuters splitting time

WHAT: As offices reopen, a new type of super commuter has emerged: the suburban worker who manages the hours-long commute into the city by staying at hotels for a few days midweek when they must make in-person appearances in the office.

SO WHAT: These workers point to an increase of housing choices for those who don't want (or can't afford) to live in the city center. If these super commuters were previously traveling by car, their few-day-stays in the city could present a new rider base for public transit agencies. How can public transportation agencies reach these super commuters? What partnerships (with employers, for example) might enable communication with these potential riders?

Sources: nytimes.com; theguardian.com

Caring for an Aging Population

From limited demand to an expanding care ecosystem

The fastest-growing age group in San Francisco is adults 60 years and older. This group is expected to reach 27% of the city's population by 2030 (up from 23% in 2020). As this group continues to age, there will be a subsequent increase in demand for an expanding care and mobility economy, as well as an ecosystem of supportive services. These services will need to address common challenges facing older adults such as aging in place, increased social isolation, limited mobility, limited incomes in an expensive housing market, and neurological disease (1 in 6 seniors will develop Alzheimer's; 1 in 5 will develop dementia).

The lack of affordable caregiving options will pressure family members and loved ones to fill the caregiving gap. Already, 61% of family caregivers say caring has affected their employment situation, whether switching careers, downgrading to flexible part-time work, or leaving the workforce altogether. Physical or cognitive disabilities among the aging population will require access to reliable and affordable social and public services—including transportation—for older people and those who care for them. By adapting services to center the needs for an aging population, public transportation agencies can become more accessible not only for this growing population, but also for their caregivers and others who might benefit from these changes to the system.

Sources: sfhsa.org; alz.org; fortune.com; hrexecutive.com

SIGNALS

Free public transportation for seniors leads to better mental health

WHAT: Findings from one UK study on free public transportation "suggest that benefits from increased transport use likely stem from reduced loneliness, increased participation in volunteering activities and increased contact with children and friends."

SO WHAT: While the main purpose of transportation is to move people and things, there is the potential of public transit to be seen as a public health tool to help older adults or people facing severe social isolation. Transit systems that cater to older adults—from ensuring pedestrian safety as they access transit hubs to accessibility of vehicles, to welcoming this population and ensuring they can easily arrive at social locations—might have an advantage in expanding their rider base to include this subset of the population. How might public transportation systems cater to older adults to help them feel safe and to reach their desired locations?

Sources: reuters.com; laketran.com

An app for both senior companionship + transportation

WHAT: Papa, an on-demand companion and assistance service for seniors, has partnered with Uber Health to provide transportation services in a battle to decrease social isolation among older adults.

SO WHAT: This partnership highlights the fulfillment of two critical needs of seniors, logistical transportation and social interaction, which have been shown to lead to better health outcomes. Other similar programs, including GoGoGrandparent (that connects seniors to gig economy services even if they don't have a smartphone), or other "door through door" services that help seniors in and out of their destination, are typically private services. Might there be an opportunity for a public transit agency to partner with companies like these when offering para-transit or senior-focused micro-mobility options?

Source: mobihealthnews.com

The Village to Village Network

WHAT: Generation X is getting involved in the Village to Village Network, which assists older people with the practical supports they need to stay independent at home and engaged in their communities. "Villages" build a sense of community and offer resources, services, programs and activities, including social and educational programs, health and wellness activities, volunteer assistance with transportation, light home maintenance, and technology coaching.

SO WHAT: A multi-generational interest in aging in place, with a network of community caregivers, could create demand for an ecosystem of services and support. Transportation options that assist aging in place with a high degree of independence will become more attractive to potential users who otherwise might turn to other travel options.

Source: nytimes.com

IMPACT ZONES & IMPLICATIONS

The next decade will see major shifts in responses to critical social and community issues. These will include how we address collective healing from the trauma of the pandemic era and how to meet the demands for care for an aging population. After the dust settles from a reshuffling and reprioritization of work, there will also be new needs based on where we'll live, and where we will choose to go. In responding to these social issues and changes, public transit agencies should consider the following:

MARKETS AND RIDERS

Impacts on different groups of riders as defined by their distinct needs and patterns of mobility and movement.

The biggest challenge and opportunity for transit agencies moving forward will be how to re-envision themselves and the people they serve around a ridership that is using the system for needs other than commuting to and from work. Changing demographics, aging populations, and widespread health challenges all present shifting markets; a great deal of energy and attention will be needed in both identifying riders beyond the traditional archetypes as well as understanding how to incentivize them and meet their needs so they use the system. For public transit agencies to capture these markets, they should embrace flexibility to pivot messaging, accessibility, and routes.

SERVICES

Impacts on the portfolio of products, services, and experiences and their distinct value proposition, design, and delivery.

Transit agencies now need to operate with the non-commuter rider in mind. Service changes will need to better support nonwork everyday and leisure activities, not only through route adjustments that better connect people to vital resources and entertainment, but also in providing services beyond what have traditionally been associated with public transportation. There is an opportunity to contribute to society's collective health, addressing physical and mental health needs. Just as ADA curb cuts benefit parents with strollers and other non-wheelchair-users, providing additional accessibility and services that can meet the needs of an aging, disabled population within a 15-minute "radius," for example, has the potential to benefit other populations of riders.

DECISION-MAKING

Impacts on factors that affect transit decisions: price, convenience, seamless connections, and other market alternatives.

Public transit agencies will be presented with many ways to define markets and optimize service design for certain archetypes of riders, needs, and value propositions. The challenge will be to make decision-making clear and simple. For example, public transit agencies could decide to be the most economical choice among mobility options, and compete on price. But we know riders' decision-making is more complicated than optimizing for any single factor. Price isn't as important if the system is not reliable or takes too much time. Nevertheless, making the value of taking public transit clear will be critically important. Some, for example, won't pursue optimizing for any single rider archetype (e.g., commuters) and instead will focus on system improvements and reliability and pursue making public transit better for all.

RISKS

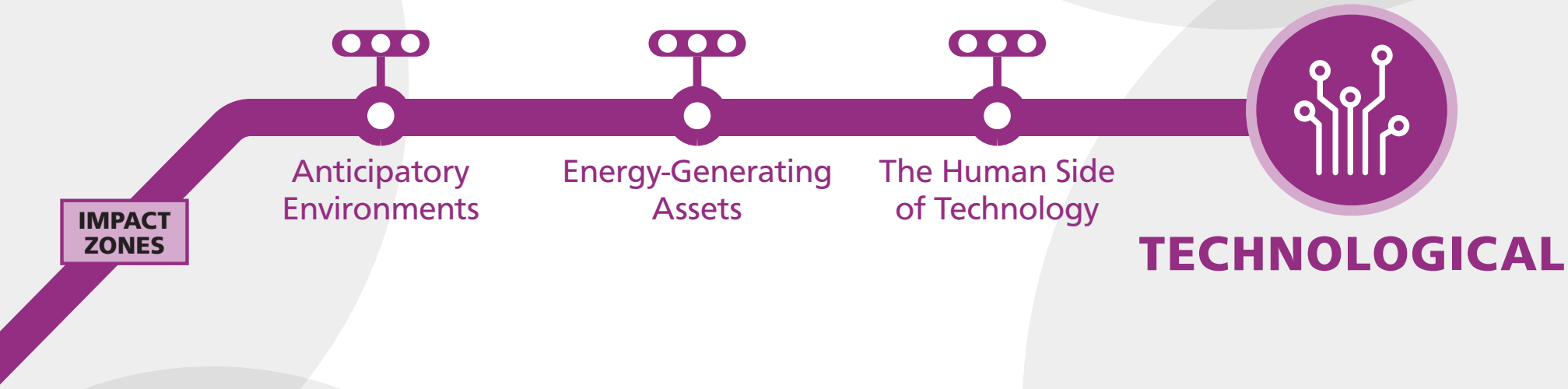
Impacts on the cost-benefit calculation of risk (actual and perceived), including everything from personal safety to climate risks.

Expect riders to be increasingly attuned to (and vocal about) the social, climate, or safety risks of transit systems and demand the city use public transit as a lever for transformation in these urgent issues. However, any attempt to make changes to the system carries inherent risk, most obvious, the risk of failure since investments and system improvements don't always translate into immediate increases in ridership or revenue, let alone progress against chronic social issues. Transit agencies will not be able to meet every need or pursue and meet every demand on the system. Systematically mapping the opportunities and risks each future force could create, and deciding which opportunities align with the agency and city's vision for transportation and mobility, will help the agency and city determine which options should be pursued.

FUNDING

Impacts on funding streams, financial incentives, and assets.

Shifting social patterns due to changing work arrangements offer new ways of reaching and incentivizing ridership. With additional movement toward hyper-localization in where and how we live, shop, and socialize, transit agencies will need to capitalize on opportunities for micro-mobility, and explore the possibilities of non-employer transit subsidy models such as through HOA's or community groups. Public transit agencies might want to consider partnering with private micro-mobility options, local businesses, or neighborhood organizations to incentivize ridership at a local level.


IMPACT ZONES
Anticipatory Environments
Energy-Generating Assets
The Human Side of Technology
TECHNOLOGICAL

TECHNOLOGICAL

How might public transportation agencies balance exploring adopting new technologies with the need to focus on core capabilities and offerings?

How can existing technologies and assets contribute to climate solutions?

Cautious embrace of exponential opportunity

Over the next decade, artificial intelligence and other technologies will continue to get more powerful and affordable. This creates huge opportunities for public transportation systems and local governments, but only if they are thoughtful and cautious about how, where and why they use the technologies. Surveillance and automation have been used by both government and private companies in ways that violate privacy and discriminate against marginalized populations. But at the same time, these technologies are being used for more human and humane purposes, for instance, expanding services to people who couldn't otherwise afford them and exposing and addressing inequities.

Similarly, a number of new technologies aimed at addressing climate change will mature and become much more widely available and affordable. But because options will be so abundant, regions leading in sustainable infrastructure will need to devote substantial resources to effectively evaluate and select the best of these new technologies.

The Human Side of Technology

From disruptive to responsive

IMPACT ZONES

Automation is everywhere. And it has spread so slowly and subtly that it's easy to lose sight of how much has already changed. Self-checkout lines have slowly rolled out in almost every major grocery chain, customer service phone lines use bots that can recognize voice commands, and most new cars will automatically let you know when you start to drift out of your lane. We can expect similar advances in the next ten years—autonomous drones and other vehicles, holographic Alexa-like chatbots as customer service agents in physical spaces, robots doing everything from cooking to cleaning to construction work. But will it lead to a world that is colder and more robotic? That depends on the decisions people make today and whether they choose to use tech in a way that puts human needs front and center in an equitable and just way.

Source: hbr.org

SIGNALS from the Future

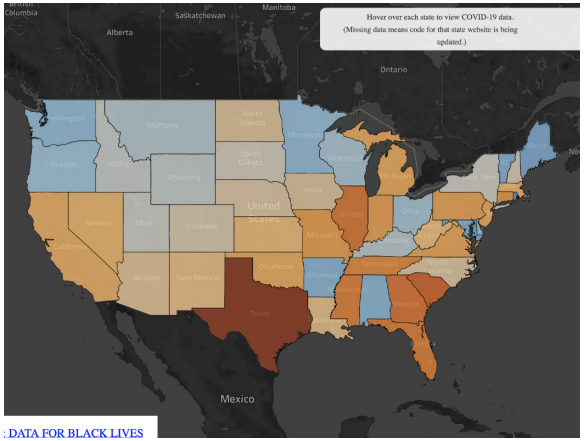
SIGNALS

Virtual concierge chatbots expand access and embody local values

WHAT: Takanawa Gateway Station in Tokyo has kiosks where travelers can talk to one of two AI "bot" station agents, one male and one female. They offer assistance navigating the train system in multiple languages, but when people discovered the female bot was programmed to respond to harassment in a demure way, local outcry led the station to revise them.

SO WHAT: The controversy points to the ways that bots can act as representatives of local values, and how those values can be contested. They present an opportunity to expand assistance to people in an almost limitless number of languages and offer new opportunities for different neighborhoods to express the character and values of their location and its community, such as sustainability, creativity, or social justice. Where and how might a personalized bot provide benefit to a U.S. public transit system?

Source: UnseenJapan.com



Social justice technology movements

WHAT: Data for Black Lives is an organization dedicated to fighting discriminatory use of digital technologies and imagining and pursuing uses of such technology to better the lives of Black people. It is working to ensure that "COVID-19 data should not be used to inform automated decision-making systems, for example: Denying a person access to public services and benefits (i.e., public transportation)."

SO WHAT: Data for Black Lives is part of a larger social justice technology movement that is gaining momentum and mainstream recognition. How might transit agencies partner with organizations such as this one to ensure that implementation of digital services is equitable, and that use of data does not discriminate or cause undue harm?

Source: d4bl.org

Robot microfactory and fulfillment centers for hyperlocal manufacturing

WHAT: Automation startup Fabric has created a platform for companies to build on-site robotic micro-fulfillment centers for lightning-fast order turnaround and delivery.

SO WHAT: If local microfactories and micro-fulfillment centers really take off, cities would see less packages coming from across the country and overseas, and more goods being produced in the city and rapidly transported around it. How can transit agencies get ahead of this emerging tech to prevent any harms it might cause to local residents and take advantage of opportunities it presents, like partnerships to move goods around on existing or convenient routes?

Source: techcrunch.com

Energy-Generating Assets

From early experimentation to explosion of options

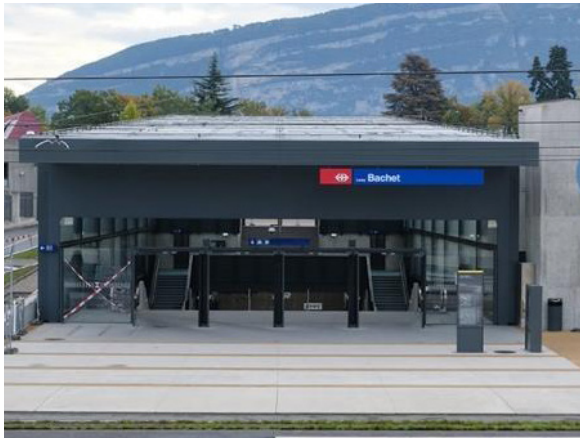
IMPACT ZONES

SIGNALS from the Future

Over the last decade, renewable energy has gone from a costly fossil-fuel alternative to an affordable one that is cheaper than oil and gas in places. We can already see this in the high rates of solar panel adoption in the San Francisco Bay Area, the electric vehicle charger stations in local parking lots, and prominent text on buses declaring "zero emission." Today, we're seeing unprecedented experimentation and funding in technologies to address climate change—in energy production and use, but also in sustainable manufacturing materials and methods, carbon sequestration, and water conservation.

Over the next decade, as many of these technologies mature and become viable, we'll see an explosion in the range of options not just for sustainable transportation and infrastructure, but for energy-generating materials and assets. Even agencies that have long ago "gone green" will need to continue to innovate and be proactive about adopting the right blend of technologies to meet their constituents' and the planet's needs. They will also have to contend with issues like "greenflation" due to rising demand for the metals and minerals used in creating renewable energy infrastructure. They will also have to maintain focus on the need for a just transition, so that already marginalized people don't bear the largest burdens of switching to sustainable solutions.

SIGNALS

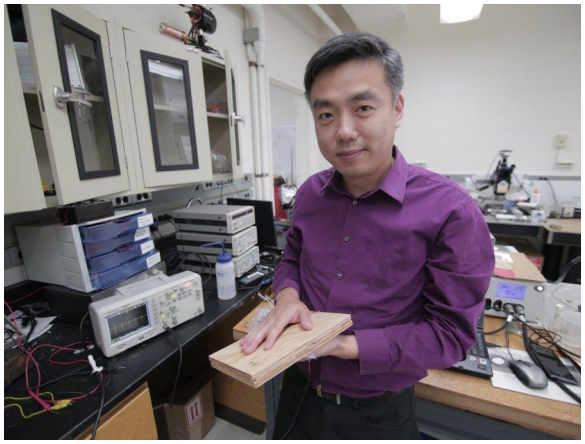


Harnessing heat from trains for homes and offices

WHAT: At Geneva's Lancy-Bachet station, heat generated by trains and brakes is collected by polyethylene pipes embedded in the tunnel walls and tracks. The heat is then injected into the district heating network and used to heat nearby apartments and offices.

SO WHAT: Recent experiments in harnessing hidden externalities of travel suggest that transit may have a role to play in a regional sustainability system. Municipalities that can harness clean energy from a variety of sources will be well positioned to meet and exceed renewable energy targets. Closing the loop by redirecting otherwise "wasted" energy created by trains (and possibly buses) can provide cities with one such avenue to do so. What current waste streams might be put to use as inputs for sustainable energy generation?

Source: swissinfo.ch



Waste-wood floors convert steps into electricity

WHAT: Materials engineers at the University of Wisconsin, Madison have developed a method for chemically treating the fibers in waste wood pulp so that they produce an electrical charge when they come into contact with untreated nanofibers.

SO WHAT: Energy-producing flooring has existed for years, such as the piezoelectric mat installed at Shibuya train station. However, many such energy harvesting experiments employ prohibitively costly technologies, preventing them from being used at scale. This latest breakthrough could make such projects viable, since it utilizes a cheaply available, renewable material. What surfaces throughout the transit system might be used to harvest energy through applications such as this?

Sources: news.wisc.edu; wired.com

Solar paint could enable energy generation on every surface

WHAT: Researchers at the Centre for Organic Electronics at the University of Newcastle have pioneered a water-based solar paint, a liquid with photovoltaic (PV) properties that allows it to absorb sunlight and convert it into electricity. The paint can be printed on glass or another surface with circuitry to create a solar cell at a relatively high speed and low cost.

SO WHAT: Solar paint could greatly expand the areas in which solar power harnessing is possible and avoid some of the issues associated with conventional silicon-based cells. We might see cars, buses, trains, or bus shelters covered in this solar paint, perhaps eventually generating enough energy to power lights, ticket machines, other appliances, or even the vehicle itself. Where might your agency experiment with renewable energy sources such as solar paint?

Sources: treehugger.com; thedriven.io; iea-pvps.org

Anticipatory Environments

From sporadic surveillance to real-time responsiveness

IMPACT ZONES

SIGNALS from the Future

Cities track people. Anyone who has gotten a ticket in the mail for running a red light or driving in the FasTrack lane without a toll tag knows this. And we can see, just by looking, that there are more cameras popping up everywhere. But it goes much deeper. Because, what's really changing is what technology can do with the information that cameras and other devices capture. And it's important that we decide now how this technology gets used in the future.

Amazing things are possible. The tech could be used to detect patterns to predict where congestion will happen and help get people where they want to go faster, in less crowded train cars, with fewer delays. It could create streets, parks, and buildings where lighting, music, and even things like airflow are automatically adjusted to make them more fun and safe, while saving energy use at the same time. We could even get rid of all ticketing systems and use facial recognition to make payments automatic.

But if the history of surveillance has taught us anything, it's that it's often used to oppress some people and privilege and protect others. There's plenty of evidence already, that predictive tech is used—either on purpose or by accident—in ways that harm people of color, activists, and others. And this means the needs of the most marginalized have to be put front and center in any decisions about adopting this powerful new technology.

SIGNALS

Citizens want practical services more than shiny objects

WHAT: A 2021 "Smart City Index" report from Institute for Management Development and Singapore University for Technology and Design ranks cities based on citizens' perception of how effective adoption of smart city technologies impacts their lives. Of note is that the factors citizens care most about remain affordable housing, employment opportunities, health services, air quality, and school quality.

SO WHAT: The sentiment that smart city solutions are not a panacea and cannot meet basic infrastructure needs or deferred maintenance was echoed by a number of the experts interviewed. Especially in the San Francisco Bay Area, where there is a constant stream of new technologies being introduced and piloted, transit agencies will need to balance how and what they choose to adopt with maintaining basic (and high quality!) services for residents.

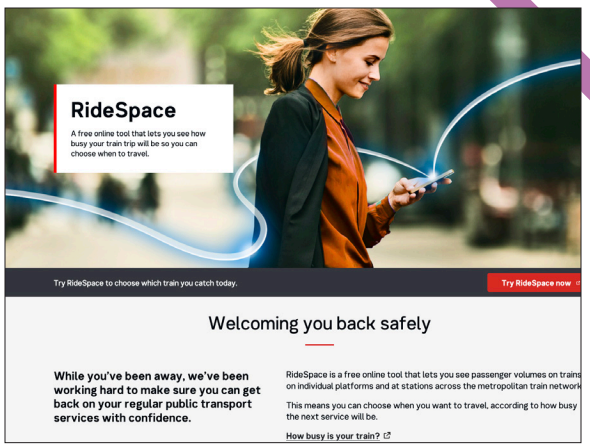
Source: morningbrew.com

Parking management system 'sees' available spaces in Chennai, India

WHAT: Using cameras and other sensors, the city of Chennai monitors all public parking spots and offers a service that lets residents book parking in advance of a trip. Despite a buggy initial rollout, the system has succeeded in reducing traffic while raising city revenues.

SO WHAT: This points to a future in which a city can utilize a comprehensive view of available resources and match them to needs with unprecedented efficiency. How might transit agencies take advantage of such technology to add value and convenience to residents' lives? Could they show residents which coffee shop en route to the bus stop has the shortest line? Or let riders know occupancy on incoming trains so they can adjust their plans accordingly?

Source: timesofindia.indiatimes.com



Tool for riders to check train occupancy in advance using transit card data

WHAT: Melbourne's transit system uses data collected by passenger-counting sensors and its transit cards, combined with predictive modeling and machine learning, to provide riders with a tool for anticipating and avoiding crowds on trains as they return to their commutes amid the ongoing COVID-19 pandemic.

SO WHAT: This initiative provides a preview of what transition to anticipatory transit routing could look like. Additionally, it suggests that COVID-19 may change the calculus for citizens who are otherwise wary of technologies that track data in this way. In what ways do you think anticipatory routing might impact ridership?

Source: itnews.com

IMPACT ZONES & IMPLICATIONS

From automation to ambient surveillance to an abundance of new clean tech, the line between what is the domain of human operation and what can be done sans people is becoming less clear. There is huge opportunity for drastic change, growth, advancement, and real-time responsiveness, but huge risks also come with this surveillance, unequal access and implementation of tech, and over-reliance on technology. As we move into a decade that will be defined by the ubiquity of technology in our lives, public transit agencies will need to consider the following:

MARKETS AND RIDERS

Impacts on different groups of riders as defined by their distinct needs and patterns of mobility and movement.

Technology offers potential for expanding into new markets. The ubiquity of social media will continue to grow, and it can be leveraged to reach new rider groups, including younger riders. With on-demand delivery platforms for just about everything, opportunities exist for transit agencies to partner with these platforms to expand their “rider base” to include delivery and shipping. Increased automation also offers new opportunities for transit systems to reach or create new riders. At the same time, automation and the increased ubiquity of ambient surveillance might deter some riders who prioritize protecting privacy, or who are wary of technology. As operators of public systems, transit agencies will need to consider how to harness this information to improve their services while protecting the privacy of riders and build trust in tech-enabled or automated systems.

SERVICES

Impacts on the portfolio of products, services, and experiences and their distinct value proposition, design, and delivery.

Technology can be leveraged to assess consumer experience and needs in real time, so that public transportation systems and services can be responsive to need. At the same time, the proliferation of clean tech, energy-generating infrastructure, and carbon capture advancements offer a new line of “services” that public transit agencies can offer, as they play a crucial role in helping municipalities realize climate goals. Public transit agencies would benefit from defining what new services they have the capacity to offer, and how those services will be delivered.

DECISION-MAKING

Impacts on factors that affect transit decisions: price, convenience, seamless connections, and other market alternatives.

There are myriad ways technology can influence riders' decisions. From incentivizing and gamifying public transportation choices, to simplifying the rider experience with a streamlined, easy-to-use tech system with real-time information sharing—even slight technological improvements could increase overall impressions of the transit system and encourage use. For example, tech trends are creating opportunities for universally accepted mobility wallets. Municipalities or public transit agencies could own and develop these payment platforms, or they could partner with private companies. Either way, a streamlined wallet that also allows for communication with riders, or is responsive and anticipatory of their riding choices, could nudge more would- be riders toward public transportation options. Public transit agencies can expect increased demand from riders for smooth, seamless platforms and apps that allow riders to plan, see information on ride options, book travel for their full journey, and more.

RISKS

Impacts on the cost-benefit calculation of risk (actual and perceived), including everything from personal safety to climate risks.

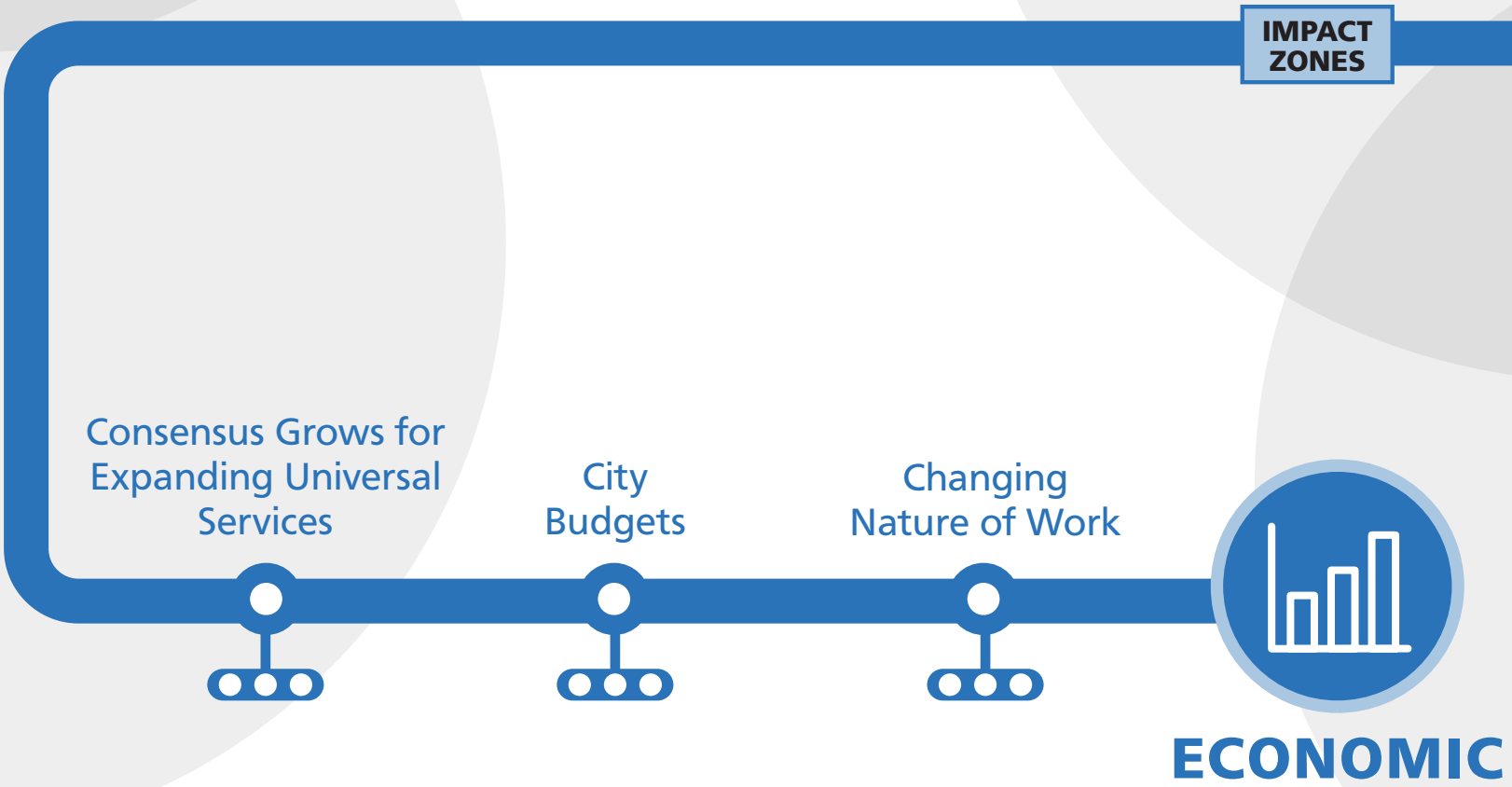
Technology has the potential to improve ridership, but only if done thoughtfully. Transit agencies must conduct thorough research to design and implement tech that substantively and effectively improves rider experience and contributes to a more loyal/ consistent rider base in the long term. Agencies will still need to focus on core services, and not adopt "tech for tech's sake," as an over-reliance on emerging technologies could hurt the system in the long term. Automating and digitizing everything can disadvantage communities and riders who don't have access to tech or are not tech literate, leading to more distrust or dissatisfaction with the system. Transit agencies will need to balance how, where, and what technologies they are adopting, doing their best to anticipate unintended consequences and impacts, particularly on already disadvantaged communities.

FUNDING

Impacts on funding streams, financial incentives, and assets.

Technology could play a huge role in increasing ridership through improving rider experience and perception. Given the high price tag on advanced technology, transit agencies might consider in-kind "investments" from large tech corporations who could design and implement systems and infrastructure.

Pilots implemented through public-private partnerships with tech companies could offer transit agencies a way to provide state-of-the-art services and technology. This might include customer focused bus or rail amenities and energy generating infrastructure, which in turn could produce additional revenue for the transit system and agency.


IMPACT ZONES
Consensus Grows for Expanding Universal Services
City Budgets
Changing Nature of Work
ECONOMIC

ECONOMIC

What might it take for public transit agencies to implement permanent universal mobility programs? What if you municipalize on-demand mobility services to achieve more equitable access to transportation?

What offerings can you consider privatizing while still retaining control over operations?

Precarity, Privatization, and Competing Priorities

The COVID-19 stimulus checks from the federal government and other forms of guaranteed income prompted discussions around the affordability of basic needs in 2022, as many basic goods and services have been privatized to the point that many have no other option than to live in debt.

Significant deregulation and privatization moves in the late 1970s and 1980s propelled private sector options and shrank public sector services. Today, a very different conversation is happening around affordability, spurring conversations around everything from free childcare to free public transportation. There are now pushes for universal basic, well, everything. When the market can't solve important social problems, what constitutes a basic human right?

The ubiquity of gig work and the burgeoning creator economy allow people independence and freedom from a rigid schedule or boss, and the Great Resignation is further pushing the boundaries of traditional work structures. Cities will need to grapple with economic decisions that test their basic civil service values. Should the services that cities cannot afford be privatized? Can public transit agencies diversify their portfolios by broadening their roles to other revenue-generating activities?

Consensus Grows for Expanding Universal Services

From an individual payment to a collective right

SIGNALS from the Future

Currently, wealthy individuals are able to pay for the private version of any service—even private firefighters have been preferred to local firefighters in some instances. Similarly, private offerings have taken the place of public options with tech shuttles transporting people to and from San Francisco to the South Bay. Almost one out of every five workers in California makes less than $15/hour (OxFam, 2022). Though most of them work full-time, owning a private car is out of reach, and a lack of affordable first- and last-mile options when taking public transportation contributes to the strain. President Biden's recent infrastructure bill includes significant investments in transportation with four priority areas: safety, modernization, climate, and equity. Federal transportation funding to strengthen equitable service, and to provide a once-in-a-lifetime opportunity for modernization, could be transformative for agencies that choose to prioritize these areas.

In the wake of several city-wide pilot programs, universal basic income pilot programs are moving beyond income and expanding to other services as well—a Universal Basic Mobility pilot launched in several cities in California in 2021. Almost all the pilots to date have been privately funded by philanthropies or institutional grants, with a handful coming from government funding.

IMPACT ZONES

SIGNALS

Universal Basic Mobility

WHAT: Inspired by universal basic income pilots, several cities in California are piloting a "universal basic mobility" or UBM program in order to close the unemployment and school absence gaps. Residents will be selected to participate in various city-wide studies that give subsidized access to public transportation, e-scooters, and e-bikes. The programs aim to understand how having a minimum guaranteed level of transportation could change economic outcomes for people.

SO WHAT: Lack of transportation access is a barrier for many; lower-wealth households spend more on transportation as a percentage of income than wealthier households. These pilot programs bring public, private, and nonprofit actors together to bring affordable mobility solutions to those with the greatest mobility challenges. What forces would impact your ability to pilot UBM for your city?

Source: bloomberg.com

Transportation Bill of Rights

WHAT: Under a larger call to create a Just Transition in Washington state, 276 organizations have co-signed a campaign outlining a "Transportation Bill of Rights" pioneered by a coalition of Washington-based nonprofits, such as: Front and Centered, Disability Rights Washington, 350 Washington, and the Yakima Asian Pacific Islander Coalition. After months of interviews with underserved communities, which include many individuals who cannot drive, the coalition generated nine key principles to which legislators should commit every time they write transportation policy.

SO WHAT: If legislators adopted these guiding principles while writing policy, multiple issues would be addressed simultaneously to advance equitable mobility access and fight climate change. If this idea takes hold, might we see a federal transportation bill of rights? What would local transit agencies need to do to adapt?

Sources: docs.google.com; usa.streetsblog.org

Public-private first- and last-mile pilot program

WHAT: California's North County Transit District (NCTD) launched a pilot program with Uber, Lyft, and TripShot offering discounted rides for first and last mile connections for people either beginning or ending at two of the busiest commuter rail stations.

SO WHAT: Partnering with private sector companies to fill these public transportation gaps is a quick solution in the short term; however, increased reliance on parties outside of a transit agency presents challenges if the private company no longer serves lower-revenue areas. How might transit agencies form public-private partnerships that ensure equitable access?

Source: gonctd.com

City Budgets

From discrete to coordinated funding

SIGNALS from the Future

IMPACT ZONES

Over the past few decades, public services and infrastructure have been infused with narratives of low-quality services and inadequacy, which led to underfunding. Despite which political party is in power, the proportion of funding for public transportation coming from federal and state sources has been shrinking. The COVID CARES Act supported lost revenue, but it remains unclear if this trend will continue. President Biden's Bipartisan Infrastructure Law contains the largest investment in public transportation in U.S. history.

Guided by the four priorities of safety, modernization, climate, and equity, the framework and proposals are well-positioned to meet the growing needs of living in the 21st century. Even though there is currently political will for massive investment, inevitable political turnover can have profound effects on city policies and long-term planning. Additionally, trust in government has been declining over the years, and some private mobility options are positioning themselves as the reliable alternatives for public transportation. Some cities have partnered with private companies to capture this value, others are using locally-based democratic processes to engage community members in deciding budget line items.

As the pandemic forces public transportation agencies to rethink priorities and budgets, the line continues to blur between which services should be private and which should be public. What is the gap and whose responsibility is it to fill it? Are new government entities needed? Or can successful regional or public-private partnerships create more resilient financing to restore trust in public transportation?

SIGNALS

PPP to capture value from underutilized assets

WHAT: Before COVID-19, Central Ohio Transit Authority (COTA) partnered with "transit tech" platform Via to launch on-demand public transit called COTA Plus. Like all public transit agencies during COVID-19, COTA had a significant decline in public transit usage, and they faced decisions about cutting underutilized routes at the expense of essential workers still using public transportation. Instead of cutting any services, leadership used the underutilized buses for the on-demand service, and they were able to improve services during COVID-19.

SO WHAT: COTA Plus demonstrates a way that public transit agencies might offer on-demand services to provide a public version of a ride hail service. As more and different types of private transit options come to the market, what are ways in which public agencies can maintain market share and offer attractive services to riders?

Source: ridewithvia.com

Calls for a National Investment Authority

WHAT: Cornell Professor Saule Omarova has written a proposal for a National Investment Authority (NIA). It describes a 21st-century version of the New Deal's Reconstruction Finance Corporation established in 1932—a government entity that provided financial support to state and local governments. The NIA would make loans or investments across the United States to foster "sustainable, balanced, and equitable growth."

SO WHAT: The NIA would be a public market actor working directly with private sector business, public markets, and communities to fund long-term public projects like transit that don't always get funded at the necessary scales to have broad and targeted impact. Its creation could assist the formation of a national economic development strategy, which would be an important step in securing funding for long-term public infrastructure projects. What would you prioritize building if an agency such as this were to exist?

Source: berggruen.org

Hong Kong transit's "rail plus property" model

WHAT: Hong Kong's Mass Transit Railway (MTR) Corporation is a public transit agency, and it's also a real estate developer, landlord, and multinational transportation company. As the majority shareholder, the Hong Kong government grants MTR land and development rights where they build stations, giving MTR a unique "rail plus property" model. Developers build residential and commercial properties above stations, and MTR takes a share of the resulting sale or income from rental properties.

SO WHAT: MTR's "rail plus property" model produces a very resilient system because of its diversified portfolio—even though COVID-19 reduced ridership by around 40-50%, they were still profitable. While MTR is considerably newer than legacy transit systems, merging public transportation with property ownership and rent collection proves a creative way to capture value beyond ridership. What assets can your transit agency monetize?

Source: reasonstobecheerful.world; theguardian.com

Changing Nature of Work

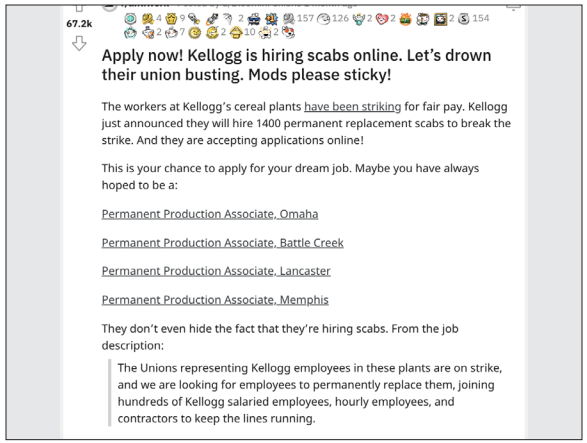
From commuting patterns to commuting decisions

SIGNALS from the Future

The pandemic shone a bright light on workforce inequities—the range in employee benefits and working conditions vary highly, as does the option to work from home. The proliferation of low-quality jobs in the United States has characterized the labor market over the past few decades, and the pandemic exposed just how poor working conditions in some of these jobs can be. New technologies have enabled many jobs to be atomized into task-based gig work. While gig work has its benefits, it also poses risks for workers' economic security (such as lack of paid sick leave, health insurance, and retirement). The federal stimulus payments offered workers some leverage in the labor market, which has led to modest wage gains and more generous benefit packages, though not all workers are seeing a fundamental shift that gives them a louder voice. But calls for change are loud and getting louder—Starbucks baristas and Amazon warehouse workers alike are paving the way for a higher standard of employment, inspiring others to organize in non-traditional ways as the fights for living wages pervade the country. As work becomes more remote and task-oriented, we can expect to see more policy discussions around worker protections and economic security. These decisions around how work is organized and compensated have practical implications for peak-hour schedules, affordability of fares, and geographic locations of routes that previously only served a downtown workforce.

IMPACT ZONES

SIGNALS



r/antiwork floods Kellogg application portal

WHAT: In December 2021, the Kellogg Company announced it would replace all of its union workers on strike with new permanent employees. In solidarity with the workers on strike, r/antiwork users flooded Kellogg's application portal with spam applications to overwhelm their system. A TikTok user posted a video on how to participate, someone on GitHub even wrote open source code to automate the application process.

SO WHAT: The growing consensus that work isn't working for people is taking hold in ways that can spur swift and successful collective action. Gen Z largely led this effort, pointing to the values younger generations hold—workers must be treated fairly. What are ways that public agencies can entice younger—or disaffected—workers and in doing so, offer a different narrative about what work can be?

Source: reddit.com

The Great Resignation

WHAT: Roughly 47.4 million people quit their jobs in 2021. People have left their jobs for multiple reasons, and women, particularly mothers, have left in disproportionate numbers.

SO WHAT: COVID-19 has given people the time and space to examine how they spend their time, and how they want to live and work (or not work). Broad reassessment of how work and life are organized in people's lives is challenging the primacy of work as a given in the way we live. As this shifts, commute patterns will follow suit, as people reorient their lives. What are the ways in which transit agencies can identify and track new travel patterns among non-workers, and offer services or routes that fulfill these new travel needs?

Source: cnbc.com

Growing prevalence of—and preference for—remote work

WHAT: One in seven jobs is currently remote, and people are twice as likely to apply for a remote job. Different municipalities and countries, from Tulsa, Oklahoma to Estonia, are offering generous relocation packages for remote workers who choose to move to those locations.

SO WHAT: While this trend is strong now, many experts anticipate a more hybrid work structure will be the eventual norm. How can public transportation become a routine for workers who come to the office only a few days a week? If remote workers lose out on the social benefits of a workplace, can there be new transit options or micro-mobility that services the after-work crowd for social gatherings?

Source: marketplace.org

IMPACT ZONES & IMPLICATIONS

COVID-19 has been an accelerant on many levels—from increasing acceptance of Universal Basic Income programs to exacerbating municipal budget shortfalls. The changing nature of work is also changing where people live, commute, and spend time (and money), further disrupting economic patterns. From privatization to pushes for universal free transit, cities—and transit agencies—will continue to undergo radical changes as they experiment with programs to help with economic survival, both their own and that of their residents. They will need to consider the following:

MARKETS AND RIDERS

Impacts on different groups of riders as defined by their distinct needs and patterns of mobility and movement.

Public transit agencies will need to evaluate the changing dynamics of their markets and what defines each rider and non-rider. The market will remain dynamic as will the portfolio of routes and services needed throughout most of the next decade, especially as work-from-home trends continue. Keeping a focus on new patterns of mobility will certainly be a concern. However, with lower-paid populations, including those dependent on public transportation, they will become even more price-sensitive as incomes do not keep up with costs of everyday living. For these groups, public transit agencies will need to consider how to ensure access when affordable and reliable public transit is needed the most.

SERVICES

Impacts on the portfolio of products, services, and experiences and their distinct value proposition, design, and delivery.

There are many opportunities for reimagining public transit services, some possibly as viable sources of new revenue. Public transit agencies could look for innovative ways to monetize real estate and other physical assets such as parking lots and spaces within train stations. New kinds of routes could be created to allow easier access to tourist areas or nature. Business-focused routes could also be created, ones that are optimized for on-board work, with reliable WiFi and other add-on services. Thinking explicitly about the experience of riding public transit could open up new innovation directions and seize revenue-generating opportunities in any economic climate. For example, if the 15-minute city model is taking hold in your city, holding the neighborhood as the unit of design and aligning public transit and other mobility services could bring coherence to the value and role of public transit to urban life.

DECISION-MAKING

Impacts on factors that affect transit decisions: price, convenience, seamless connections, and other market alternatives.

Economics and price certainly figure into the calculus of taking public transit or not, but price is not the only factor, nor is it the most important all the time or for everyone. Programs such as universal basic mobility, combined with policies that more fully capture the full costs of car ownership and parking, could make driving a less appealing and more expensive option. At the same time, people—especially younger generations—will make decisions based on values, purpose, or the kind of impact they can have with their mobility choices, presenting a profound opportunity for transit systems to communicate the myriad non-financial benefits of public transit, from climate action to social cohesion.

RISKS

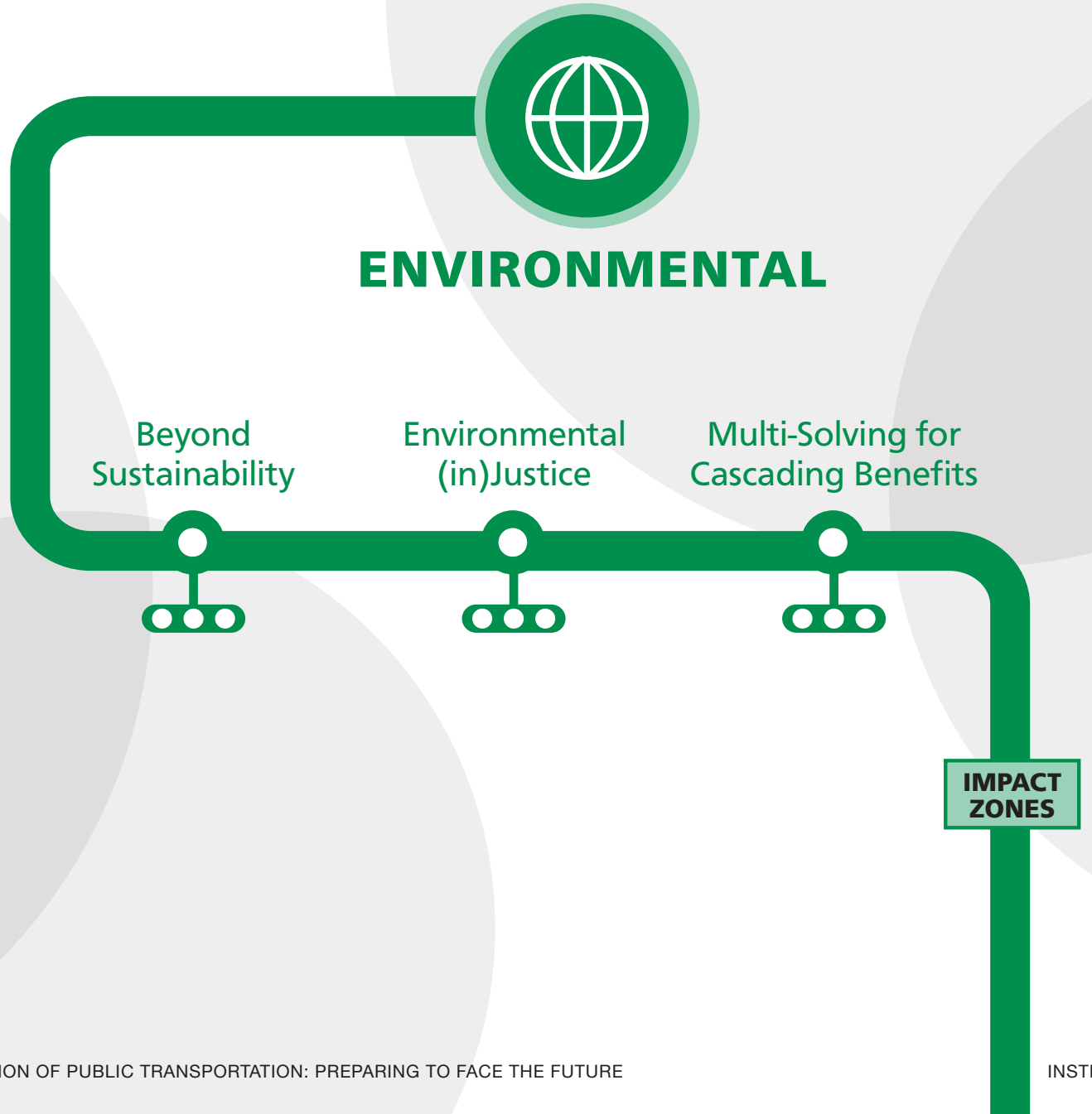
Impacts on the cost-benefit calculation of risk (actual and perceived), including everything from personal safety to climate risks.

Transit agencies will need to navigate a wide range of risks, from the impacts of people working at home, to the unaffordability of urban life, and the exodus of businesses and other forms of commerce—including the closing of restaurants and food service that drive human flows to urban centers. Some cities will experience more permanent change and long for the vibrancy of the past, while other cities will continue to attract inflows of new residents in a way that is able to make city life work. Regardless of which direction becomes the new reality, transit agencies will not escape the mandate to provide reliable public service for all. But even the conception of public service will need to be reimagined under different economic realities. For example, the imperative to grow ridership and revenue should not shut down universal basic mobility initiatives and other efforts to mitigate economic precarity in the community.

FUNDING

Impacts on funding streams, financial incentives, and assets.

Public transit agencies need to consider alternative sources of funding and revenue-generating activities. The proportion of funding coming from federal and state sources for public transportation have and will most likely continue to shrink, after one-time funding from the infrastructure bill has been spent. This includes monetizing assets, or creating value-added services for different markets of riders. Some public transit agencies will rethink their routes and see serving the entire city and not just downtown as the pathway to new and sustainable sources of riders and revenue, while others will rapidly adopt new technologies of automation and digitization to increase efficiency and rely less on human labor. Other cities and transit agencies will pursue climate-positive strategies and view carbon reduction as the primary way to account for costs and benefits.


ENVIRONMENTAL
Beyond Sustainability
Environmental (in)Justice
Multi-Solving for Cascading Benefits
IMPACT ZONES

ENVIRONMENTAL

How can public transportation infrastructure and assets be places that heal people and the planet?

Where can public transit agencies partner with companies and community groups to help them reduce their carbon footprint?

Root problems need root solutions

The climate emergency is the urgent issue of our time.

Climate change is impacting how we move around, where we choose to live, and how our systems operate. Extreme heat buckles rail lines or melts tires. Sea level rise and floods will damage or destroy critical infrastructure, and unprecedented fires cause power outages that affect our daily lives. This issue knows no geographic bounds, so even cities, communities, and agencies that are prepared for the worst of it will be affected. Planning for resilience and using multi-solving solutions can address cascading crises contributing to and exacerbated by climate change. Addressing the impacts of climate change will require not one solution, but a diverse array of innovations, technologies, justice-focused policies, new designs, and the ability to pivot quickly between them.

Finding the right levers within a circular system and taking a climate justice lens to programming and policy can also address the intersectionality of the challenges that we face.

Beyond Sustainability

From net zero to circular systems

As cities, residents, and businesses are forced to adapt to an increasingly extreme climate, they will need to look beyond net zero goals toward broader approaches to addressing climate change: systemic, circular models that create resilience and help lead us toward regenerative systems. Cities, states, and even the federal government are considering a suite of circular economy bills, largely focused on consumer products, such as plastic and packaging waste, or the right to repair. Given the urgency of the climate crisis, it's possible that climate-forward states like California would consider legislation mandating circular economy principles into infrastructure and transportation.

An October 2021 McKinsey report describes these principles as, "Where possible, materials should be reusable, reparable, recyclable, and recoverable," and suggests that "transport infrastructures could be planned, designed, constructed, and operated with the aim of increasing their level of climate resilience—which includes mitigating climate impact, protecting biodiversity, and minimizing pollution. Sustainable transport infrastructure should catalyze a virtuous circle."

Advances in building materials and technology have paved the way for net-negative buildings, and cities such as Seoul have weather-protected their bus stops—could public transportation infrastructure go a step further and be part of city-wide circular economy efforts? Could bus shelters be made with construction waste materials, or could tracks include rainwater capture and filtration systems?

SIGNALS from the Future

IMPACT ZONES

SIGNALS

Funding for circular economy tops $1.3 billion

WHAT: A July 2021 Chatham House report found global spending on circular economy initiatives reached $1.3 billion. This report also documented the emergence of 10 corporate circular economy bonds from Morgan Stanley, Barclays, and other institutions.

SO WHAT: Financial institutions see huge potential in a circular economy, and as private (and public) equity firms make climate a stronger priority internally and for their clients, they might offer government agency borrowers an opportunity to pilot new models, developments, or programs that support a circular economy. What are the ways a transit agency, system, or assets, can participate in and support a city-wide circular economy?

Source: chathamhouse.org

Firm designs "net negative" buildings

WHAT: At COP26 in November 2021, design firm SOM unveiled a vision for buildings that use direct air capture and generate biofuels to create "carbon net-negative architecture" buildings that will go beyond current net zero goals.

SO WHAT: As the built environment is among the highest contributors to GHG emissions in the world, buildings that can act as a carbon sink will go a long way to meeting emissions targets. The most innovative places will use principles of circular design to create net-negative infrastructure, including bus shelters, transit hubs, roads, and rails. They will also find ways to retrofit legacy infrastructure to be more climate-neutral. Does your agency have a plan for decreasing the carbon emissions of your infrastructure? Where and how can your assets support a move to carbon-negative infrastructure?

Source: bloomberg.com

A platform for the circular economy

WHAT: Excess Materials Exchange creates an online platform for assessing "waste" materials for their financial and ecological impact, and helps find a buyer who can use the waste as input.

SO WHAT: The circular economy has been growing steadily, and platforms such as this one will enable its acceleration. There could eventually be a marketplace for inputs for—and outputs of—large scale construction projects, and this could make it easier for infrastructure projects to reduce reliance on virgin materials. What current waste products might be upcycled elsewhere in your transit system?

Source: excessmaterialsexchange.com

Environmental (In)justice

From environmental racism to climate equity

In so many ways, 2020 made visible the inequities in our society: examinations of past racist development decisions and policy show the lingering impacts of their legacies, such as worse health outcomes and higher levels of pollution, which has been linked to higher crime. A 2018 report found that 75% of bus depots in New York City are located in communities of color, contributing to worse air quality and pollution in those areas. A national reckoning with these issues has brought the need for intersectional climate justice into mainstream policy and conversations.

In response to the Black Lives Matter protests of 2020, many cities, states, and even the federal government have added an equity lens in their planning. Nashville, for example, began a process for equitable disaster mitigation in the wake of a 2020 tornado followed by a series of disasters, in which the deep inequalities in the city were made painfully visible. This process includes a comprehensive review of city policies, ensuring information access for non-English speakers, and finding ways to help non-driving seniors in case of evacuations.

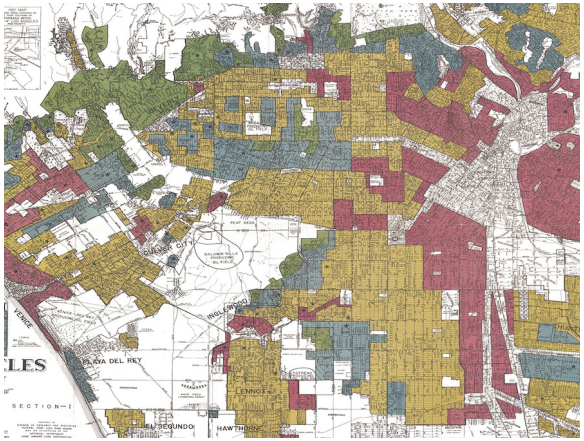
Climate equity planning might grow to include centering Indigenous communities, expanded stakeholder engagement, and focusing on marginalized communities.

Sources: sph.umn.edu/; nyc-eja.org; nextcity.org

SIGNALS from the Future

IMPACT ZONES

SIGNALS



Study shows climate effects of redlining

WHAT: A study of 108 urban areas in the United States showed that historically redlined neighborhoods were hotter by up to 13 degrees, showing the connection between racist housing policies and current heat exposure, which carries health impacts.

SO WHAT: A push for climate equity will need to take into account the myriad ways in which historical planning decisions continue to impact communities. Cities will be held accountable for undoing the impacts of past decisions, while also equitably preparing communities for the impacts of the future, particularly for communities that will continue to be hardest hit by climate change. How is your transit agency addressing legacies of redlining, particularly the lingering climate and related public health impacts?

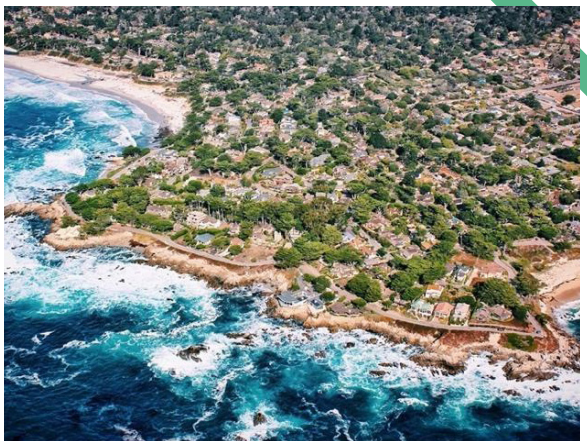
Source: mdpi.com

Increasing access to transportation

WHAT: King County Metro, in the state of Washington, is responding to loss of ridership by increasing access for essential workers and residents in low-income neighborhoods. They are exploring expanded partnerships with businesses to ensure employees have access to employer-sponsored or subsidized transit passes.

SO WHAT: As agencies continue to recover post-COVID-19, offering incentives to businesses to provide services and support to their employees—especially lower-paid workers—could benefit both the employees and agency budgets. What are ways you—or your partners—can expand your reach to underserved neighborhoods?

Source: fusecorps.org



Climate gentrification hits coastal towns

WHAT: A report out of Florida State University outlined the potential for displacement that sea level rise will have on low-income households and renters in low-lying areas in Florida.

SO WHAT: Sea level rise will push coastal communities inland. Lower-income communities will have fewer options for relocating their lives, and they risk being forced to move to unsafe areas. Governments will need to take into account these existing inequalities, which will be exacerbated by climate change if not addressed with aggressive policies that support lower-income communities. How are you preparing for sea level rise, and how can your transit agencies help at-risk communities prepare?

Source: miami.cbslocal.com

Multi-Solving for Cascading Benefits

From targeted responses to mutually beneficial relationships

As we quickly reach a planetary tipping point, responding to climate change will require multi-faceted approaches to address both its roots as well as its impacts, which reach into every aspect of our world. Inequality, poor health outcomes, psychological challenges of modern society: all of these intersect with and are impacted and exacerbated by climate. When cities added curb cuts to benefit people using wheelchairs, this change had unexpected wider benefits, including to parents pushing strollers. Increased walkability of a city can lead to a decrease in CO2 emissions while improving health outcomes and decreasing pedestrian deaths. Multi-solving intentionally looks to solve multiple problems with one solution, policy, or investment, turning cascading crises into cascading benefits. Atlanta's MARTA subway system has been hosting farmers' markets in the subway since 2015, using existing and highly trafficked infrastructure to bring healthy food directly to people, including those who live in food deserts.

Increasing pressure on all of our social and ecological systems will require us to look for innovative multi-solving solutions. Many companies are attempting to reduce their Scope 3 emissions (emissions indirectly generated: business travel, employee commutes, transportation, waste, purchased goods and services, end-of-life product disposal, etc.). Can new partnerships between transit agencies and companies ensure high quality, reliable public transportation to reduce employee transportation emissions while also increasing ridership?

SIGNALS
from the Future

IMPACT ZONES

SIGNALS

Installing solar on underutilized assets pays off

WHAT: A school district in Arkansas bought solar panels and installed them in a vacant field to power its district—this move saved enough money to add $15,000 to each teacher's paycheck.

SO WHAT: The savings from renewable energy, the positive climate impact, and the direct improvement in teachers' salaries is illustrative of the positive cascading effects of a shift to renewable energy can have for individuals, a district, the planet, and the future of all three. We can expect to see more of these multi-solving approaches as planning for resilience becomes standard. Where can climate solutions also address other social or economic challenges your agency or city is facing?

Source: interestingengineering.com

Teaching climate change to doctors

WHAT: In response to a student-led advocacy campaign, Emory University School of Medicine in Atlanta, Georgia is adding climate change to its curriculum, requiring that all med students learn the health risks and impacts of climate change.

SO WHAT: No aspect of our lives will be untouched by climate change, and every field will need to find ways to embed climate change into their work. Expect to see more overlap between climate and professional education to prepare the next generation of workers to address climate in all aspects of our lives. Where might your employees benefit from applied climate learnings?

Source: grist.org

Reducing carbon emissions and pedestrian deaths

WHAT: The London Cycling Campaign is urging elected leaders to implement "Climate Safe Streets" initiatives to get to zero carbon roads while also achieving Vision Zero safety goals.

SO WHAT: In taking a comprehensive look at road-based risks to both people and the environment, we can begin to think about integrated solutions that can have multiple benefits for our cities. What are ways that transit agencies might reimagine streets in general to make them safe for walkers and cyclists, attractive for kids to play, and inviting and convenient for people to shop, and still allow for movement of mass transit?

Source: hamhigh.co.uk

IMPACT ZONES & IMPLICATIONS

Climate change touches—and will disrupt—our lives, our cities, our routines, our systems. Agencies, cities, and regions will need to work on climate solutions, from transitioning to a circular economy to addressing the lingering inequities of the past, which are linked to hotter neighborhoods, proximity to polluting industries and infrastructure, and poor health outcomes. Addressing the intersecting root challenges of climate change will require "multi-solving," and transit agencies can position themselves as a significant piece of the climate solution puzzle. In looking to a climate-impacted future, they should consider the following:

MARKETS AND RIDERS

Impacts on different groups of riders as defined by their distinct needs and patterns of mobility and movement.

Climate change and rising sea levels will accelerate climate-driven migration globally and locally, adding to the dislocation of work and commutes from urban centers. As population centers shift from coasts to inland areas, new patterns of work and movement will emerge and define distinct markets of riders and needs. Teaching climate change (and what climate action looks like) to the public is a huge challenge and opportunity.

Cities looking for public engagement with climate strategies could give public transit agencies the additional mandate of public education. Teaching the public about the climate crisis will not only contribute to a city's resilience but also build the readiness and openness needed for more impactful actions such as ending car-centricity in cities and optimizing public space for people.

SERVICES

Impacts on the portfolio of products, services, and experiences and their distinct value proposition, design, and delivery.

The climate crisis will define an entirely new innovation landscape for the future of transportation and public transit agencies. Innovations that leverage the dynamics of hyper-connectivity, social justice demands, and resource sustainability could motivate a new cadre of artists, designers, makers and rider-citizens into action. Expect to see circular economy principles inform new solutions and initiatives that reimagine public transit agencies as regenerative "carbon net negative" systems where resources are radically "reusable, reparable, recyclable, and recoverable."

DECISION-MAKING

Impacts on factors that affect transit decisions: price, convenience, seamless connections, and other market alternatives.

Public transit agencies need to understand where climate and environmental stewardship sit in relation to all the other factors that matter (e.g., price, convenience, seamlessness, etc.) when riders are making transit decisions. Building specific strategies to elevate the position of climate action in this calculus will be critical. Multi- solving is already a persuasive principle for addressing systemic and fundamental change. Transportation is simultaneously a climate, economic, and equity challenge— and solution—and will emerge as a critical lever for multi-solving opportunities. Public transit agencies have a huge opportunity to help riders draw a straight line from taking a ride on the bus to meeting climate action goals. Providing feedback and data on climate positive behaviors will be a source of new value and will weigh persuasively in navigating transportation choices.

RISKS

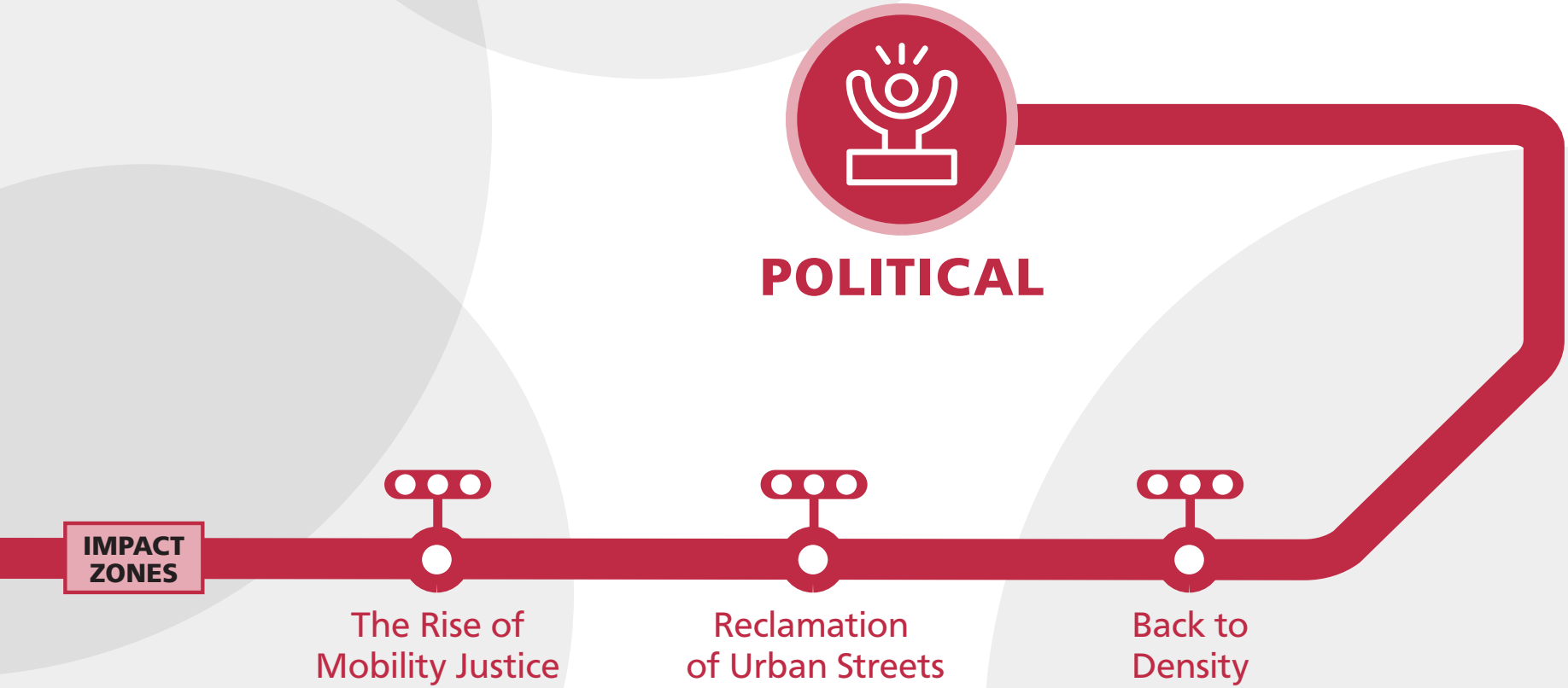
Impacts on the cost-benefit calculation of risk (actual and perceived), including everything from personal safety to climate risks.

Justice movements connect racial, environmental, and mobility concerns. Increasingly, transportation and equity initiatives will need to address the climate crisis, and climate initiatives will need to address racial and economic equity demands. Assessing risks will require intersectional thinking and anticipating the consequences of any action across multiple domains and stakeholders. Urban policies and decisions have resulted in neighborhoods with disproportionate heat exposure and health impacts. As public transit agencies implement new responses to the climate crisis, expect to see sharp and focused scrutiny on equity and the demand for human-impact audits that anticipate the outcomes of marginalized communities.

FUNDING

Impacts on funding streams, financial incentives, and assets.

Climate solutions that result in cost savings such as switching to renewable energy sources or sustainable resource management will be good for the bottom line and can support repositioning public transit agencies as forces for climate action. Doing well by doing good will be an important metric and narrative to drive further climate actions that realize savings. The housing crisis and the vision for 15-minute city life could be leveraged to reimagine public transit agency assets. Cities could repurpose parking lots and station buildings into open space, affordable housing, or vertical farms, for example, and by doing so align the use of these assets with climate goals.


POLITICAL
IMPACT ZONES
The Rise of Mobility Justice
Reclamation of Urban Streets
Back to Density

POLITICAL

Where might you have leverage in city-wide planning to partner with agencies who do have authority to make the changes that will benefit public transportation and benefit society?

Identity politics fuel mobility choice

In an era characterized by heated debate reflecting increasing political polarization, everyday citizens and city leaders must reckon with just how intricately linked mobility is to the broader movement toward justice, equity, and freedom.

While improving public transit would require major shifts in areas such as housing, health, and policing/criminal justice, transit agencies do not exercise direct control in these domains. This means that there are major structural limitations to addressing the grievances of riders and potential riders in order to increase ridership. The transit systems that will be most successful 10 years from now are those that recognize the intersectional nature of transit and strategically pursue partnerships that allow for substantive changes. This might include joint ventures between transit agencies and other public and private organizations and advocacy work in non-transit specific areas.

IMPACT ZONES

SIGNALS from the Future

Back to Density

From single family zoning to high-density, multi-use spaces

The nationwide dual crises of a housing stock shortage coupled with astronomically high rents and prices are particularly acute in California. Lingering impacts of a housing production slowdown as a result of the 2008 crash, coupled with city and state zoning policies that favor building single family homes, NIMBYism, and high land and labor costs have exacerbated the problem, especially in California cities. The effects of these policies are reflected in the fact that only 12 of America's "largest central cities had as many as 7,500 residents per square mile in 2020—the average population density for U.S. central cities in 1950." The decreasing density of American cities has major implications for housing, mobility, and equity. Implementing policies to increase density in cities not only opens up the opportunity for increasing affordable housing stock but also sets the stage to improve mobility and access for residents through building more mixed-use spaces, more businesses, and more homes located where using public transportation is convenient.

SIGNALS

Senate passes bill that could increase housing stock

WHAT: In September 2021, California Governor Gavin Newsom signed two new bills designed to make it easier to build more housing in California. The first, Senate Bill 9, makes it possible to build more than one housing unit on land that was previously designated for only one unit. The second, SB 10, allows for denser development near public transit corridors, such as bus and train lines.

SO WHAT: After a string of legislative proposal losses, politicians are setting the stage to increase housing in California cities, including in proximity to transit corridors. This could provide statewide incentives—and resources—to municipalities to enhance their public transit in such corridors. How can your agency prepare for new potential development and be positioned as the choice for newcomers?

Source: latimes.com

House passes bill aimed at encouraging affordable housing

WHAT: In March 2020, the U.S. House of Representatives passed the "Yes In My Backyard Act" (H.R. 4351), a bill aimed to encourage affordable housing development and to increase transparency by requiring jurisdictions receiving Community Development Block Grants to explain why they don't implement inclusive zoning practices that help increase housing opportunities for low- and middle-income residents. The bill later failed in the Senate.

SO WHAT: This bill reflects a growing concern over the country's housing shortage and the politics surrounding it. The fact that it was passed by a majority-Democratic House and failed in the majority-Republican Senate highlights politics as a significant barrier to increasing transit-friendly housing stock in cities. How prepared would you be to leverage new transit-oriented housing development into increased ridership or services?

Source: nlihc.org

Working from home is here to stay in the Bay

WHAT: The Survey of Working Arrangements and Attitudes (SWAA) predicts that once the pandemic is over, New York, Los Angeles, and San Francisco will see the largest reduction in people commuting into physical premises for work.

SO WHAT: While the bulk of public transit ridership has historically come from commuter traffic, the number of people commuting to offices will remain drastically reduced. Transit agencies need to think about how to encourage ridership outside of this context. Denser neighborhoods with more mixed-use spaces could increase demand for micro-mobility as residents spend more time in and near their homes.

Source: wfhresearch.com

IMPACT ZONES

Reclamation of Urban Space

From streets for cars to streets for people

SIGNALS from the Future

Politicians and urban planners throughout the world are making efforts to reduce the number of cars driving through cities. These efforts are often rooted in concerns about pollution, traffic congestion, and pedestrian safety. The pandemic has further catalyzed the movement toward fewer car-filled streets by highlighting the lack of outdoor recreational space in many large cities. During the pandemic, many cities allowed businesses to take over portions of streets for seating. In some residential areas, the streets were barricaded against through traffic, to allow residents to walk and children to play safely. Although these changes were not permanent in many cases, these pandemic- inspired changes in conjunction with increased environmental consciousness point to the shift away from car-centricity and toward urban planning and retrofitting practices that prioritize streets for people.

SIGNALS

Pedestrian-friendly streets get city approval

WHAT: San Francisco's Great Highway was closed to car traffic during the pandemic to allow for more outdoor space. In a case filed by a group of residents against the city, a San Francisco Superior Court judge struck down efforts to reopen the Great Highway to regular car traffic seven days a week. In December 2022, the San Francisco Board of Supervisors brought this pedestrian-friendly one step closer to being permanent. The Board passed an ordinance that keeps the Great Highway car-free until December 31, 2025 as a pilot study.

SO WHAT: The Court's siding with the city sets the stage for more pedestrian-oriented urban design policy, and the Board's passing a 3-year pilot program to keep it open demonstrates growing governmental support for this popular pandemic initiative. As cities adjust to the post-pandemic world, we might see more of these car-free streets becoming permanent. How can your agency work with residents and/or your city to promote more car-free streets?

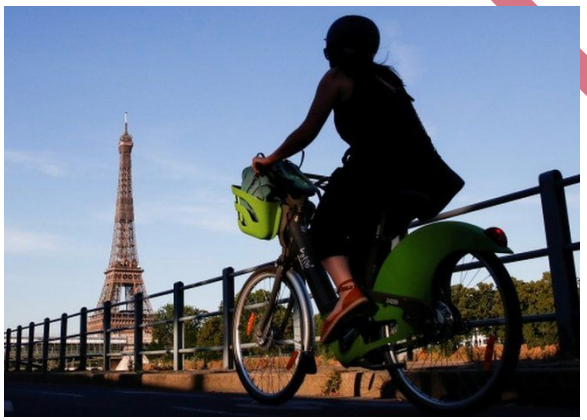
Source: sfrecpark.org/1555/Great-Highway-Pilot-Project

Culdesac, an innovative car-free neighborhood

WHAT: Culdesac, a newly designed and built neighborhood in Tempe, Arizona, requires that residents do not own a car. To support their car-free lifestyle, residents will benefit from resources such as discounts on rideshares, free public transportation, and guaranteed easy access to micro-mobility.

SO WHAT: While Culdesac is operating at the neighborhood scale, the creation of such a space points to an increasing emphasis on designing urban spaces that decentralize the car and encourage more communal, active, and sustainable forms of transportation. Would a car-free neighborhood work in your city? What systems or routes would you need to enhance to support an entire carfree neighborhood?

Source: culdesac.com



Cars to be banned in Paris City Center

WHAT: In 2021, Paris' mayor, Anne Hidalgo, announced her plan to significantly reduce car traffic in the city center by banning most vehicles from the Paris Center district. The primary motivation for this plan is to reduce carbon emissions.

SO WHAT: As urban leaders throughout the world look for ways to meet climate goals, banning cars could be a significant strategic lever. As cities experiment with car-free days or weekends and residents get used to the idea of car-free streets, how might transit agencies work with elected leaders to highlight public transportation alternatives to driving?

Source: france24.com

The Rise of Mobility Justice

From transit in a vacuum to transit in the name of mobility justice

Public transit is increasingly being discussed within the broader context of mobility justice. This term frames mobility as a social issue that significantly shapes the lived experiences of riders.

In particular, the idea of mobility justice urges stakeholders to consider the unique implications of public transit for marginalized groups. Following this approach, the interconnectedness between transit and policies related to housing, health, education, and labor becomes more visible, as do the race and class implications of having access to quality transit. As we prepare our cities for the future, it's essential to understand the important role that public transportation plays in making these spaces more equitable and creating a sense of belonging for all.

SIGNALS

Improving public transit makes it easier for people to stay healthy

WHAT: A recent study in the Twin Cities found a significant decrease in the number of no-show appointments among clinic patients who lived near the city's newly opened light-rail line, with the no-show rate dropping by 4.5% compared to before the line opened. For Medicaid patients, the no-show rate declined by 9.5%.

SO WHAT: The results of this study highlight the health implications for public transit access. Given how certain groups are more prone to negative health outcomes, understanding this intersection highlights the political stakes of having quality public transportation that is accessible for marginalized groups. What might it look like to partner with public health advocates to increase public transportation use for better health outcomes?

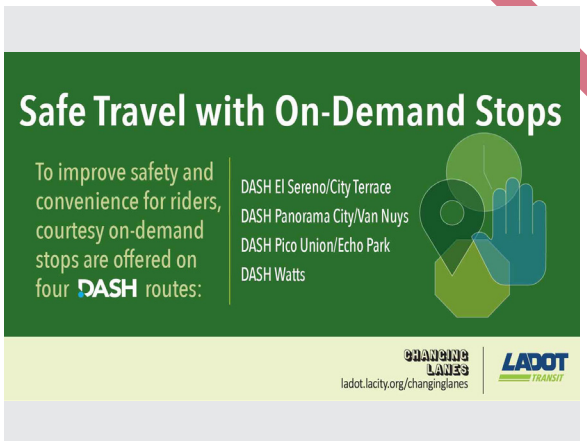
Source: vox.com

LA Metro pilots fareless transit

WHAT: In Fall 2021, LA Metro began piloting fareless transit, making fare free for K-12 students and community college students. The transit organization may use the data collected during this pilot to make their entire system free for everyone in the future.

SO WHAT: This signal highlights a shift from transit as a publicly subsidized good toward transit as a right for all. How can public transportation stakeholders help city leaders incorporate mobility rights into other equity efforts? How can public transit agencies harness the power of its ridership to advocate for mobility rights?

Source: metro.net; commons.wikimedia.org



LADOT allows on-demand stops

WHAT: In Summer 2021, the Los Angeles Department of Transportation announced a new pilot program for "on-demand stops" for its DASH bus service. The pilot allows riders to request a stop along a given bus route separate from established stop locations. This program was designed in response to a recent LADOT study that identified reasons that kept women from using transit more often.

SO WHAT: Since rider experiences are shaped by their race, class, and gender identities, how can a transit agency respond to different rider challenges? Could customizing services and routes open up new rider pools?

Sources: ladot.lacity.org; ladottransit.com/ondemandstops/

IMPACT ZONES & IMPLICATIONS

Mobility is part of a larger movement and struggle for justice, equity, and freedom. While addressing these issues will take systematic social and policy change beyond the scope of public transit agencies, those that wish to play a part in a broader effort for systems change will form strategic partnership and see their work beyond a silo of public transportation. Navigating an increasingly polarized society, public transit agencies will want to consider the following:

MARKETS AND RIDERS

Impacts on different groups of riders as defined by their distinct needs and patterns of mobility and movement.

Transit policies and programs that address access issues of riders and potential riders (such as making more frequent or on-demand stops to decrease last-mile distances for women) could incentivize new groups of would-be riders to consider public transit choices. As more municipalities consider car-free days, roads, or zones, closing areas to car traffic could increase reliance on public transportation for accessing those areas for workers, customers, visitors, and possibly even for commerce, as these areas prioritize public space for human interaction.

SERVICES

Impacts on the portfolio of products, services, and experiences and their distinct value proposition, design, and delivery.

Anticipating significant shifts in the urban landscape in the form of both increased housing density and permanent adoption—or modification—of slow streets, transit agencies have an opportunity to develop new services that cater to these urban changes. Higher density in different areas of a city presents a need for new routes and a diversity of options, from micro-mobility to new choices for vehicles (shuttles, bikeshare, scooters, etc.). With a push for people-first streets, transit agencies might also consider what non-traditional services (such as delivery services) they can offer to increase the usability of streets for businesses and people.

DECISION-MAKING

Impacts on factors that affect transit decisions: price, convenience, seamless connections, and other market alternatives.

Public transit creates many downstream benefits in areas such as physical health, public health, and climate mitigation; agencies have the opportunity to leverage these benefits in how they create convincing narratives to choose public transit over other mobility options. To the extent possible, transit agencies could also advocate for city or state policies that help nudge people toward taking public transportation, including per-mile vehicle fees, congestion pricing, and limiting roadway capacity that could drive up demand for choosing public transportation.

RISKS

Impacts on the cost-benefit calculation of risk (actual and perceived), including everything from personal safety to climate risks.

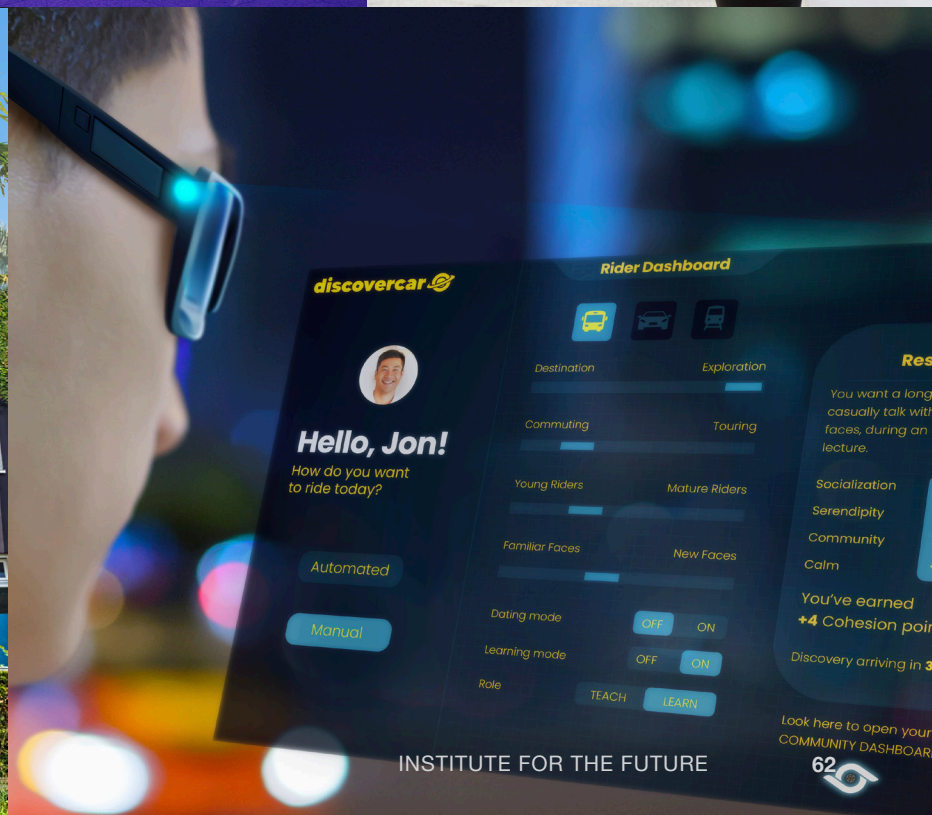
In an increasingly politicized environment, there will be challenges and limitations to how a transit agency can respond to rider and potential rider needs. Improving transit systems may require zoning changes, policy changes with regards to policing, or increasing housing stock, all of which are currently outside the jurisdiction of what a transit agency can do. As such, agencies run the risk that their efforts to increase ridership will be deterred by external policy factors. On the flip side, expanding services based on a favorable political climate makes one subject to that climate, with the risk of changing political winds impacting services, funding, and programs. Transformation will require expanding the current mandate of public transit agencies and empowering them to see a wider range of actions within their domain.

FUNDING

Impacts on funding streams, financial incentives, and assets.

The recent federal infrastructure bill and funding from Congress offer a once-in-a-generation opportunity for needed investments, though agencies will need to rebuild public trust and enthusiasm for public transit, and for funding it. Public transportation has been underfunded for decades and is suffering because of it: less funding leads to decreased service offerings, further eroding trust and interest. Public transportation agencies can take advantage of incoming funding streams to build needed infrastructure and restore trust and confidence around transit.

5 Future Scenarios



5 Future Scenarios

How to engage with scenarios

The scenarios in this report are stories about potential futures a decade out from now. They illustrate a holistic world and are composed of multiple forecasts, drivers, and signals that you have seen earlier in this report. They are based on explicit and internally consistent assumptions about the future forces driving change.

Scenarios are not predictions, nor are they necessarily preferred futures. Avoid judging the scenarios or identifying your favorite. Imagine each scenario as though it represents the reality of the present. Place yourself into the world described. Get specific. Think about how old you will be in ten years. What are your feelings or reactions to everyday life in this world? How do you spend your time and move through your day? How does this future affect you, your family, your workplace, your industry, and your country? After considering the complete set of scenarios and immersing yourself in these worlds, move to more critical and strategic insights. Ask yourself:

- What aspects of these scenarios are most plausible to you? Which are least plausible? Why?
- In which scenario(s) are your city and its public transit agencies best positioned for success?
- Which scenarios place your city and its public transit agencies at a strategic disadvantage?
- What strategies or actions can your city and public transit agencies implement to move toward a preferred future or avoid a particular scenario?

SCENARIO 1
Shifting to Market-Based Mobility Systems

SCENARIO 2
Pioneering a New Civic Norm

SCENARIO 3
Centering Resilience

SCENARIO 4
Prioritizing Social Cohesion

SCENARIO 5
Embedding Regeneration

Connecting the future to the present

All useful foresight ties into the present. Use these scenarios to stimulate imagination and consider a broad range of future possibilities. They also are a resource for working with stakeholders to identify additional insights within the impact zones of markets, services, decision-making, risks, and funding and to anticipate consequences for your city and public transit agency. Working with scenarios requires the discipline of systematically considering each future possibility, enabling you to prepare to navigate the disruptions—and seize the opportunities—of the next decade.

Scenario structure

Each of these five scenarios describes a possible future. Each starts with a provocative visual representation of the scene depicted in the scenario and includes a high-level summary identifying the values and dynamic future forces—social, technological, economic, environmental, and political—defining the primary throughline of the scenario.

Each scenario ends with a summary statement on who benefits in this scenario, and who is left behind—which individuals, groups, or entities have positions of power and strategic advantages in this future and which are left behind or find themselves at a strategic disadvantage.

SCENARIO 1

Shifting to Market-Based Mobility Systems

From Public Good to Private Great

SCENARIO 1

Imagine the future of public transit as it finds financial sustainability through market- and profit-driven approaches. A focus on revenue and profit generation remains sharp as cities respond to the re-prioritization of work to drive economic recovery, expanding automation, smart environments, the reclamation of streets from cars, and increased demand for transit-friendly housing.

Public transit in most U.S. cities never recovered from the impact of COVID-19 and the widespread shift to remote work in the 2020s.

More accurately, the 20th-century paradigm of public transit never recovered. In 2032, nearly a third of American cities have drastically reduced or shuttered almost all public transit options, leaving an empty shell of what was there before. Another third have tried to hold on to previous service levels, although ridership continues to vanish, creating what is known as a "ghost train" system. The remaining third have radically rethought the whole notion of public transit—from revenue models to staffing to technology and infrastructure. In fact, for these cities, the nomenclature of "public transit system" is outdated and inaccurate. The market-based mobility systems (MBMS) implemented in major cities such as Dallas, Atlanta, and San Francisco in the mid to late 2020s have redefined what public transit can be and is likely to become elsewhere.

Market-based, profit-driven approaches have done more than make public transit financially sustainable in these cities. Their transit agencies have become a vital revenue-generating business, replacing much of the income from parking tickets and fees lost due to hybrid work in the 2020s. This hybrid workforce led to fewer cars on the road at a time, reducing the need for garages and parking lots—and the space that once stored cars has been transformed into much-needed housing, which bolstered the still-growing 15-minute city design movement. For-profit public transit now meets transportation needs, generates revenue, and satisfies the anti-private-car "take back the streets" movements that have spread around the world.

A decade ago, public transportation planning rarely had such an undistracted focus, but the emphasis on revenue and profit sharpened agency thinking and creativity to a razor's edge. Where could costs be reduced? Where could nontraditional revenue streams be generated? What could be done to delight riders and make public transportation synonymous with luxury and style, not just efficiency and reliability? Many people were initially skeptical, just as they were about electric cars before Tesla made them sexy and Ford made them ubiquitous.

Impact Zones

MARKETS AND RIDERS

The profile of the typical public transportation user has undergone a profound transformation.

In some cities, high-end mobility services have become an environmentally sound status symbol rather than simply the means to move from place to place for those without other options. Cutting-edge entertainment options, premium upgrades, loyalty and incentive programs, integration with personal apps, and a host of customized services have made the car-less life in big cities a symbol of wealth and freedom.

Discount options are available for those who don't have the desire—or the funds—to indulge in the array of paid services offered. Some people shy away from sharing their data with the system and pay more for data-blind options. Although there may be required advertisement viewing, more tightly packed train cars, and longer routes, discount riders are often reminded that they should be happy to have a transit system at all.

Riding public transit is no longer synonymous with environmental sacrifice or the drudgery aesthetics of the working poor. Advocates argue that luxury riders and corporate partners keep the whole system afloat and should be welcomed rather than vilified. They are afforded prestige and opportunities to network with others of their own social and financial station. Corporate sponsors have extended engagement windows to shape the attention and desires of a prime marketing audience.

SERVICES

Each node in the market-based mobility system has designed services and add-on options for high-end and discount riders.

Customization, automation, and anticipatory services are key. Many frequent users allow data sharing with the system to help predict their movement and orchestrate the best transportation options on a minute-by-minute basis.

A host of personal preference- and wellness-oriented services are offered as well. Do you prefer to ride with only those of your gender identification? Do you need a calming car? Do you want to socialize, or party? Do you want your technology to be disabled or enhanced while you ride? Did your doctor prescribe a nature outing? These personal preferences, desires, and needs are constantly logged and integrated into the system to enhance rider experience and open up untapped revenue streams.

Impact Zones

DECISION-MAKING

The profile of the typical public transportation user has undergone a profound transformation.

In the 2020s, most career leaders and officials in public transportation were not up to the task. So, with little to lose, many cities began by clearing out or reassigning long-time employees, reducing local unions' power. This freed up finances to hire a new breed of design strategists, software engineers, innovation experts, and marketers.

With this approach, it was not surprising to see the hard push toward automation. Dallas, for example, saw a 60% reduction in its public transportation workforce. Innovative public-private partnerships accelerated infrastructure creation. Even though profits and rider data had to be shared among companies, cities still usually came out financially better than they had with a wholly public system.

RISKS

Each node in the market-based mobility system has designed services and add-on options for high-end and discount riders.

A perfect system that serves everyone efficiently and affordably was not sustainable—the story of the 2020s proved that. But although this new Market-based Mobility Systems model has not reached every neighborhood and may have cost the jobs of many workers, a viable public transportation system is still available for a large portion of the population. And with new revenue coming in, advocates can assure residents that an expansion to underserved neighborhoods and populations is on the horizon.

The loss of city public transportation jobs affected thousands, and those who remained employed had to be retrained or reassigned. The blowback from layoffs and disruptions had to be addressed. The hollowing out of a public asset and the push for profitable business models created inequities in access and service, causing further social tension.

Impact Zones

FUNDING

The profile of the typical public transportation user has undergone a profound transformation.

In the 2020s, many transit agencies began to evolve into “rail plus property” systems, such as those pioneered in Hong Kong. This process turned transit agencies into housing developers and property managers, which opened the door to a host of innovations in shifting public assets into new revenue sources.

With the strong anti-car policies San Francisco implemented in the 2020s, a wealth of exploitable public space opened up in former parking lots and car-centric infrastructure. One of the unique innovations is the city’s collaboration with p2pBnB, a new app-based room-renting platform. A resident/rider can receive an investment from p2pBnB, or in some cases from the city, for a down payment on an “above-train housing unit.” This financial investment makes these homes affordable to many people previously priced out of the market. In exchange, residents share their home equity with p2pBnB and are required to lease one of their bedrooms to a public transit customer. This win-win-win innovation provides the opportunity for homeownership to those previously unable to afford it, an inventory of conveniently located bedrooms for frequent transit users, and a sizable revenue stream for both p2pBnB and the city.

Summary

Focusing on profit turns attention away from money-losing routes, services, and investments. It shifts focus to high-margin services and sometimes draconian cost-cutting measures. Running a public transit system for profit leaves behind the poor and marginalized. Barring tempering factors, this approach likely exacerbates systemic racism and worker injustice while favoring corporate partners and wealthy users. We've seen this happen in medicine, education, and other domains that were once public goods rather than profit-centered businesses. Services are excellent for those who can afford them, and it is argued that a private, profit-focused system is better than no public transportation system.

SCENARIO 2

Pioneering a New Civic Norm

From Car-Centric to People-First

SCENARIO 2

What if transportation policy could put people first and disincentivize car ownership? Imagine a future where micro-mobility takes off at the neighborhood level, the new metric of success is livability, and where people can access what they need for living: transportation, food, work, culture, art, and entertainment. This future emerges as cities look for ways to tackle the big problems of deteriorating living conditions, increasing inflation and cost of living, and the persistent rise of houselessness.

The 2020s saw living conditions in major cities deteriorate for all but the wealthy. Cost-of-living increases, precarious work, rising inflation, and other systemic factors contributed to a significant rise in houselessness across the nation and California, especially in San Francisco and Los Angeles.

Politicians running on aggressive "people-first" platforms swept into power in the late 2020s. Having dramatically improved its subway and light rail systems in preparation for the 2028 Olympics, Los Angeles officials invested in robust micromobility systems at the neighborhood level. This plan organized adjacent neighborhoods into zones within which residents could move easily. It wasn't the 15-minute city model, in which all services and living needs could be accessed within a walkable radius, but it was as close as a megacity like Los Angeles could get. Access to fresh food and produce, open green space, and vital cultural infrastructure such as churches, libraries, and art spaces became part of the livability criteria that informed policy decisions. LA Metro implemented a seamless fare system that holistically and dynamically assesses the cost of a given trip across a combination of public and private transportation services, including rail, bus, ride-share, scooters, bikes, and shuttles. Furthermore, public transportation is free for those below a certain income threshold and discounted for many others in need.

LA Metro created a successful trip-planning app that allows riders to map their desired journey based on efficiency, vehicle preference, and cost. In addition to improving the efficiency of public transit, Los Angeles disincentivized private car ownership by implementing an annual car-ownership tax, and limited use of private cars to certain times of the day, enforced by hefty fees. Not everyone is happy that their personal transportation choices are constrained, especially the ultrawealthy. Still, most working Angelinos are thrilled to see fewer cars on the roads and more efficient and affordable options for getting around the city.

Impact Zones

MARKETS AND RIDERS

The archetypes of a transit user in Los Angeles have significantly expanded.

Once a city where the vast majority of ridership was made up of the poor and working classes and few car owners ever opted to use the system, Los Angeles now has the most socioeconomically diverse ridership in the country. Tourists ride transit in the hopes of catching sight of celebrities.

This ridership expansion was catalyzed by "The Challenge," a multibillion-dollar moonshot campaign initiated by LA Metro wherein all city residents were invited to limit their car trips for a month to under three per week. Everyone who chose to participate received an account that enabled them to see the benefits of their transit choices using metrics such as carbon reduction and cost savings. Over 2 million people participated in the campaign, and over 20% opted to go car-free after the month ended. Though many people still own at least one car, they do so primarily for the ability to take road trips outside of the city. They now conduct most of their daily activities by walking or using local transit systems.

SERVICES

LA Metro's focus on livability and access helped neighborhoods thrive and become more self-sufficient, with more local mobility choice as well as customizable trip planning.

Transit experiences are now seamless. Metro partnered with Giga (the big-data-driven predictive simulation giant that rose to dominance in the last decade) to design a sleek app that allows riders to build their itinerary according to their needs and preferences. The user-friendly platform provides real-time itinerary updates that will enable them to make instant changes to their trip and travel as efficiently as possible—as long as they share their data.

At the end of "The Challenge," those with eligible vehicles had the option to sell their car to LA Metro, agreeing that they could not register a new car in Los Angeles County for two years. LA Metro used these cars to form a fleet for its car rental service. This service was designed to help solve transit's first mile/last mile problem and accommodate those wanting to take longer trips within Southern California. While buses continue to make up the bulk of the transit system, rapid shuttles have been added to facilitate commutes between neighborhoods that are not well connected by other transit services.

Impact Zones

DECISION-MAKING

LA Metro brought its vision of livability and access to fruition by working with other municipal bodies.

To effectively adapt this framework, Los Angeles County embraced a vision of interdepartmental coalitions and collaborations. This approach allowed departments governing housing policy, transit, commerce, and health to pool financial, intellectual, and creative resources to apply a holistic multisolving approach to city planning and design comprehensive solutions to pressing issues.

This new approach to policy helped create thriving neighborhoods bolstered by small businesses. To develop community infrastructure, Los Angeles had to design policies that favored small business and local entrepreneurship over global corporations. This created tension between the city and large bricks-and-mortar retailers, which consequently pulled their operations out of the city, taking jobs and tax revenue along with them. This trade-off was consistent with Los Angeles' values of people first, and boosters of the program argued that big-box retailers were a dying breed anyway. They calculated that a better transit system would deliver net gains over time.

RISKS

Los Angeles became a global leader in people-first urban planning, bolstered by its open and experiment-friendly culture.

These moves, however, widened the political divide between the wealthy and the nonwealthy. While most are happy with Los Angeles' shift toward accessibility, some see it infringing on their liberties. Car ownership has been cultivated as a symbol of freedom in the U.S., especially in Southern California, since the early 20th century. The county's pivot left many feeling slighted, leading to increased political polarization regarding the county's decisions. Leftists and the working and middle classes strongly approve of the county's people-first approach and are grateful for how it has improved their lives. But the wealthy feel underrepresented in the county's approach because they don't experience the benefits on a daily basis. Car-lovers feel attacked as elements of their lifestyle, such as owning multiple cars, now cost them additional money in fees and taxes. However, some big celebrities joined "The Challenge" and celebrated the resulting change, believing that reducing car use fosters the spirit of individuality and inclusiveness. Others chose to relocate outside of Los Angeles to avoid paying additional taxes.

Impact Zones

FUNDING

While Los Angeles' free ridership program helped make the system more accessible and equitable, the policy resulted in over 65% of users riding for free.

Fare revenue now makes up only about 8% of the transit system's overall operating budget. To address funding shortfalls and increasing pressure from the public to discontinue its contract with LAPD and the Los Angeles sheriff's office, LA Metro significantly reduced the number of police officers patrolling LA's transit services and repurposed these funds for basic operational costs.

While the social and environmental impacts of the county's new approach to livability and accessibility are generally positive, fewer cars on the road have resulted in a substantial decrease in revenue generated from parking fees, fines, and moving violations. To compensate for this and keep incentives aligned, Los Angeles County has imposed "excessive lifestyle" fees that apply to choices such as owning multiple cars, which are now taxed.

Summary

A people-first, subsidized transit system requires a radical rethinking of policy and funding priorities. Any money savings from decreasing policing and other services have met with resistance. Temporary increases in crime (or even the perception of an increase in crime) have put political pressure on decision-makers to not trade public safety for cost savings. In the end, a publicly subsidized system has won the day because most of the public prioritized access and equity to achieve a shift in car centricity and new civic norms. The classic philosophical debates of individual freedom versus collective responsibility continue to rage, but a highly functional, widely accessible transit system has dramatically changed behavior and attitudes.

SCENARIO 3

Centering Resilience

Social Infrastructure for All

SCENARIO 3

Imagine public transit and transportation as a lever for building resilience and future-readiness. After a decade of extreme weather, social instability, and the unaffordability of everyday life, cities embrace the principles of equity, sustainability, and foresight to respond to calls for justice. Cities amplify the idea of "social infrastructure for all," making public education, public safety, public health, public space, and public transportation universally available to all. Starting with universal basic transportation benefits, a new road to resilience comes into view where the city works better for all.

In 2032, resilience is the name of the game in California. In the wake of a devastating global pandemic and cascading climate disasters, policymaking is now guided by principles of equity, sustainability, and foresight.

These guiding principles enhance a city's ability to withstand systemic crises. Environmental sustainability cannot be achieved without social cohesion and trust in collective institutions. The "Resilience Revolution" is reversing decades of privatization and policies that led to unbalanced wealth and power accumulation. Now, social infrastructure is viewed as an asset that should be universally available to all residents. In 2022, it took at least five minimum wage jobs to afford rent in the largest U.S. cities; city living was impossible for most. The universal basic assets (UBA) program implemented in the mid-2020s was a direct response to the concentration of private wealth and the power of corporations. It constituted an attempt to make city living possible for working people.

Facing mounting political pressure from ongoing heat waves, drought, and fires that exacerbated social unrest, California was the first state in the nation to design and adopt a bipartisan 21st-century social safety net, which includes mandates for the creation of more social infrastructure for public education, public safety, public spaces, health care and, importantly, public transportation. This resilience-focused approach recognizes public transportation as an important aspect of economic security. Not only does accessible transit connect people socially or for job access, but it also minimizes the need to own a car, an expensive private asset that declines in value from the moment of purchase and has significant negative impacts on the environment, health, and livability.

Investments in critical social infrastructure helped build a more resilient city. Leveraging this infrastructure to reduce economic precarity enabled the city to work better for almost everyone. The first project involved providing universal basic transportation benefits (UBT) to the most financially insecure, expanding transit routes to serve all major neighborhood centers, not just downtown, and providing students with deep discounts or free rides. Accessibility enhancements also helped support the first-mile and last-mile needs of seniors and people with disabilities.

Impact Zones

MARKETS AND RIDERS

Under the UBT mandate, students, seniors, people with disabilities, and riders making less than a living wage automatically receive a free mobility wallet every year, which provides access to a mix of transportation and delivery services.

In addition, qualifying city dwellers have guaranteed access to friends, family, events, health appointments, schools, jobs, and entertainment throughout the city. The UBT mandate prioritizes riders living in food deserts or far from essential services. As daily vehicle miles decrease from almost 6 million per year in the early 2020s to less than 3 million in 2030, people in these regions spend less on cars and gas. The percentage of income spent on transportation by financially insecure riders has decreased from 40% in 2022 to 19% in 2030.

SERVICES

A top goal for UBT is to ensure that no one has to travel more than 30 minutes to reach a health appointment.

To meet this goal, public transit-dense cities are constantly optimizing routes based on ridership levels, commonly referred to as dynamic scheduling.

The first- and last-mile city partnerships encouraged previously reluctant riders to try the new and improved system. Before, many would-be riders opted only to pay for a ride from point A to point B rather than for a full ride, including first- or last-mile options.

While first- and last-mile stops are not currently available at every stop, a pilot is being tested to enable people to request a last-mile ride by entering their bus number and final destination on their personal device or an onboard touch screen. The first- and last-mile request data is also used to develop route optimization.

UBT is resulting in more foot traffic and has prompted the transformation of transit stops into community centers and parks, increasing employment, public engagement, and public safety.

While private services have had to compete with improved public options, they are not feeling the loss initially anticipated because their services are so frequently being used to support first- and last-mile rides.

Impact Zones

DECISION-MAKING

The decision to drive or ride transit has never been easier. With free or discounted rides, optimized routes, dynamic schedules, and transit-only lanes, public transportation performs better ride-hailing's speed, cost, and reliability.

Community events at these organic gathering spaces have strengthened social ties and community resilience. In most areas, the highly connected routes between neighborhoods have made taking the bus or train more viable than driving. Public transportation is almost always the best option unless you're traveling to another state.

Private transportation services have had to re-evaluate their priorities. They now focus on niche services for tourists and entertainment-based travel experiences. The renewed culture of care in California, especially the Bay Area, rendered exploitative, value-extracting systems socially unacceptable. Private transportation companies have had to embrace the commitment to serving people over profits. The pivot was rapid, with value-aligned Gen Z and Millennials in leadership positions.

RISKS

The exponential improvement in service routes and free or low-cost fares means that many more people are taking public transportation.

Even with dynamic scheduling in operation, crowding on public transportation is an issue. During certain peak hours, people traveling with children, those with disabilities, and seniors are less inclined to use public transit. A systems approach must be used to assess how housing, work conditions and schedules, education, and environmental impacts intersect and to determine where solutions can be found. Many "win-win" solutions are still being tested and implemented, and for the time being, there are fluctuations in ridership and use of private options, but leaders are hopeful that they will get these kinks worked out.

Impact Zones

FUNDING

The funding for UBT comes from local taxes, municipal governments, local companies, and state and federal governments.

In dense urban areas, there are higher fees for street parking, garage parking, and traffic tickets. Employers receive tax breaks when they buy a green UBT pass for their employees. The top 5% of wealth holders in California pay a 0.5% Universal Basic Living Tax that funds basic transportation for all Californians. Measures to expand to other public services—with direct transit routes—such as universal pre-k and public parks are also in the works. Additionally, all companies that offer ride-hailing or personal transportation pay a 10% tax that helps fund public transportation. Sustained funding is provided through the national Universal Basic Assets Act, passed in the mid-2020s.

Summary

Policymaking through a community-first, resilience-based lens allows governments to operate and plan for the long term. Citizens feel supported by local and state governments because they see how policy changes prioritize their needs. These policies have contributed to a better sense of community in cities where public transportation is most vibrant, from optimized transit services to prioritizing spaces for pedestrians over private cars. UBT has raised the bar for public institutions, and more demands are being placed on them. Sometimes these demands lead to civic engagement and sometimes to frustration. People who choose to own private cars are paying much more than they used to, which hurts groups that need personal vehicles. Although initially, this felt like a loss, the high cost of owning a car in California has led to widespread co-ownership—some vehicles have up to 15 different owners!

SCENARIO 4

Prioritizing Social Cohesion

Putting All Neighborhoods on the Map

SCENARIO 4

What if public transit systems expanded their definition of riders beyond the commuter? What would it mean for you and your neighborhood? After years of falling short of their aspirations for diversity and inclusion, cities look for ways to address geographic segregation, inequality, and violence explicitly and achieve that elusive state of vibrancy. Vibrancy is the truest measure of a city's health and well-being. By reimagining public transit as a purveyor of social cohesion, all riders—and therefore all neighborhoods—could now be on the map and collectively bring the city to life.

No one thought it was possible to challenge the cable car's status as San Francisco's iconic transportation system, but that's precisely what Discovery Cars are doing today.

Maybe that's because they're so conspicuous. They look different from similar light rail trains because they're covered in paintings by local artists. Each one is unique. They also move differently—much slower and steadier. Because of this, they've changed the visual landscape of the city. From Coit Tower, you can watch as these mobile murals slowly weave circles in and around the city.

What's genuinely distinctive about Discovery Cars is their intention. While most public transit is designed with value, efficiency, and convenience in mind, Discovery Cars were intended explicitly as a way of promoting social cohesion in the city and combating the geographical segregation, inequality, and violence that in the 2020s was undermining San Francisco's aspirations to be a bastion of diversity and equality.

Designed to be a sort of third space on wheels, the interiors have dynamic seating layouts that can be rearranged for various purposes. They are decorated intensively by local artists, making each one its own attraction. Early media coverage drew connections to Burning Man's aesthetic and intention. The cars move slowly on routes designed to connect neighborhoods that previously had little connection. Their stops prioritize public spaces, a deliberate move meant to entice riders to hop off if they see a park, library, or a shop that looks interesting. Discovery Cars are public spaces that move people!

Impact Zones

MARKETS AND RIDERS

These innovative cars make for a better experience for riders, who get a more pleasant trip, regardless of destination.

They also provide customization for riders, while focusing on social cohesion makes for additional personalization. For instance, Discovery Cars employ a smart-pass system that aims to reduce disparities and increase cohesion among riders of different demographics. The system nudges people to ride with passengers of different ages and explore new city areas. As a result, different passengers have different experiences. For instance, if you're a student, your pass won't open a car door if there are already many students inside; instead, your pass will allow you to enter a car filled with seniors and net you credits you can use in local stores. You can also earn credits for riding at specific times, trying new routes, and getting off to explore areas you don't usually visit. It is a fun game to master if you have the time and motivation.

SERVICES

Focusing on social cohesion opens up a new set of imperatives for the system to pursue that don't just focus on getting people from one place to another quickly and efficiently.

For instance, transit employees and designers see themselves as providers of social connection and recreation and focus on "programming" the transit cars like museum exhibits.

Over time, the imperatives for social cohesion expanded services even further. Understanding that meal delivery and online shopping companies are also logistics and transportation companies, Discovery Cars began to municipalize delivery services to encourage more people to shop local and take public transit to do it. Participating businesses allow customers to have their in-person purchases delivered to their homes at off-peak hours by transit employees and contractors. It serves many civic organizations, not just individuals, and works with organizations to find new ways to meet logistics and transportation needs.

Impact Zones

DECISION-MAKING

The Discovery Cars substantially alter riders' decision-making calculus.

For instance, people who need to get to their destination quickly tend to bypass a Discovery Car and instead choose a rapid transit option like BART or express light rail. Because the range of service options uncouple the need for speed from the desire for a pleasant ride, riders generally opt for the more fun, social, and relaxing Discovery Cars unless they need to be somewhere urgently. They are much less eager to arrive at a destination when the journey is enjoyable. This has the benefit of diffusing the concentration of riders at certain times of day along specific routes. The municipalization of commercial transit allows for a high level of coordination and interoperability between all transit options. Discovery Cars offer an integrated app that helps riders plan a journey on the spot based on where they're going and why, and then recommends the right transit option or a mix of options to meet their needs.

The Discovery Car system rejects conventional imperatives around efficiency. While this benefits the city and its residents, the system is not as green as it could be: Keeping trains running all day for people who don't strictly need to travel inherently means energy savings aren't being maximized. And while cutting-edge green technology and clever routing lessen this effect, many people call the project into question on these grounds.

RISKS

Data collection and storage enable the transit system's behavioral nudges that present several potential risks, including breach of privacy, cybersecurity threats, and discrimination.

Even though the agency rejected technologies like facial recognition and biometric monitoring, it used mobile wallets in its experiments to engineer social cohesion. Mobile wallets are criticized across the political spectrum, sometimes due to misunderstandings about the technologies and their effects, but often due to informed understandings of potential risks. Several citizens oppose the premise that transit agencies should nudge riders into doing anything. Others disagree with the way some of the categories are defined and the nudges that are specific to them. Other people are not opposed to the mobile wallet system and data collection in general but believe that their particular uses carry potential risks that outweigh the current benefits.

While social cohesion is commonly understood to create greater resilience in the face of crisis, the Discovery Car system and other reforms to increase social cohesion create new vulnerabilities. For instance, its reliance on people congregating in shared spaces could prove untenable or dangerous in the event of contagious disease outbreaks or mass shootings.

Impact Zones

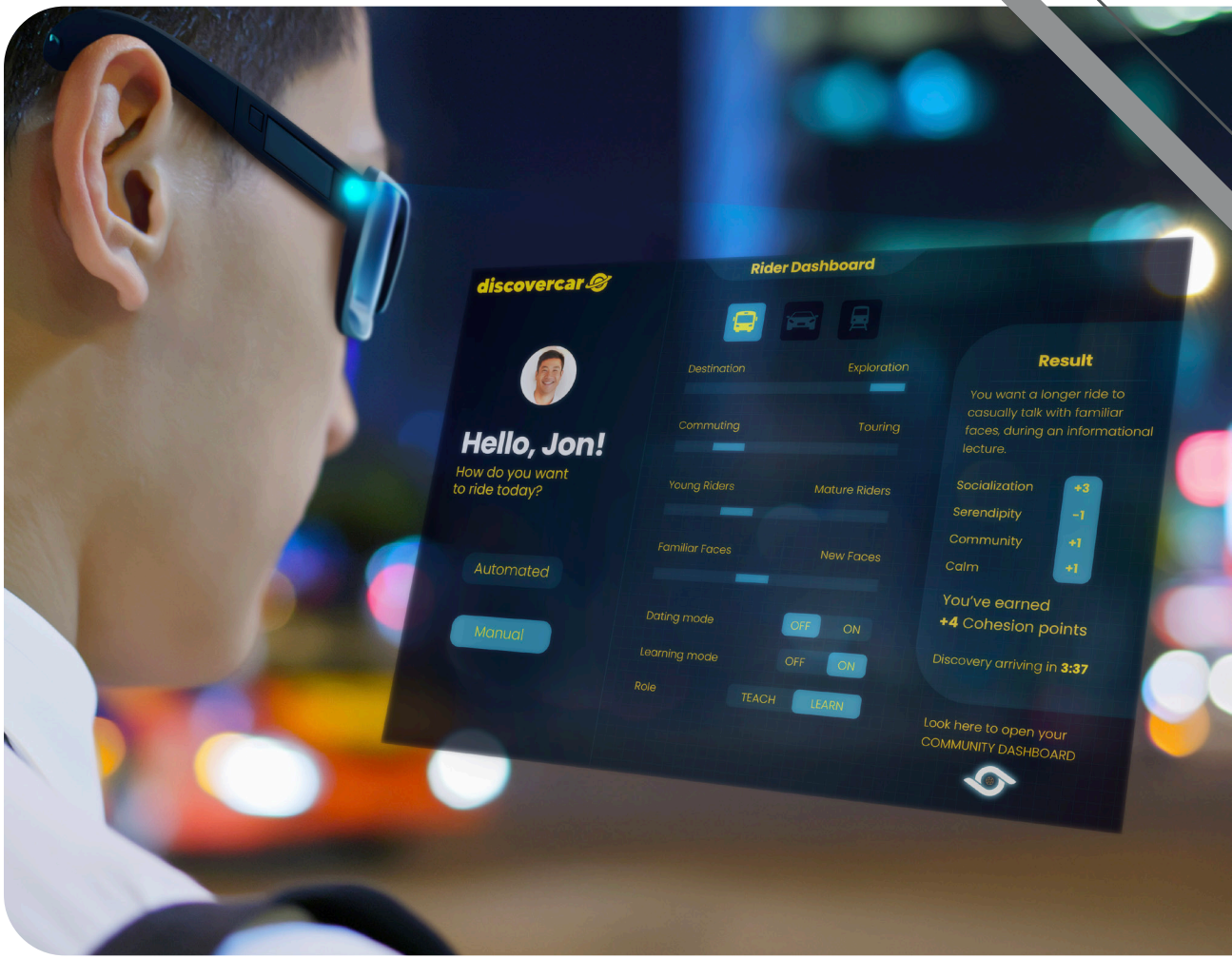
FUNDING

The Discovery Cars system has a unique funding model.

The theory that drives the project is that Discovery Cars increase social cohesion, which creates positive externalities—second- and third-order impacts that advance other goals. For example, research indicates that high levels of social trust and cohesion positively affect individual and community health, happiness, and economic prosperity, and may curb crime and violence. Over an extended period, this could result in significant savings in public health, education, policing, and criminal justice, all areas where spending increases would otherwise be expected. Current investments are paid for through anticipated future savings. However, this approach was controversial from the beginning and has remained so. While savings have materialized, critics point out that it is hard to definitively determine their cause, because violence, education, and health behaviors don't occur in a vacuum.

Summary

This transit system that focuses on social cohesion benefits almost all San Francisco Bay Area residents, but it also diverts resources away from routes optimized for efficiency or revenue. As well, people who wish to keep their neighborhoods insular are largely opposed. In addition, the systems' focus on serving city residents means people who live outside the city and commute to San Francisco, or have difficulty proving residency because they are unhoused or for other reasons, would not share in the benefits. While a growing movement of concerned people has come forward with a list of reforms to rectify this and other issues, the small number of people who oppose the system overall use these issues as a wedge to cast doubt on the whole system.



SCENARIO 5

Embedding Regeneration

Turning Transit Agencies into Climate Action Organizations

SCENARIO 5

Imagine repurposing transit agencies into climate action organizations. After decades of extreme weather and climate emergencies, deep social and economic inequalities, and intergenerational conflict over what to do about it all, political radicalization gives rise and voice to new generational power. With this shift comes a vision that goes beyond climate mitigation to reach for recovery, healing, rewilding, and regeneration. A new civic responsibility is emerging, and public transit agencies are at the center as mobility becomes a force for climate and community action.

The past ten years have been tough.

The after-effects of COVID-19 and its recurring variants, combined with violent political radicalization, never-before-seen inequalities, and now-frequent extreme weather events, have caused deep trauma. Society is sick, and the planet is hurting. Some people have fallen into pessimism and believe the world is broken beyond repair, although many believe that now is the time for transformative regeneration. After the strife and the tumult of the 2020s, society realized it must move beyond zero-sum strategies for socio-environmental sustainability and turn all human activity into an opportunity for climate action and social rebirth.

The youth who protested climate inaction, racial injustice, and economic inequality in the 2020s have come of age. Angry, impatient, but deeply motivated, most millennial, Gen Z, and Gen Alpha adults can't afford to live a life that is not focused on recovering the world. For them, work, leisure, and the moments in-between must somehow contribute to healing their local environments and communities. In 2032 businesses, government agencies, and local communities are deeply affected by fresh and radical ideas pushed forward by young leaders and grassroots movements.

Public transportation is the industry that best embraces the concept of embedded regeneration. As a natural connector of the many aspects of urban life, public transportation agencies are now responsible for rewilding landscapes, infrastructures, and symbols of the carbon culture, such as parking lots, multilane highways, and even the atmosphere. Most agencies have adopted partnerships with businesses and communities to fund mobile gardens mounted in buses and trains as a strategy to cool down temperatures in less climate-resilient neighborhoods. As a result, ridership and revenue have significantly increased, as riders now see public transportation not just through the lens of mobility but as a force for climate and community action and even for personal health and wellness.

Impact Zones

MARKETS AND RIDERS

In 2032, most people consider taking public transportation their planetary duty, especially as a growing number of buses and trains become equipped with mobile carbon-capture technologies.

As free-access transportation, flexible work, and orchestration technologies become widespread, riders have shifted from paying for the fastest routes to supporting the most climate-positive rides. A common game among students and workers is carbon-trawling—paying for a bus or train ride and comparing how many kilograms of CO2 one helped to capture.

Tracking and sharing one's green footprint is also important to commuters. Many cities have adopted carbon budgets, so companies provide incentives for workers who can capture more carbon than they produce when commuting, raising their company's public image and preventing fines for going over budget. Sharing one's green footprint on social media is popular among teenagers, as is shaming private car owners. Even personal EVs have gone out of fashion, as many neighborhoods have banned private cars under hyperlocal governance norms.

SERVICES

Transit agencies leading in the field of regeneration have adopted mobile carbon-capture technologies for their fleets. They are repurposing public infrastructure once dedicated to cars into rewilded spaces and neighborhoods.

Rewilding is the practice of returning land to wilderness and natural evolutionary processes. Rewilding disused parking lots and highways have become a mandate for transportation agencies. Cars have given way to other forms of mobility, including dedicated walkers, who have emerged as a new demographic. In many communities, walker-jams are a common problem, and building larger and greener walking lanes and organizing walking groups have become critical demands for cities.

Transportation agencies have become one of the most critical assets for other agencies and governing bodies responsible for reversing climate change. Transportation agencies are a digital hub, providing a wealth of data generated by capturing and monitoring CO2 and tracking the carbon footprint of citizens and companies. They can measure the impacts of rewilding in real time as a byproduct of transportation itself. In 2032, many climate strategies depend on that type of data, and transit agencies are their primary providers.

Impact Zones

DECISION-MAKING

In 2032, the decision-making process in public transportation includes nontraditional data points and stakeholders.

A mix of tracking technologies and new metrics for environmental and mental health, happiness, and public engagement have been added to traditional data points such as revenue, number of rides, and riders transported, and routes and communities covered. In the past, data was used to anticipate shifting numbers and demand for urban mobility, even responding in real-time to the needs of riders. Now planning focuses on quality of life and the impact of transportation on well-being. Hard numbers are still relevant, as are statistics on riders-per-mile, but measuring the results of regeneration in every ride and repurposed lane and sidewalk, and studying the social performance of rewilded communities have become top priorities for urban planning. Management faces a governance challenge in this regenerative culture because citizens have become much more involved in decision-making. Many neighborhoods have councils operating directly with companies and public agencies to co-design solutions that affect their environments.

RISKS

Though environmental and social regeneration are the primary purposes of transportation agencies in 2032, extreme weather events and the deterioration of the social fabric are still significant threats.

Transportation agencies risk not generating enough impact in the scale and time necessary to achieve their goals. Regeneration, rewilding, and other healing strategies are slow processes and susceptible to leaders and communities dealing with urgent issues and the undesirable short-term effects of regenerative strategies. Repurposing of drivers, large idle fleets of old gas-powered vehicles, clashes between different agencies' mandates, and generational conflicts are among the challenges transportation agencies face. But in this heavily climate-aware society, public opinion turns quickly against those who don't play the climate-positive game. In 2032, urgency-led, climate-focused civic engagement can soon become eco-authoritarianism and oppression. Protests are frequent, and agencies are sometimes accused of favoritism, corruption, and privileging some communities over others in the name of climate action.

Impact Zones

FUNDING

To encourage regeneration, many cities have adopted some form of universal basic assets (UBA).

Some have made services such as health and transportation free for most of the population, but even cities that adopted basic income have placed caps on prices and fares of most essential services. In 2032, most transit agencies are reinventing their funding models. One of the most common strategies is to seek out public funds associated with climate change, environmental conservation, crisis mitigation, and the like. The most successful models have repurposed transit agencies into climate-action organizations that operate through mobility and transit infrastructure, which secures grants at the state and federal levels and from private donors. But those funding streams are not enough, and financially healthy agencies have created partnerships and new business models aimed at helping private organizations shift from degenerative to regenerative models. The business of tracking, processing, and selling climate-change and environmental data also has become a huge revenue stream for both transit agencies and vehicle manufacturers.

Summary

In this future, natural and rewilded environments win the most, with benefits for society as well. Metrics to measure and assess the regenerative economy are yet to be standardized, while the long-term impacts of rewilding cities remain uncertain. However, riders and underprivileged communities gain quality of life as a consequence, while providers of greener transportation benefit from a much larger market. The last decade's authoritarianism, polarization, and mistrust still haunt the currently dominant generation, and their anger and anxiety over climate continue. However, there's a dramatic decrease in carbon-intensive employment and car ownership, and the aging Boomers, Gen-Xers, and "net-zero" advocates have lost power. Climate activism is at an all-time high, but eco-authoritarianism is also rising. Knowing when and what to choose among top-down and bottom-up strategies and management is key in this future.

Appendices

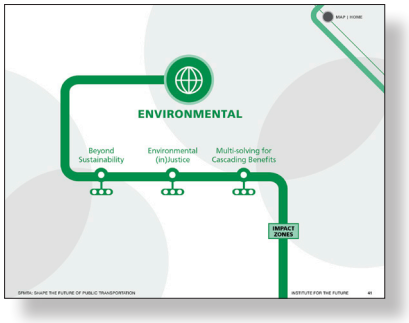
I. Key Terms

SCENARIO

Scenarios are stories about the future as it is a decade from now. They illustrate a holistic world and are composed of multiple forecasts and drivers. They are based on explicit and internally consistent assumptions about the future forces driving change. These public transportation scenarios are not predictions, nor are they necessarily preferred futures. IFTF uses scenarios to dramatize different and plausible trajectories of change. Although these futures are often radically different from our current world, they are generated from signals of change that exist in the present. The future of transportation and public transit systems will likely contain elements and trends from each of these five scenarios.

FUTURE FORCE

Future Forces are possible futures based on compelling evidence in the present. These are plausible, and often provocative, statements about the future. In foresight practice, these forces can be quantitative or qualitative, as long as they are grounded in present-day facts. They describe a range of plausible changes but importantly don't predict a specific outcome. The forces in this report are statements about possible futures and directions of change over the next 10 years, with a focus on those that will transform the public transportation industry as well as the ecosystems with which it interacts.



SIGNAL

A signal is an early, emergent, or local innovation or behavior that has the potential to grow in scale and geographic distribution. A signal can be a new product, service, initiative, policy, data point, or technology. Unlike more easily identifiable trends, signals turn our attention to possible disruptions before they become obvious. Signals often focus attention at the margins of society rather than the core and hint at emerging practices or technologies that may become widespread. Signals add concrete details to our understanding of what the future might look like, and act as an "early warning" or clue about things coming our way.

STEEP

STEEP is shorthand for Social, Technological, Environmental, Economic, Political. The external changes in each of these domains over the next decade will transform rider demands and expectations. Through these domains, we can see the interactions and combinations of a broad range of forces that influence the course of change. Our research and analysis aim to inform SFMTA and other public transportation agencies about the ways in which different futures within systems present challenges and opportunities for the future of public transportation.

IMPACT ZONES

In addition to the STEEP framework, this research considers the future of transit through the following five impact zones. These impact zones were clarified through research and interviews as critical focal points for identifying threats and opportunities for transit systems.

MARKETS | Impacts on different groups of riders as defined by their distinct needs and patterns of mobility and movement.

SERVICES | Impacts on the portfolio of products, services, and experiences and their distinct value proposition, design, and delivery.

DECISION-MAKING | Impacts on factors that affect transit decisions: price, convenience, seamless connections, and other market alternatives.

RISKS | Impacts on the cost-benefit calculation of risk (actual and perceived), including everything from personal safety to climate risks.

FUNDING | Impacts on funding streams, financial incentives, and assets.

II. Acknowledegments

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ABOUT THIS PROJECT

Institute for the Future (IFTF) collaborated with the San Francisco Municipal Transportation Agency (SFMTA) to develop a National Transit Adaptation Strategy to identify mobility needs and target market segments and to develop messaging to rebuild confidence in public transportation to drive up ridership quickly. As part of this project, IFTF used strategic foresight methods and leveraged decades of research to identify critical forces and build scenarios that expand the range of possibilities regarding the future of transportation. We gained insights into future possibilities and directions of change by interviewing subject matter experts, riders, and potential public transit riders and by conducting workshops with staff and other San Francisco government employees. We also identified barriers and constraints to transformation, which are essential to anticipating change over the next decade. The interviews were conducted with leading experts in transportation, land use, climate, infrastructure, and government. The project also involved an Introduction to Foresight for SFMTA staff to equip them with a working understanding of terms, frameworks, and tools for anticipating risk and envisioning possible futures.

IFTF created several reports for the National Transit Adaptation Strategy project, including 1) a future forces report investigating the major drivers and signals of change demanding strategic responses from public transit agencies; 2) a report that builds on the futures forces report and presents a series of provocative scenarios for public transit agencies; and 3) this final report that visualizes and serves as an executive overview of both the future forces and scenario reports, along with tools and frameworks for public transit agencies to use in strategy discussions on the demands and realities of the next decade.

ABOUT IFTF

Institute for the Future is the world's leading futures thinking organization. For over 50 years, businesses, governments, and social impact organizations have depended upon IFTF global forecasts, custom research, and foresight training to navigate complex change and develop world-ready strategies. IFTF methodologies and toolsets yield coherent views of transformative possibilities across all sectors that together support a more sustainable future. Institute for the Future is a registered 501(c)(3) nonprofit organization based in Palo Alto, California. www.iftf.org

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