Autonomous Vehicles, Micro-Mobility, and Public Transit

Master of Science in Information Management

IMT 580: Management & Strategic Leadership

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EXECUTIVE SUMMARY

Today's municipal leaders face the critical challenge of modernizing urban mobility systems to meet the demands of rapidly growing cities. The ever growing population in urban areas are placing an unprecedented pressure on transportation infrastructure. **This report examines how autonomous vehicles (AVs) and micro-mobility solutions represent transformative opportunities to address contemporary transit challenges** through enhanced efficiency, improved first-/last-mile connectivity, and data-driven decision-making. **A SWOT analysis and recommendations are also presented to share best practices for municipal leaders**.

The integration of AVs and micro-mobility into public transit systems offers substantial promise, as the global AV and micro-mobility markets are expanding. Real-world implementations in Seattle, Sun City, and Chandler demonstrate how these technologies can expand transit access, improve service reliability, and enhance quality of life for diverse populations. However, these innovations also introduce significant challenges around safety, equity, workforce transitions, data governance, and public trust that demand thoughtful leadership responses.

The strengths and weaknesses of multimodal mobility integration require leaders to develop strategic competencies including **articulating compelling visions, managing cross-sector partnerships, strengthening social capital, and executing equity-centered deployments**. Through analysis of pilots and organizational transformations, this report identifies how the four management functions of **planning, organizing, leading, and controlling** must evolve to support seamless mobility ecosystems that serve all community members.

Municipalities aren’t waiting for the perfect technology. Forward-thinking organizations are piloting integrated systems that combine e-scooters, autonomous shuttles, and traditional transit into unified networks. Residents increasingly expect convenient, sustainable, and affordable mobility options tailored to their needs. Therefore, leaders' time to plan strategically and implement thoughtfully is now. The competitive advantage tools for tomorrow's cities are already emerging through AV and micro-mobility integration - leaders who act decisively with equity and governance frameworks at the center will position their communities for long-term success.

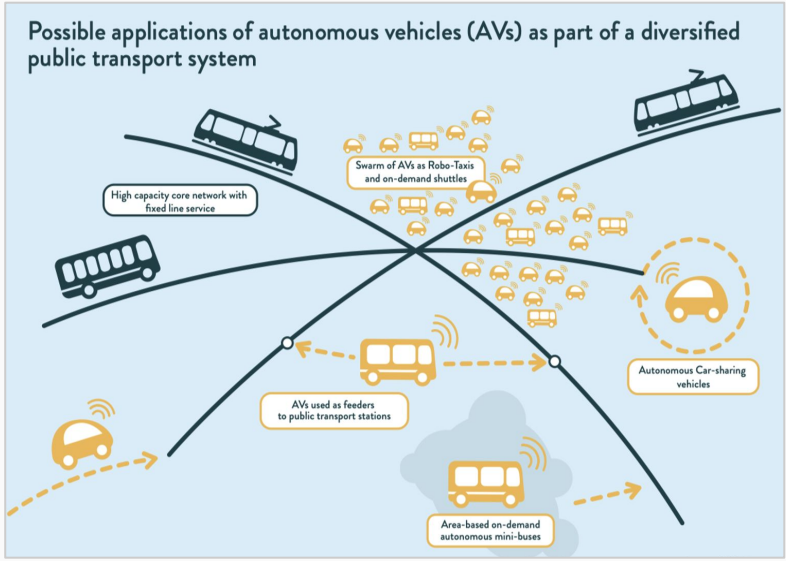
MODERN PUBLIC TRANSIT NEEDS MODERN SOLUTIONS

Globally, there has been a growing demand in urban centers to provide faster, flexible, affordable, and sustainable public transportation solutions. Today, cities and municipalities are focused on reducing friction, improving reliability, and closing first-/last-mile gaps. Autonomous vehicles (AVs) and micro-mobility services (e-scooters and e-bikes) are emerging as essential components of such multimodal transport systems (DuPuis et al., n.d.). By fostering economic development, enhancing quality of life, promoting social equity, and ensuring public safety, as entities tasked with advancing the public good, **municipalities must now consider how to leverage these technologies to strengthen multimodal mobility, as well as what governance, ethical, and operational challenges must be addressed to ensure these innovations truly serve the public**.

Contemporary Transit Challenges

1. Urbanization & Transit Strain: With constantly evolving travel patterns, overcrowding, and inequitable access to mobility, cities need to explore new technological innovations to support sustainable urban growth.
2. First-Last Mile Gaps: Traditional buses and rail systems often cannot efficiently serve low-density neighborhoods. As a result, people shift toward private cars, intensifying congestion and reducing transit ridership.
3. Fragmented Mobility Networks: Transit networks in most cities were not designed to integrate with emerging mobility services. This fragmentation creates confusion for users, inefficiencies for agencies, and unnecessary friction in multimodal journeys.

68% of the world population is projected to live in urban areas by 2050 (United Nations, 2018). This places unprecedented pressure on cities to deliver efficient, reliable, and sustainable mobility systems. AVs and micro-mobility solutions offer transformative tools to modernize public transit, reduce friction across multimodal journeys, and support data-driven mobility planning. As cities prepare for this demographic shift, investigating these technologies becomes essential for shaping policies around **safety, governance, equity, infrastructure design, and long-term urban resilience** (Lang et al., 2020). This urgency sets the foundation for understanding how **emerging mobility innovations can help cities meet rising public expectations** while fulfilling their mission to enhance quality of life and deliver public value.



Source: UITP: Advancing Public Transport (2017)

THE BOOMING INDUSTRY OF AV TECHNOLOGY

In 2025, the global market size for Autonomous Vehicles was estimated at roughly USD 274 Billion. **A significant expansion is expected upto USD 4.5 Trillion by 2034**. That is a CAGR increase of 36.3% between 2025 and 2034 (Precedence Research, 2025). AVs are transitioning from long-term R&D to commercial rollouts. Market forecasts and large-scale pilots indicate strong investment (Grand View Research, 2024), rapid tech progress (sensors, compute, simulation), yet **geographically uneven deployment** (North America, Europe, Asia Pacific & LAMEA).

Market Projections

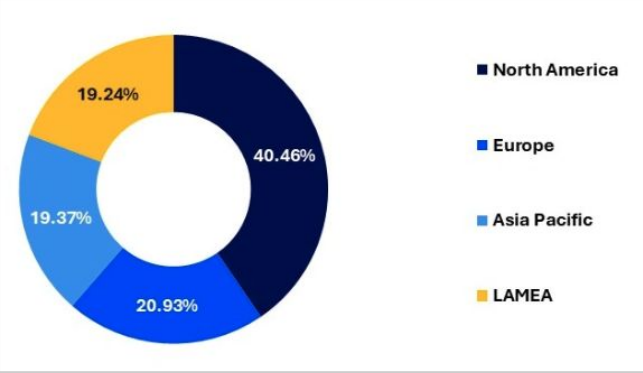
- United States: Projected number of AV's expected to rise to 35,000 by 2030. At that level, they could generate USD 7 Billion in revenue; up to 8% of US rideshare market (Goldman Sachs, 2025)
- Asia-Pacific: The robotaxi market is projected to grow from USD 701 Million in 2024 to USD 16 Billion by 2030
- Europe: The market is expected to grow at a CAGR of 19.9% by 2030. Passenger vehicle segment generated the most revenue in 2023 (Grand View Research, 2025)

Regional Regulatory Landscape

(UrbanSDK, n.d.)

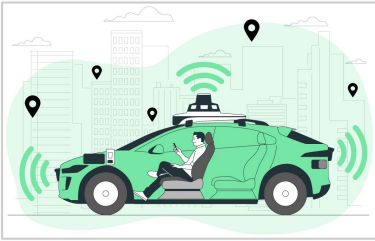
- China: centralized city/state support; faster municipal permits
- USA: privately driven; high investment; regulations vary by state/city
- Europe/UK: regulatory caution (safety-focused); strong link to urban planning objectives
- LAMEA: public-private partnerships; attractive because of controlled environments and public support

AUTONOMOUS VEHICLES MARKET SHARE BY REGION, 2024



Source: Precedence Research (2025)

The global AV market has diversified: going beyond ride-hailing into autonomous shuttle services, microtransit, and AV hardware and software supply

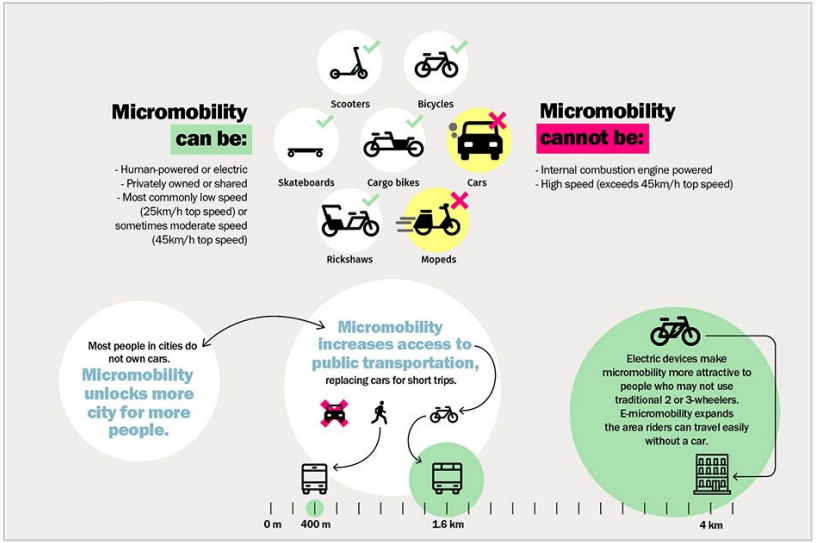


Growth Factors

- Improvements in AI, sensor technology, and software are making AVs increasingly viable and affordable (McKinsey, 2025b). As the technology matures, the cost per mile for AVs could decline, making AV-based mobility more economically competitive
- The convergence of electrification, autonomy, and shared mobility could transform where value is captured: by 2035, "new mobility technologies" (including AVs) may drive roughly 40% of auto industry profits (BCG, 2018)
- Strong demand for improved safety, efficiency, and urban mobility solutions. AVs promise to reduce collisions caused by human error, increase reliability, and enable new mobility patterns (e.g. shared robo-taxis, on-demand transit)

MICRO-MOBILITY SOLUTIONS ON THE RISE

The global micro-mobility market is on the upswing. McKinsey estimates that the market was worth about USD 160 Billion in 2022; by 2030, it's estimated to reach USD 340 Billion (McKinsey, 2025a). Worldwide, **micro-mobility is moving from experimental deployments to mainstream urban mobility, powered by advances in hardware, fleet management, and supportive policy**. Cities now view e-scooters and e-bikes as critical to solving congestion, emissions, and first-/last-mile gaps. The convergence of improved vehicle durability, extended battery ranges, and integrated smart features is making micro-mobility more practical and appealing for everyday use, transforming it from a novelty into a component of modern urban transportation networks.



Source: Women Mobilize Women (2022)

Market Trends (McKinsey, 2025a)

- United States: Expected to reach $35 billion by 2030
- China: Expected to double to $80 billion by 2030
- Europe: Projected to reach $140 billion by 2030, representing the largest regional market
- India & Indonesia: Expected to become the second- and third-largest markets for electric two-wheelers by 2030, with annual growth rates exceeding 60 percent

Regional Regulatory Landscape

- Europe: Most sophisticated regulations, but highly fragmented; permissive cities like Berlin embrace mobility hubs while Paris have banned scooters (Polis, 2023).
- USA: Micro-mobility regulations are decentralized, with most rules set by state and local governments, covering areas like device operation (speed, wattage, equipment) and usage (where to ride, parking, age restrictions, helmets)
- China: Regulations focus on standards for electric bikes, requiring them to meet specific limits for speed, weight, and motor power, while also implementing city-level rules for services like unit caps, designated parking, and operational area restrictions (Li et al., 2023).

Growth Factors

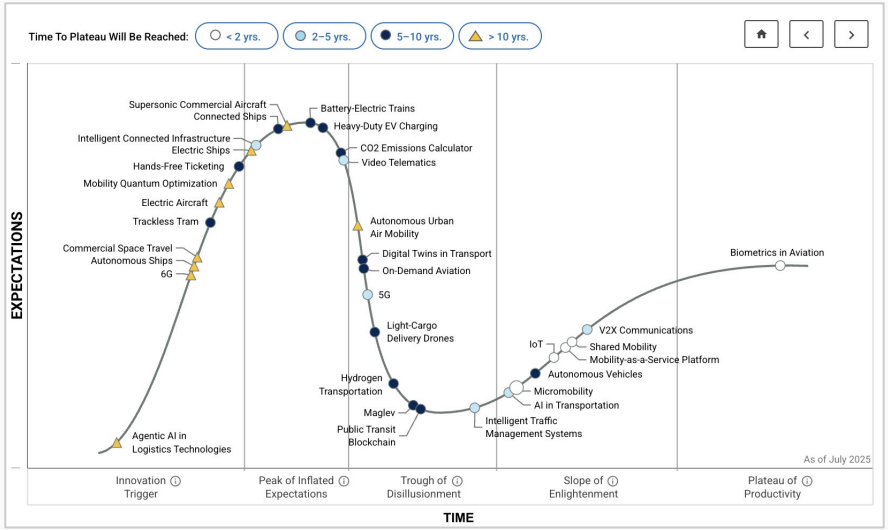
- Technology Advancements: New models of e-scooters can now last for up to five years on average, and e-scooter battery ranges are increasing by 2-3x compared to 2021 models, giving up to 100km range (Hubbard, 2024).
- Path to Profitability: After years of hypergrowth but lagging profitability, market consolidation and greater regulatory scrutiny, there are signs the sector is on the cusp of a new chapter (Heineke & Scurtu, 2025).
- Regulatory Support: Almost 60% of cities in the US and EU support micro-mobility as a valuable mode to reach their climate goals (Hubbard, 2024).

THE CURRENT STATE OF AV & MICRO-MOBILITY TECHNOLOGIES

Autonomous vehicles (AVs) and micro-mobility systems are being increasingly used to enhance transportation operations and urban mobility services. Several major automotive manufacturers, logistics operators, and metropolitan transit agencies are experimenting with some form of automated driving or shared micro-mobility fleet. However, **many key innovations in both domains remain emergent**. Gartner places autonomous vehicles and micro-mobility technologies on the Slope of Enlightenment within its 2025 Hype Cycle for Transportation and Smart Mobility, reflecting meaningful progress but substantial uncertainty regarding cost, safety, and regulatory maturity (Palepu & Pacheco, 2025). Despite robust growth projections, investing too aggressively in immature deployments continues to carry a heightened risk of weak or uneven returns.

AVs today are transitioning from experimental deployments to more scalable operating models. Robotaxi operators such as Waymo and Cruise are demonstrating scaling potential across multiple cities worldwide, reinforcing Gartner's assessment of the technology's upward trajectory (Palepu & Pacheco, 2025). There is also some regulatory clarity, like UNECE approvals for Level 3 vehicles (UNECE, 2022) or Dubai's smart city vision testing protocols (UrbanSDK, n.d.) Yet, the path to full-scale deployment remains constrained by high R&D costs, operational liability, regulatory requirements, and the complexity of training systems to manage edge cases. The Cruise AV that ran over a pedestrian in 2023 (Fang, 2024) and subsequent strategic pullbacks illustrate the persistent risks that accompany innovations.

Gartner's Hype Cycle for Transportation & Smart Mobility, 2025



Source: Palepu & Pacheco (2025)

Micro-mobility has seen rapid consumer adoption and growing governmental support. Its distinct value is in solving first- and last-mile gaps, reducing congestion, and offering low-cost, low-emission travel alternatives (Palepu & Pacheco, 2025). Advances in battery technology, and the proliferation of dockless e-scooters are accelerating mainstream acceptance. However, there are continuing challenges: safety incidents, regional regulatory ambiguity, vandalism, and the risk that micro-mobility may cannibalize short public-transit trips if poorly managed (GHSA, 2020). These obstacles place micro-mobility at an inflection point - popular, promising, and increasingly data-driven, yet still dependent on stronger governance, infrastructure design, and interoperable digital systems.

SEATTLE'S MICRO-MOBILITY JOURNEY: LESSONS FROM FAILURE

THE FAILURE: Pronto Cycle

What happened:

- Launched in 2014 with 500 bikes, 50 docking stations
- Bikes ridden less than once per day on average (Herbert, 2022)
- City purchased insolvent system for $1.4M in 2016 (Soper, 2016)
- Shut down permanently in 2017 - one of the few cities to shut down modern bike share

Why it failed:

- Limited geographic coverage: Missing high-demand neighborhoods
- Low density: 500 bikes over 5 sq mi vs. dockless systems' 9,000 bikes over 84 sq mi
- Expensive: $8/day, no per-ride option vs. dockless $1/ride (Herbet, 2022)
- Political resistance: No appetite for city-owned system; media coverage complicated expansion

What Changed Organizationally?

The dockless model required SDOT to develop new capabilities in real-time data monitoring, permit management, and complaint systems (SUMC, 2019). By 2024, the program generated nearly 6 million trips annually with 67% residents viewing bikeshare favorably, demonstrating a successful organizational adaptation by engaging in public-private partnerships (Trumm, 2025).

Seattle Department of Transportation

WHEELS SPIN LINK by Superpedestrian Lime

Source: SDOT (2022)

Organizational Learning

Seattle's transformation shift required developing new strategic competencies in managing organizational resources and sustaining ethical practices (Hitt et al., 2010). **Planning** became data-driven, **organizing** required multi-vendor coordination, **leading** emphasized co-design processes, and **controlling** focused on equity deployment mandates (Jones & George, 2016).

THE EVOLUTION: Scooter Share Pilot

Implementation Process:

- 18-month co-design: With disability advocates, equity orgs, vendors
- City ordinances passed: Permits scooters on roads/bike lanes only (Zhou, 2022)
- Four vendors selected: Wheels, Lime, Link, and Spin
- Fleet scaling: 1,500 devices initially scaled to 5,000 by September 2021 (Zhou, 2022)

Outcomes:

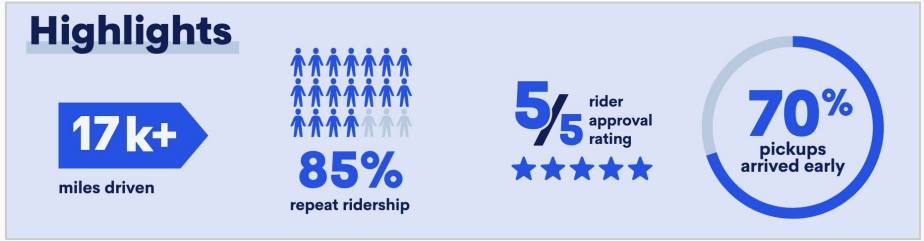
- 1.4 million trips by 260,000 unique riders (SDOT, 2022)
- Average trip: 15 min, 1.4 miles, $6.63 (SDOT, 2022)
- Car replacement: 54% would have used taxi/rideshare/personal vehicle (SDOT, 2022)
- Transit connection: 21% used scooters to connect to transit; 50% of trips started/ended near transit stops

SUN CITY, AZ: SCALING PUBLIC TRANSIT FOR RETIREES

Sun City is a retirement community that is mainly composed of residents over 55+ (Hawkins, 2023). May Mobility launched a fully driverless pilot program in December 2023 (Korn, 2023). May Mobility's strategy is to focus on on-demand transportation in geofenced, easily mapped business districts, college campuses, and closed residential communities (Hawkins, 2023). Sun City, AZ has wide lanes, separate and protected pedestrian walkways, and sunny/clear weather, making it a perfect environment for May Mobility's first driverless service (Hawkins, 2023).

The pilot program has helped Sun City to (May Mobility, n.d.-a):

- **Increase mobility and independence** for residents of all activity levels, ages, and abilities
- **Promote safe and reliable transportation** for those who have limited mobility choices
- **Reduce stress and improve well-being** by allowing riders to simply enjoy the ride



Source: May Mobility (n.d.)

May Mobility aims to sell long-term transportation contracts, primarily to businesses and governments. It allows them to deploy step by step and be a capital-efficient company (Hawkins, 2023).

Source: Hawkins (2023)

Organizational Learning

May Mobility's phased deployment strategy required developing new organizational learning competencies to support safe scaling and long-term adoption. Early operations in a controlled, low-risk environment in Sun City provided the foundation for refining service design and transitioning to a fully rider-only model (Hawkins, 2023). These deployments enables iterative experimentation, allowing May Mobility to examine assumptions about routing, utilization, service design, and system safety (May Mobility, n.d.-b).

CHANDLER, AZ: WHEN ON-DEMAND MEETS AUTOMATION

Chandler Flex started in June 2022 as an on-demand, public transportation service where residents are able to request a shared ride when needed (Chandler Arizona, n.d.). The program is aimed to digitize and expand its transit networks to complement K-12 school transportation, making the entire system more accessible for residents and bridge transit gaps within the community. Chandler Flex has both point-to-point service and fixed-route options to ensure the service functions as part of a unified transit network (Via, n.d.). Since launch, Chandler Flex has completed 100,000 rides and provided over 3,000 rides per month, where 42% of the monthly rides are to and from school.

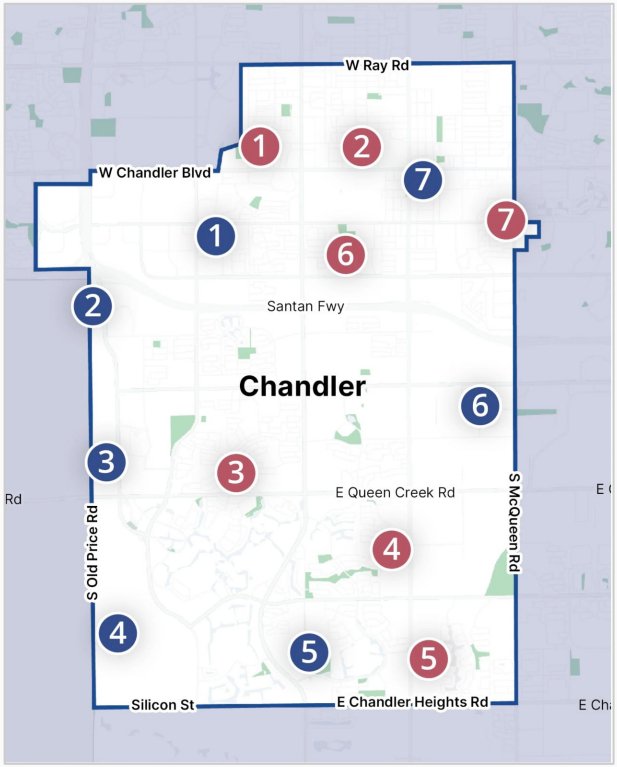
100k	51%	3k+
rides since launch in July 2022	of riders do not have access to a personal car	wheelchair-accessible rides provided

Source: Via (n.d.)

In September 2025, Chandler Flex partnered with Waymo to bring AVs to the program. This pilot program is designed to expand Chandler Flex's capacity as demand for the service continues to grow. This partnership marks the **first time Waymo's AVs are incorporated directly into a U.S. public transit network** (Chandler Arizona, 2025).

Organizational Learning

Although Chandler Flex's partnership with Waymo was recently established, the program can **establish clear performance metrics, gather community feedback, and leverage real-time data** to iteratively refine routing and dispatching. These insights can also guide long-term integration strategies and build public trust through openly sharing results and outcomes from the program.



Source: Chandler Arizona (n.d.)

HOW MOBILITY TRANSFORMS STRATEGIC LEADERSHIP

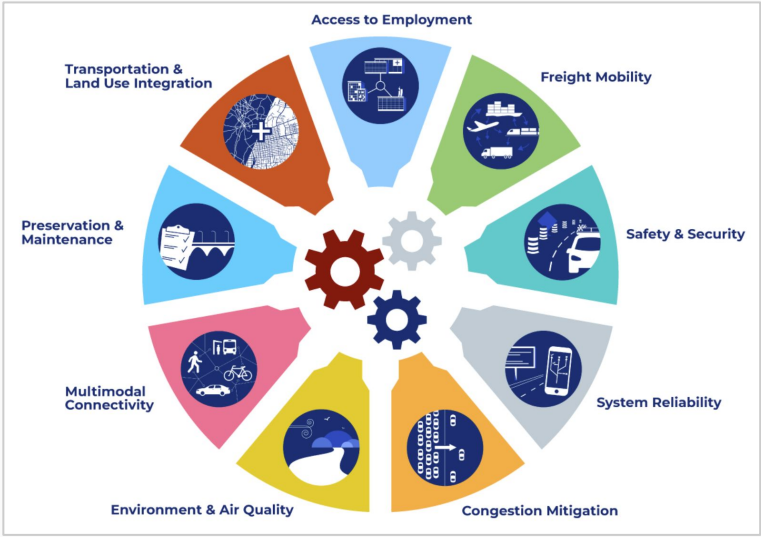
Planning

The integration of AVs and micro-mobility creates profound planning implications for municipal and transit organizations. **Traditional transportation planning relied on static, schedule-based approaches with fixed routes and predetermined service patterns.** However, the complexity of multi-modal transportation systems requires organizations to **transition toward dynamic, data-driven planning processes** that can adapt to real-time demand patterns and technological capabilities (SUMC, 2024).

Strategic Vision and Mission Redefinition: Organizations must fundamentally redefine their planning approach to encompass multi-modal integration. For transit organizations, this means expanding their mission beyond traditional public transportation to include seamless mobility ecosystem management (Via, n.d.).

Forecasting and Demand Analysis: The planning function must now incorporate predictive analytics and scenario planning for technology convergence. Unlike traditional transportation planning that relied on historical ridership data, AV and micro-mobility integration requires organizations to anticipate multiple technological adoption scenarios simultaneously (PlanRVA, n.d.-b).

Performance Impact: Organizations that successfully adapt their planning functions demonstrate improved resource allocation and community responsiveness (The Urbanist, 2025; May Mobility, n.d.-a).



Source: PlanRVA (n.d.-b)

HOW MOBILITY TRANSFORMS STRATEGIC LEADERSHIP

Organizing

The organizing function faces significant transformation as AV and micro-mobility integration requires organizations to **manage complex networks of public-private partnerships, coordinate multiple technology platforms, and restructure internal capabilities**.

Partnership Structures and Resource Allocation: Municipal organizations must develop new organizational structures to manage relationships with private mobility companies, technology providers, and community stakeholders. The traditional hierarchical structure of public agencies often conflicts with the collaborative, network-based requirements of multi-modal integration (Hansel, 2025).

Chandler's partnership with Waymo and Via required the city to organize cross-departmental coordination between transportation, public safety, and technology departments while maintaining oversight of private partner performance standards (Chandler Arizona, 2025).

Source: Miller (2022)

Cross-Functional Coordination: Organizations must restructure to facilitate integration across previously siloed departments. It requires coordination between urban planning, public safety, technology, and community engagement teams, representing a shift from traditional departmental organizing toward matrix or network organizational structures (NACTO, 2023).

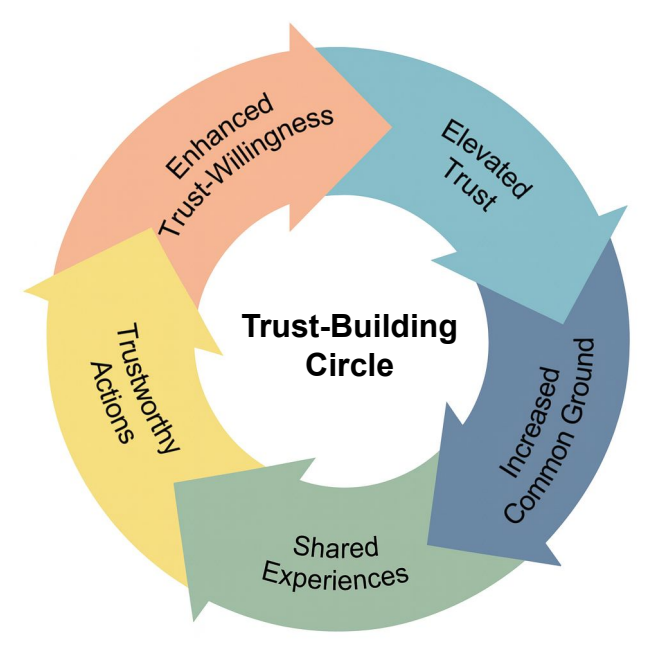
Technology Integration Management: Organizations need to develop capabilities to manage API integrations, data sharing protocols, and multi-vendor technology stacks while ensuring security and regulatory compliance (Sharma, 2025).

Performance Impact: Effective organizing enables better service integration and operational efficiency (The Urbanist, 2025).

HOW MOBILITY TRANSFORMS STRATEGIC LEADERSHIP

Leading

The leading function faces unprecedented challenges as organizational leaders must **guide technological transformation while building public trust, managing change resistance, and coordinating diverse stakeholder groups**.



Source: Police Chief Magazine (n.d.)

Vision Communication and Public Trust Building: Leaders must develop competencies in communicating complex technological benefits to diverse public audiences. This requires translating technical capabilities into understandable public value propositions around safety, accessibility, and sustainability (May Mobility, n.d.-a).

Stakeholder Engagement and Change Management: The leading function must now encompass management of complex stakeholder networks including community advocates, disability rights organizations, private technology companies, and regulatory agencies (PlanRVA, n.d.-b).

Managing Technology-Human Workforce Integration: Leaders must guide organizational members through technological transitions. This includes helping public sector employees adapt to data-driven decision making, public-private partnership management, and technology-mediated service delivery (Boikanyo, 2025).

Performance Impact: Strong leadership correlates with improved public acceptance and policy support (May Mobility, n.d.-a).

HOW MOBILITY TRANSFORMS STRATEGIC LEADERSHIP

Controlling

The controlling function must evolve to **monitor complex, multi-modal transportation systems while balancing innovation objectives with safety, equity, and regulatory compliance requirements**.

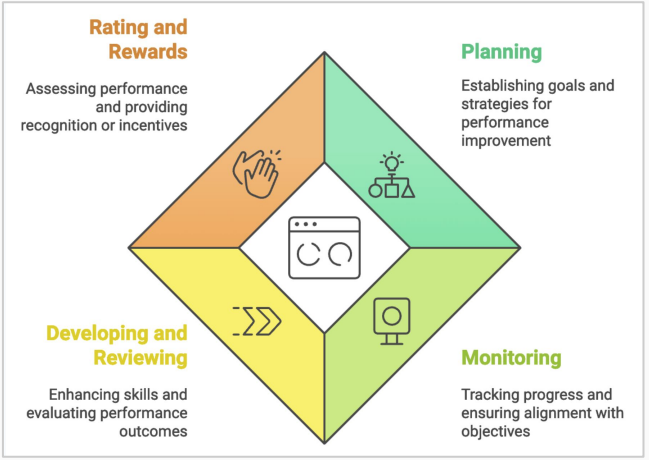
Performance Monitoring and Evaluation Systems: Organizations must develop sophisticated monitoring systems that track traditional transportation metrics alongside new equity, sustainability, and technology performance indicators. This requires implementing real-time data collection, analysis capabilities, and multi-stakeholder feedback mechanisms (Jalayer et al., 2024).

Safety and Risk Management: The controlling function must now encompass oversight of autonomous technology safety, data privacy protection, and algorithmic decision-making accountability. Organizations need new competencies in technology auditing, bias monitoring, and continuous safety validation (Osano, 2025).

Regulatory Compliance and Standards Management: Controlling systems must ensure compliance with evolving federal, state, and local regulations while maintaining service quality and innovation objectives. This includes developing protocols for data sharing, accessibility compliance, and safety standard maintenance across multiple technology platforms and private partners (Djizmedjian, 2025).

Equity and Accessibility Monitoring: Organizations must implement monitoring systems that track service distribution, user demographics, and accessibility outcomes to ensure equitable service delivery. Seattle requires companies to deploy at least 10% of scooters in "equity focus neighborhoods" and offers reduced-fare programs with a maximum of $1.50 per hour for income-qualified riders (Seattle Times, 2022).

Performance Impact: Effective controlling enables sustained service quality and regulatory compliance (PlanRVA, n.d.-a).



Source: Chellappa (2025)

DEVELOPING, COMMUNICATING, AND WORKING TOWARDS A VISION FOR AV AND MICRO-MOBILITY

First Mile/Last Mile Integration

Integrating AVs and micro-mobility into public transit **means envisioning seamless door-to-door journeys where passengers might use an e-scooter to reach an autonomous vehicle that connects to light rail, or an e-bike to a bus to a train.**

Decades of urban sprawl and continued inequity have left many households without reasonable access to public transportation (Beale et al., 2022). Current urban transit systems suffer from a lack of strategic vision, leading to fragmented decision making and misaligned goals between private companies, community leaders, and public transport authorities. This creates barriers to realizing the potential of multi-modal networks (Mordret et al., 2021).

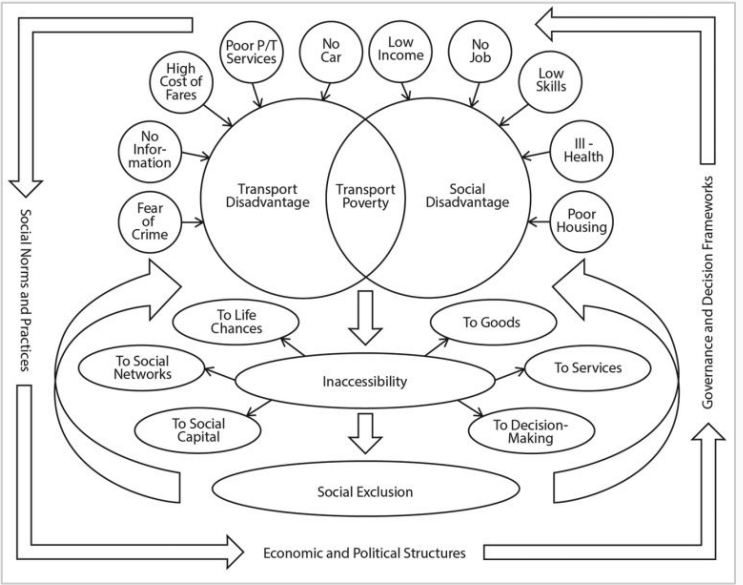
Leaders must articulate a compelling vision that transcends these silos and aligns stakeholders on the common goal of a cohesive transportation network. A successful integration requires a fundamental commitment from all stakeholders to "make multimodal trips as easy as possible" (Brüning et al. 2025).

Equity in the Vision

Transparency of the vision and trust in the technology can **create a more inclusive implementation that benefits everyone** (Torres, 2024). Typically, micro-mobility stations are placed in higher-income, predominantly white areas and are utilized most often by young men. Disadvantaged populations face several **barriers** to accessing these technologies, including:

- Lack of credit card or smartphone technology to unlock e-vehicles
- Concern about financial liability in the event of vehicle damage
- Rider safety concerns
- Belief that micro-mobility is a recreational mode of transport for tourists or high-income residents (Beale et al., 2022)

A universal design and accessible, inclusive implementation is crucial to ensuring not only the usage of this technology, but also that current socio-economic divides won't be further exacerbated (Mordret et al., 2025). Leaders must communicate that **equity is not supplementary to the vision, it defines whether the vision succeeds or fails.**



Source: Beale et al. (2022)

MANAGING RESOURCES EFFECTIVELY FOR AV AND MICRO-MOBILITY INTEGRATION

Acquiring and Developing

Effective resource management for AV and micromobility integration balancing innovation with regulatory, financial, and infrastructural realities. Over 70 years of urban sprawl, an increasing demand for urban mobility, but a lack of vision **demands strategic resource reallocation for a successful multi-modal transit network.**

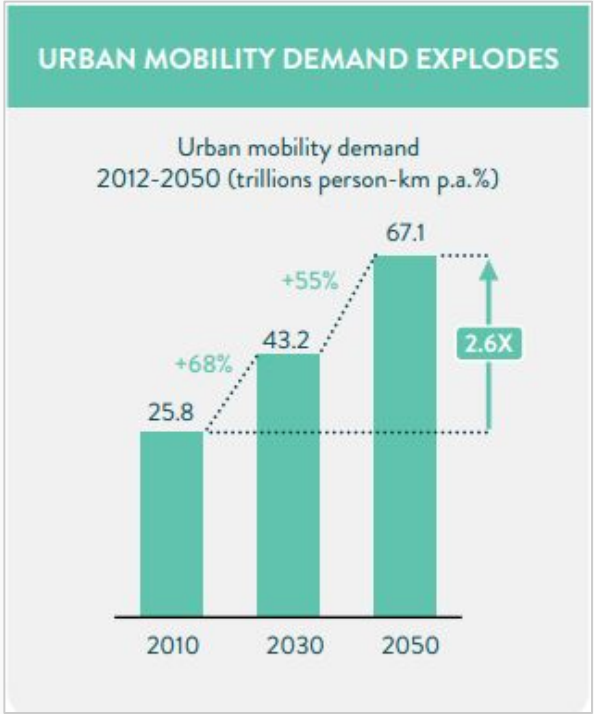
Physical infrastructure represents a foundational resource priority. Brüning et al. (2025) emphasize that transit hubs serve two purposes: increased visibility and availability of micro-mobility vehicles, and orderly parking systems that promote acceptance by non-users. Partnership across stakeholder groups prove equally essential. Market volatility makes this particularly challenging, as private operators face profitability pressure while city leaders try to implement regulatory frameworks to prevent chaos (Brüning et al., 2025). **Partnerships enable public agencies and private operators to combine their strengths of infrastructure and existing service with innovation and operational flexibility, respectively.**

Financial Constraints

Financial resource management carries high stakes for multi-modal integration. Since 2020, the transportations sector has been among the hardest hit due to the loss of passengers and the increasing operational costs. Relying on purely on fares for funding isn't enough; diverse sources of funding are crucial for economic resiliency (Mordret et al., 2021).

Transit systems across the country are weighing massive service cuts due to the widening deficits caused by the rising costs, exhaustion of pandemic-era aid, and low passenger count. Notably, Pittsburgh is warning that of 100 total bus routes, 41 would be cut and 57 would have longer wait times. Cuts like this create a dangerous cascade that encourages more people to buy cars, resulting in increased congestion and pollution and making people even less likely to make use of transit systems (Zipper, 2025).

Effective resource management means protecting core transit service even with financial pressure, recognizing that **the entire multi-modal vision collapses without reliable public transit at its center.**

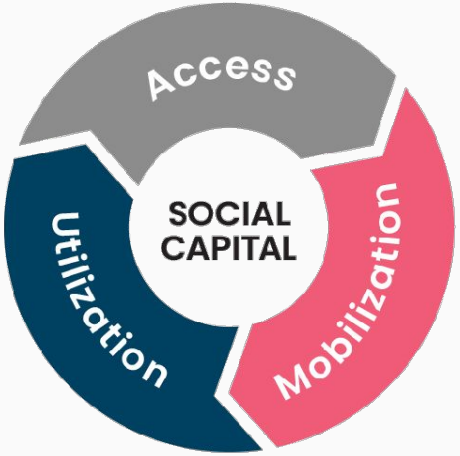


Source: Mordret et al. (2021)

STRENGTHENING SOCIAL CAPITAL TO ACCELERATE AV AND MICRO-MOBILITY ADOPTION

Leadership decisions influence the well-being and prosperity of the communities, societies, and nations they serve, creating an obligation to protect and promote the interests of stakeholders and society (Jones & George, 2016). While accessibility challenges disproportionately affect marginalized communities, successful integration of AVs and micro-mobility into public transportation **has the potential to expand coverage for older adults, people with disabilities, and individuals in rural areas with limited transportation options** (Othman, 2022; Sustainability Directory, 2025b).

Effective integration of AVs and micro-mobility into public transit depends heavily on the relationships, trust, and networks across multiple stakeholders. **Unlike traditional technology rollouts, it spans public transit agencies, private micro-mobility companies, AV developers, city departments, community groups, disability advocates, and local businesses**. Since AVs and micro-mobility often raise concerns regarding accessibility, safety, and service distribution, organizations must prioritize authentic stakeholder engagement, transparent communication, and collaborative decision-making to support long-term adoption.



Source: CED Guest Author (2025)

How leaders can develop and emphasize social capital through AVs and micro-mobility

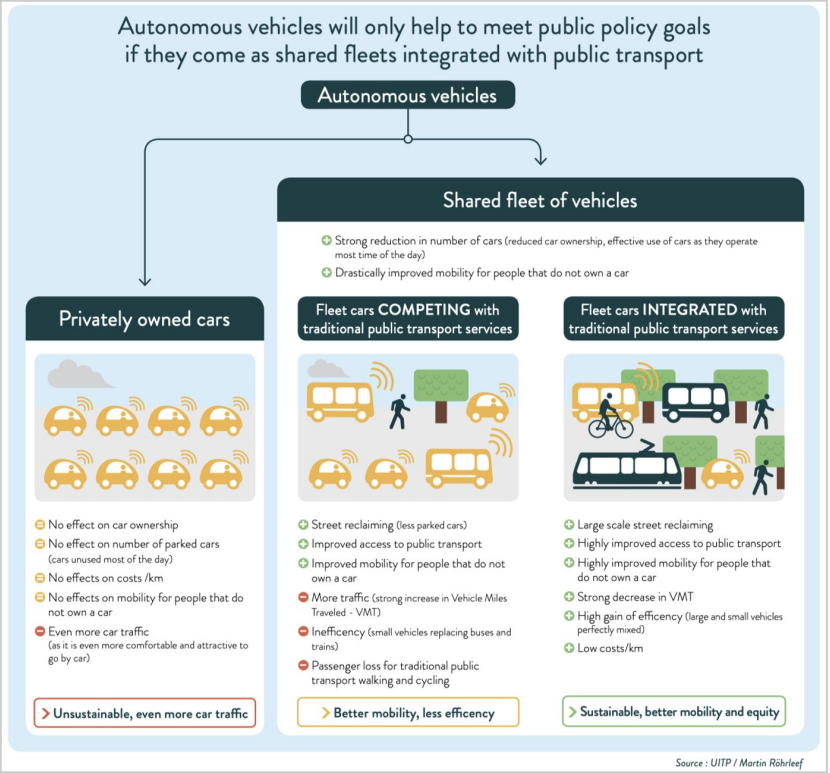
- Utilize pricing models, service availability, and community engagement strategies to ensure equitable access (Sustainability Directory, 2025b)
- Build and maintain partnerships that enable data sharing, coordinated service planning, and joint infrastructure management (UITP: Advancing Public Transport, 2017)
- Address shared challenges including safety protocols, curb space management, data privacy, workforce transitions, and equity outcomes (Othman, 2022)
- Provide subsidies for low-income users and establish ride-sharing rules that protect vulnerable populations (Fatima et al., 2024)

DELIVERING RESULTS THROUGH EFFECTIVE EXECUTION

The rapid shift towards AVs and micro-mobility creates both pressure and opportunity for leaders seeking to turn ambitious visions into reality. As these technologies advance and public expectations evolve, leaders must align diverse stakeholders, update regulatory frameworks, and integrate new tools into existing transit systems (Jones & George, 2016). Through real-time data, iterative pilot designs, and clearer standards, AVs and micro-mobility offer new ways to test, refine, and scale solutions. Implementation also demands iterative learning, cross-functional collaboration, and proactive governance to keep pace with the advancing landscape (Jones & George, 2016). **AVs and micro-mobility can determine how effectively leaders can implement, adapt, and deliver equitable mobility outcomes.**

How AVs and micro-mobility allow leaders to achieve shared goals (Jones & George, 2016; UITP: Advancing Public Transport, 2017)

- Pushes leaders to build strong collaborative structures across city departments and organizations for infrastructure integration, creating cross-functional teams
- Establishes common safety and data standards that help leaders track performance and enforce quality to provide a better program
- Creates opportunities for leaders to implement shared mobility initiatives through streamlined piloting and scaling
- Enables low-risk pilot and scalable shared mobility models, letting leaders test, refine, and expand solutions that advance their vision



Source: UITP: Advancing Public Transport (2017)

ANALYSIS OF AV AND MICRO-MOBILITY TECHNOLOGIES FOR CITIES

Strengths

Sustainability and Space Efficiency: Reduce traffic, parking pressure, congestion and emissions, aligning with climate goals that nearly 60% of US/EU cities support (Hubbard, 2024).

Enhanced Multimodal Connectivity: Close first-/last-mile gaps, improving access to fixed-route transit systems (DuPuis et al., n.d.; Palepu & Pacheco, 2025).

Public Value: Integration supports equity and accessibility for all (UITP: Advancing Public Transport, 2017).

Weaknesses

Equity Gaps in Access: Micro-mobility often clusters in affluent areas, leaving disadvantaged populations excluded. (Beale et al., 2022).

Immature Technology: AVs remain constrained by high R&D costs, liability issues, and edge-case failures (Fang, 2024).

Fragmented Governance: Regulations vary widely across regions, creating uneven deployment and confusion. (Li et al., 2023; UrbanSDK, n.d.).

Operational Complexity: Cities must manage multi-vendor ecosystems, requiring new competencies and cross-departmental coordination (Jones & George, 2016).

Opportunities

Expand: Provide new options for existing transit users and reach new audiences.

Data-Driven Planning: Data can optimize bus routes, demand-based transit, and multimodal scheduling (Palepu & Pacheco, 2025).

Public-Private Partnerships: Successful pilots show how collaboration can scale innovation while building public trust (SDOT, 2022).

Technology Convergence: Advances in electrification, AI, and battery ranges make these systems more reliable and attractive for mainstream adoption (Hubbard, 2024).

Threats

Public Trust & Safety Concerns: High-profile failures erode confidence, requiring strong leadership and transparent communication to overcome public uncertainty or opposition (Fang, 2024).

Market Volatility: Overinvestment in immature deployments risks weak returns, as the tech is still on the “Slope of Enlightenment” (Palepu & Pacheco, 2025).

Cannibalization of Transit: Poorly managed micro-mobility may replace short public transit trips rather than complement them, undermining ridership goals (GHSA, 2020).

RECOMMENDATIONS

Build Equity-Centered Deployment Frameworks

- Equity must be embedded into the planning process, ensuring disadvantaged communities are prioritized.
- Require vendors to allocate fleets in underserved neighborhoods (Seattle Times, 2022).
- Offer reduced-fare programs and other access options to mitigate financial and technical barriers.
- Apply universal design features to ensure accessibility for seniors and disadvantaged riders (Beale et al., 2022).

Invest in Data-Driven Planning and Governance

- Leverage AV/micro-mobility data to dynamically adjust bus routes, demand-responsive transit, and multimodal scheduling. (Palepu & Pacheco, 2025).
- Develop Mobility-as-a-Service (MaaS) platforms that unify trip planning and payments (Brüning et al., 2025).
- Establish data-sharing protocols with private operators to ensure transparency, privacy, and algorithmic accountability (Sharma, 2025).
- Implement real-time monitoring systems that track equity, sustainability, and safety metrics, ensuring compliance with evolving regulations (Jalayer et al., 2024).

Strengthen Public-Private Partnerships

- Formalize co-design processes with community advocates, disability groups, and private operators (SDOT, 2022).
- Use contracts that balance innovation incentives with accountability for safety, equity, and service quality (Chandler Arizona, 2025).
- Re-organize and create cross-departmental coordination teams to manage multi-vendor and multi-stakeholder ecosystems (NACTO, 2023).

Enhance Trust Through Transparent Leadership

- Communicate benefits in terms of public value (convenience, sustainability, accessibility, safety) rather than technical jargon (Hitt et al., 2010).
- Implement continuous safety validation, bias monitoring, and transparent reporting to rebuild trust after incidents (Fang, 2024).
- Leaders must actively guide employees and stakeholders through new expectations, new workflows, and new cross-sector relationships (Boikanyo, 2025).

THE SOLUTION FRAMEWORK: LEADERSHIP, GOVERNANCE, AND SYSTEMS FOR MOBILITY

Achieving integrated, equitable, and efficient multimodal transit requires more than technology: it demands organizational leadership, collaborative governance, and system-level thinking (Hosseinian et al., 2024). The framework below outlines a three-pillar strategy to guide cities and private companies:

Governance & Institutional Alignment

Establish unified governance structures
Combat siloing for multimodal planning by creating cross-agency bodies (transportation, planning, public works + IT/legal)

Adopt open data & interoperability standards
Require data-sharing, open APIs, and transparent performance reporting from private operators to avoid vendor lock-in and enable public oversight (Sustainability Directory, 2025a; Duffey et al., 2019).

Organizational Capacity & Leadership

Encourage experimentation
Pilot AV shuttle services, micro-mobility hubs, curb-management programs. Use small-scale pilots to test, learn, adapt, rather than betting everything on large deployments.

Foster a learning organization
Encourage personal development. Organizations that maximize employees' ability to think creatively and learn from both successes and failures gain a competitive advantage in the market (Jones & George, 2016).

Performance & Equity-Centered Metrics

Define and track KPIs beyond ridership
Safety incidents, equity of service (geographic distribution), environmental impact, system resilience, first/last-mile coverage. Use these KPIs to guide continuous improvement.

Embed equity and accessibility in planning
Prioritize underserved communities in pilot deployments, ensure universal payment/UX, design services to serve a diverse population (Hosseinian et al., 2024).

01 ***QUICK WINS***

02 ***SYSTEM ALIGNMENT***

03 ***MULTIMODAL INTEGRATION***

GLOSSARY

- **API (Application Programming Interface) integrations:** Connections that allow different software systems to exchange data and functions through APIs, enabling features such as real-time vehicle locations, trip planning, and payment across multiple mobility services.
- **Autonomous Vehicles (AVs):** Vehicles that can sense their environment and operate with limited or no direct human control, using sensors, mapping, and AI-based decision-making systems.
- **Curb-management programs:** Policies and digital tools that cities use to allocate and regulate curb space (for parking, pick-up and drop-off, loading, micro-mobility parking, etc.) to reduce conflicts and improve access and safety.
- **Dockless e-scooters (dockless systems):** Shared electric scooters that are not tied to fixed docking stations. Riders locate, unlock, and pay for trips through a mobile app and can end trips in approved locations within the service area.
- **First- / last-mile gaps (First Mile–Last Mile integration):** The first and final segments of a trip between a traveler's origin or destination and the nearest transit stop or mobility hub, which are often difficult to serve with traditional fixed-route transit.
- **Geofenced service areas / geofenced communities:** Digitally defined geographic boundaries within which a service (such as AV shuttles or shared scooters) is permitted to operate. Device behavior or service rules can automatically change when crossing these boundaries.
- **Hubs (mobility hubs / transit hubs):** Designated locations where multiple transportation options come together—such as buses, trains, micromobility, and ride-hail—and where users can transfer between modes and access supporting amenities.
- **Hype Cycle / Slope of Enlightenment:** The Hype Cycle is a framework that describes the stages of maturity and adoption of a new technology. The Slope of Enlightenment is the stage after initial hype and disillusionment, when more realistic expectations and productive use cases begin to emerge.

GLOSSARY

- **KPIs (Key Performance Indicators):** Specific, measurable metrics used to track whether a program or service is achieving its intended outcomes, such as ridership, accessibility in equity-focus areas, safety incidents, or user satisfaction.
- **Micro-mobility / Micro-mobility solutions:** Small, lightweight vehicles—such as bicycles, e-bikes, and e-scooters—typically used for short urban trips and often provided through shared fleets.
- **Microtransit / On-demand microtransit:** Flexible, technology-enabled public transit services that usually use smaller vehicles and dynamic routing to provide shared rides in response to real-time or advance trip requests, rather than fixed routes and schedules.
- **Mobility-as-a-Service (MaaS):** An integrated digital platform that allows users to plan, book, and pay for trips across multiple modes of transportation through a single interface and, often, a single account.
- **Multimodal networks / Multimodal transport systems:** Transportation networks that combine multiple modes—walking, cycling, micromobility, public transit, AVs, and private vehicles—into a connected system that supports end-to-end journeys.
- **Public-private partnerships (PPPs):** Formal agreements in which public agencies and private companies share responsibilities, risks, and benefits to deliver transportation infrastructure or services.
- **Robotaxis / Robo-taxis:** Driverless taxi services that use autonomous-driving technology to carry paying passengers without a human driver on board, usually within a defined service area.
- **Social capital:** The networks, relationships, trust, and norms of reciprocity that connect people and enable them to coordinate, share information, and support one another within a community.

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