Micromobility and Transit Guidebook

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Prepared by:

FOURSQUARE ITP

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1 EXECUTIVE SUMMARY

1.1 Background

"Micromobility" is a general term that refers to small, low-speed, human- or electric-powered transportation device, including bicycles, scooters, electric-assist bicycles (e-bikes), electric scooters (e-scooters), and other small, lightweight, wheeled conveyances (FHWA, 2022). Two hundred communities in the United States are served by at least one micromobility provider. While the majority of shared micromobility trips occur in large metro areas, there are dozens of systems that serve small metro or rural areas; in fact, the first bikeshare program in the US was the Tulsa Townies, started in 2007 in Tulsa, Oklahoma. Shared micromobility has the potential to have a positive impact on public health; reduce trips that would otherwise be made with automobiles; and, serve first mile/last mile connections to transit. Shared micromobility is the country's fastest growing mode of transportation, with annual trips increasing from 22 million in 2015 to 136 million in 2019 (NACTO 2020). To date, much of the research and attention paid to micromobility has focused on its application in large cities. This guidebook looks specifically on how the mode can serve the transportation needs of small urban, rural, and tribal communities.

1.2 Study Purpose and Methodology

Shared micromobility has proven to be an effective car-free mode of travel in urban areas, yet there is limited guidance on micromobility that is targeted toward smaller cities and rural areas. This Guidebook explores shared micromobility use cases in non-traditional settings to offer insight on how transit agencies and local jurisdictions could implement similar programs. The Guidebook provides an overview of industry trends; how shared micromobility systems interact with transit; and strategies for managing, operating, regulating, and monitoring shared micromobility programs while considering risk and liability. The research team conducted an extensive literature review; conducted eight interviews with agencies, jurisdictions, and a vendor (**Table 1**Table 1: Interview List); and worked closely with N-CATT staff to develop the Guidebook.

TABLE 1: INTERVIEW LIST

Interviewee	Interviewee Title	Organization Name
Parker Aden	Executive Director	Pocahontas Chamber of Commerce, Pocahontas, Iowa
Ricardo Cardenas	Branch Manager	Anythink Library, Commerce City, Colorado
Alison Cohen	Founder	Bicycle Transit Systems
Benny Foltz	Executive Director	Heartland Bikeshare, various locations in Nebraska
Tim Geibel	General Manager	Crawford Area Transportation Authority (CATA) and Venango County Transit, Meadville, Pennsylvania
Elliott McFadden	Greater Minnesota Shared Mobility Program Coordinator	Minnesota Department of Transportation
Cindy Moore	Sustainability Manager	City of Goleta, California
Philip Pugliese	General Manager, Planning and Grants	Chattanooga Area Regional Transportation Authority (CARTA), Chattanooga, Tennessee

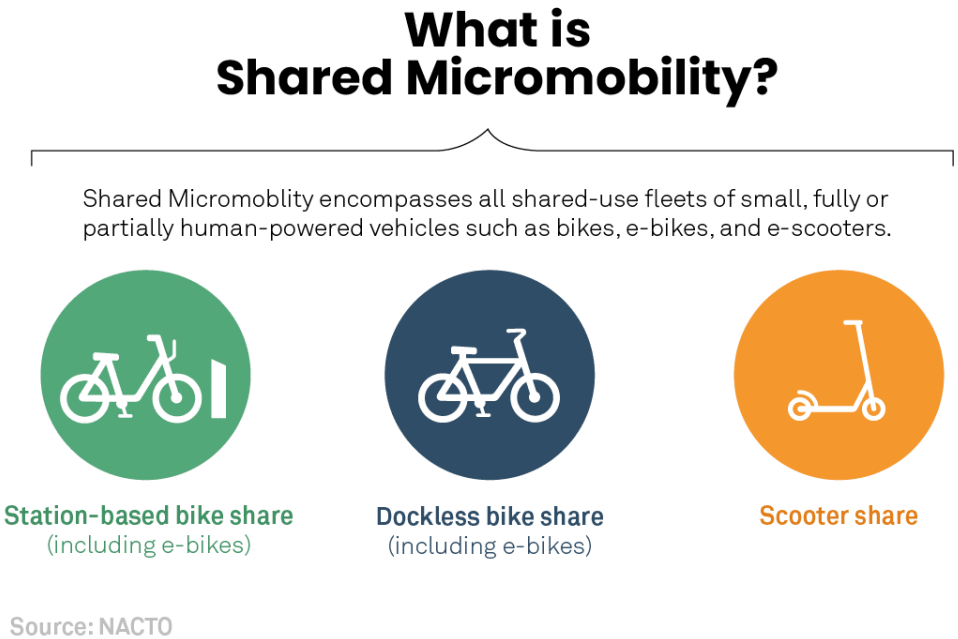
2 PRIMER ON MICROMOBILITY

2.1 What is Micromobility?

"Micromobility" is a relatively novel term used to describe a familiar concept: small, low-speed vehicles intended for personal use, such as bikes, scooters, mopeds, and microcars. Many (but not all) micromobility services are electrified, offering users either an electric boost or being entirely electrically propelled. "Shared micromobility" is a more specific phrase that describes micromobility devices to which a user can gain short-term access, often through a smartphone application. For the purposes of this guidebook, the term "micromobility" will refer to the concept of shared micromobility. **Micromobility is a form of shared transportation for communities. These systems provide the public a way to efficiently and cost effectively get around.**

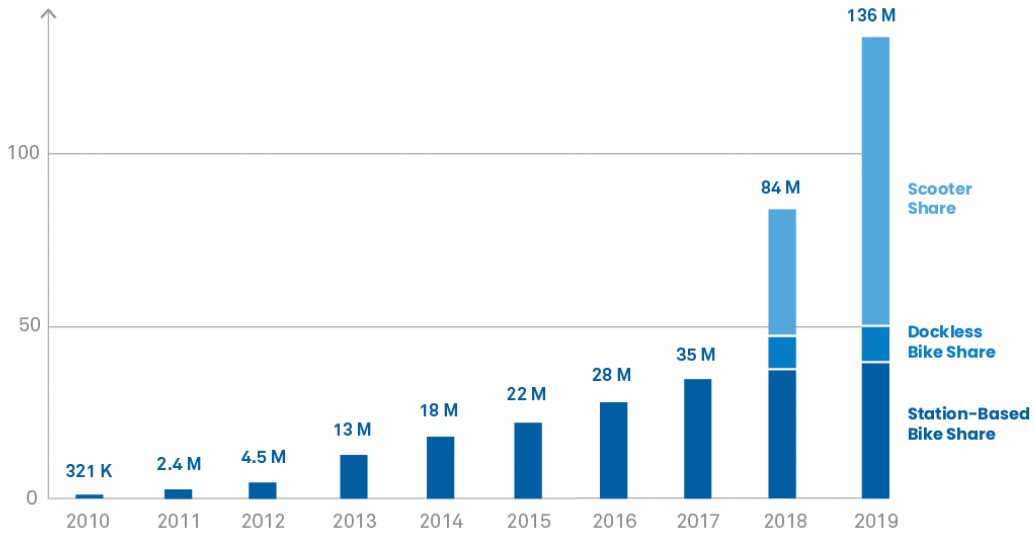
While the term micromobility has only been in use for a few years, the concept of micromobility has been around for decades. The earliest bikeshare system was established in 1960's with free-to-use bicycles scattered across city centers, but early systems struggled to gain traction due to the inability to prevent vandalism and theft. It was not until the mid-2000s that a host of technologies, such as cellular connected locking mechanisms and account-based rentals enabled a new generation of bikeshare systems that successfully secured bicycles. Modern micromobility programs gained traction in the U.S. in the 2010 with the launch of large-scale station-based docked bikeshare systems (Nice Ride MN, in Minneapolis, MN and Capital Bikeshare in Washington, DC). Since that time the market has grown to include multiple other system types, including free-floating dockless bikeshare, electric scooters, and more recently electric mopeds, where users are typically accessing vehicles and devices through app-based accounts.

FIGURE 1: WHAT IS MICROMOBILITY (SOURCE: NACTO, *SHARED MICROMOBILITY IN THE US: 2018*)



Micromobility is one of the fastest growing segments of transportation in the US. Between 2014 and 2019 combined, micromobility trips in the US increased by 618 percent to 136 million trips in 2019 (**Figure 2**Figure 2) (NACTO 2020). According to the consulting firm McKinsey, the American micromobility market is projected to grow in valuation to over $200 billion by 2030 (Heineke, Kloss and Scurtu 2020). As just under 60 percent of household vehicular trips nationwide are under six miles (Department of Energy 2018), micromobility could serve a large share of daily trips across the country.

FIGURE 2: MICROMOBILITY RIDERSHIP THE UNITED STATES, 2010 TO 2019 (SOURCE: NACTO, 2020)



2.2 Micromobility Modes

Micromobility can describe an ever-growing number of modes that share common characteristics like being low speed, available for point-to-point trips for short-term rentals, and designed to carry one or two riders. While many of these modes can compete with one another, these modes complement each other as well. Scooters and bikeshare excel at serving short point-to-point trips where the rider has limited baggage. Electric assist bicycles provide the ease of use and rider comfort to support longer distance and duration trips than traditional bikeshare. Finally, modes like microcars and mopeds are sometimes also considered micromobility and allow users to carry cargo and travel over distances of several miles with ease. While micromobility services have flourished over the last decade in large cities, the growing diversity in technologies mean that now more than ever, these services can be tailored to the unique needs of small urban, rural, or tribal communities.

2.2.1 BIKESHARE

The earliest form of modern micromobility, bikeshare, takes a variety of different forms. Bikes can be conventional or electrified, usually with either pedal-assist (when the rider pedals, an electric motor gives them a boost) or a throttle (the rider does not have to pedal; electric propulsion is controlled via a throttle on the handlebars). The bikes have speeds of around 10-20 mph, depending on propulsion (and the rider, for conventional bikes). The bikes are rented from and returned to a dock or are free-floating and unlocked or locked from anywhere within a geofenced zone. **Figure 3** Figure 3shows an example of a docked bikeshare station. **Section 2.3 2.3**explains the differences between docked and dockless systems. Bikeshare systems are often smartphone application-based, but some systems allow bikes to be accessed through a payment kiosk, card, or tag.

FIGURE 3: BIKESHARE IN ARLINGTON, VIRGINIA (SOURCE: CAPITAL BIKESHARE DCA BY MARIORDO / CC BY-SA 4.0)

What differentiates bikeshare from traditional bicycle rentals is how the service is intended to be used: bicycles are available for one-way trips, with users to encouraged to take short trips instead of holding onto the bicycle for an entire day or week.

2.2.2 SCOOTERSHARE

Shared electric scooters first came on to the micromobility scene in the U.S. in 2017, when the company Bird launched operations in Santa Monica, California. By 2019, scooters surpassed bikeshare as the most ridden shared micromobility mode. In 2019, 109 cities had scootershare programs and ridership had increased year-over year by 135 percent to over 85 million trips (NACTO 2020). Shared electric scooters are small and lightweight, typically with a platform for standing or a seat, as shown in **Figure 4**Figure 4. Propulsion is controlled via a throttle and brakes on the handlebars, and they have speeds typically limited to between 10-20 mph (though some communities may restrict them to lower speeds in select areas).

FIGURE 4: ELECTRIC SCOOTERSHARE (SOURCE: COLUMBUS ELECTRIC SCOOTERS BY MJ / CC BY-SA 4.0)

Unlike bikeshare, scootershare systems are nearly identical in operations. They are almost exclusively dockless and rented through a smartphone application. Some jurisdictions (such as Washington, DC) require riders to lock their micromobility vehicles to bike racks or other designated locations to reduce clutter and sidewalk blockage.

2.2.3 EMERGING TECHNOLOGIES

While bikeshare and scootershare are the two most common forms of micromobility available in the U.S. today, two other forms are being introduced in this country and around the world. One, electric mopeds, are already commercially available in New York City, Washington, D.C., San Francisco, Miami, Pittsburgh, and Austin, from three companies: Revel, Lime, and Scoobi. These are larger, two-wheeled mopeds (similar to a Vespa or other motor scooters) that are electric-powered and capable of speeds up to 30 mph. Similar to scootershare, they are dockless, rented via a smartphone application, and charge a flat unlock fee plus a per-minute rate, though some systems have hourly and daily passes available. **Figure 5**Figure 5 shows a person riding a Revel electric moped in Washington, D.C.

FIGURE 5: ELECTRIC MOPED IN WASHINGTON, D.C. (SOURCE: REVEL ELECTRIC MOPED BY ELVERT BARNES / CC BY-SA 2.0)

2.3 Dockless vs. Docked

Micromobility services are commonly broken into two broad categories: Docked and dockless systems. Docked micromobility describes any system where vehicles must be returned to physical "stations" where the vehicle (typically a bike) is locked to a physical dock, shown previously in **Figure 3**Figure 3. In most docked systems, much of the mechanical and electronic elements of the system are part of the station and trips must start or end at a functioning station. Dockless systems move the computer and locking hardware onto the vehicle themselves, enabling trips to start or end anywhere. There are benefits and drawbacks of both types of technology (see **Table 2**).

TABLE 2: COMMON STRENGTHS AND WEAKNESSES OF DOCKED AND DOCKLESS SYSTEMS

	Strengths	Weaknesses
Docked	▪ Deters theft and vandalism as vehicles are physically attached to stations. ▪ Can be paired with payment kiosks as an alternative to access via smartphone. ▪ Avoids issues of vehicles being improperly parking in the public right-of-way.	▪ Higher upfront capital costs. ▪ Require dedicated space for stations. ▪ Reduced operating flexibility, i.e., stations need to be relocated to respond to shifts in demand. ▪ Riders are unable to end their trip if a station is completely full. ▪ The need to walk to or from a station increases travel time.

Dockless	▪ Lower upfront capital costs ▪ System can be quickly deployed ▪ Operational flexibility, trips can start or end anywhere within a prescribed zone. ▪ Ability to geofence vehicles, e.g., restrict speed or ability to ride in certain locations.	▪ Easier to steal or vandalize vehicles. ▪ Can be more challenging to manage fleets as vehicles can be scattered across a large service area. ▪ Harder to enforce proper parking of vehicles, opportunity for parked vehicles to pose barriers to pedestrians, bicyclists, and other sidewalk uses.

FIGURE 6: THREE DIFFERENT COMPANIES' DOCKLESS BIKES (SOURCE: SEATTLE RENTAL BIKES BY JOE MABEL, CC BY-SA 4.0)

2.4 Grassroots / Community-Based Programs

The models of bikeshare and scootershare systems described in the previous sections are predominantly in operation in medium and large cities in the U.S. Smaller communities face many hurdles to implementing micromobility: they may not have the funds required to start a program; demand may be insufficient to attract a private operator; or they may have a large portion of their population that does not have a smartphone or is unbanked and therefore cannot access systems that require a smartphone and/or credit card. More information is available in U.S. DOT's Shared Micromobility and Equity Primer. Many communities have a solution that is significantly older than internet-based micromobility: bike libraries.

Bike libraries are a system by which users can rent or borrow bikes on an hourly, daily, or even weekly basis, either for free or for a small fee. In most cases, the user only has to present an ID, library card, or other similar document to "check out" a bike and sign a waiver for safety and liability concerns. Rentals usually include a lock and helmet. Bike libraries are often operated publicly or by local non-profit organizations and funded through local government and community grants; equipment can be donated or upcycled from other bikeshare providers. Often, maintenance is performed by a local bike shop. For example, at the Anythink public library in Commerce City, Colorado, any person with a library card can rent a bike, lock, and helmet for up three weeks for free. Thrive Allen County, a rural health advocacy organization, operates a free bikeshare system in Allen County, Kansas, where anyone can rent a bike with only a photo ID. These systems address many concerns with bikeshare, as they are accessible to nearly everyone regardless of smartphone or credit card access and have comparatively low startup and operations costs.

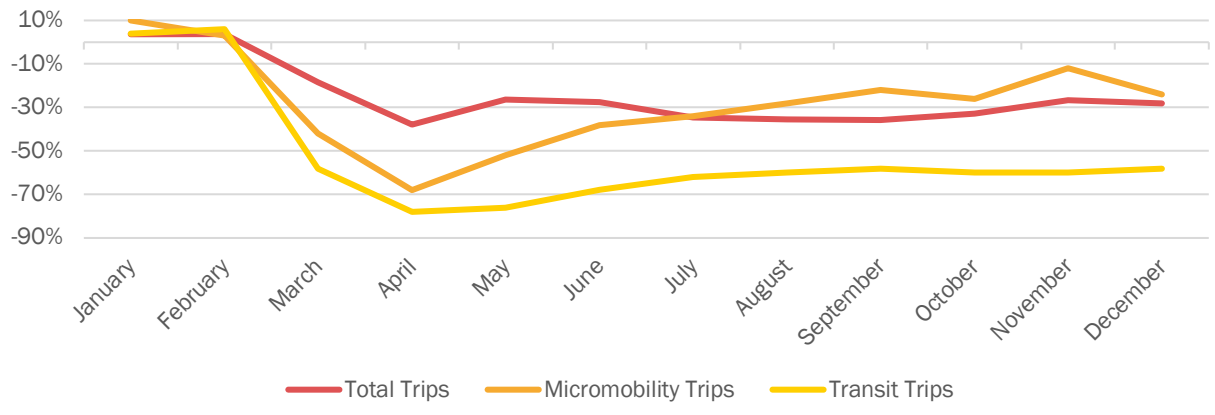
FIGURE 7: BIKESHARE IN MANHATTAN, KANSAS (SOURCE: BETTER BIKESHARE PARTNERSHIP)

2.5 Micromobility Usage

In 2020, 203 cities in the U.S. had some form of micromobility available. One-hundred-and-sixty-seven cities had bikeshare systems while 129 had scootershare for a total of 142,000 vehicles available to the public. Of the cities with bikeshare systems, 56 percent of those systems were docked, 19 percent dockless, and 25 percent were both, while 44 percent of systems had e-bikes available. Almost all scootershare systems are dockless (NABSA 2021). In 2019, micromobility ridership in the U.S. was over 136 million trips, a 60 percent increase from 2018 (NACTO 2020).

The COVID-19 pandemic had a significant impact on micromobility usage: 2020 micromobility trips declined 70 percent in April compared to the previous year, a significantly larger decline than total trips overall. However, likely because it is easier to social distance on micromobility than other shared modes (and because it allows outdoor recreation), micromobility usage had rebounded to within 20 percent of 2019 levels by November 2020, better than total trips overall and significantly better than the recovery in ridership on traditional public transit. **Figure 8** shows the percent change in micromobility, transit, and total trips by month in 2020 compared to 2019. Reflecting trends in trip patterns across all modes, micromobility usage had changed: 60 percent of providers reported a reduction in weekday trips, while 50 percent noted an increase in weekend trips, and 60 percent reported that time of day for trips had changed substantially (NABSA 2021).

FIGURE 8: MICROMOBILITY, TRANSIT, AND TOTAL TRIPS, 2020 VS. 2019 (SOURCE: NABSA STATE OF THE INDUSTRY 2020; BTS DAILY TRAVEL DURING THE COVID-19 PUBLIC HEALTH EMERGENCY STATISTICS)



The demographics of micromobility users are more likely to be higher-income, younger, white, and male compared to the areas that they serve. Despite this, the proportion of low-income, female, and racial minority ridership increased in 2020 compared to 2019; many micromobility programs operate equity programs to attract underrepresented groups of riders to their systems (see **Section 4.6 Equity**) (NABSA 2021).

Micromobility usage has the potential to replace personal vehicle trips over short distances. The average micromobility trip duration in 2019 was 11 minutes and the average trip distance was 1.5 miles (NACTO 2020). In one survey of six cities, NACTO found that 45 percent of micromobility trips replaced a personal vehicle or ride share trip, while 37 percent replaced a walking or transit trip, and 18 percent of trips replaced other modes or wouldn't have been taken at all (**Figure 9**Figure 9). Additionally, 16 percent of micromobility trips were used to connect with transit (NACTO 2020).

FIGURE 9: TRIPS REPLACED BY MICROMOBILITY SURVEY RESULTS (SOURCE: NACTO, SHARED MICROMOBILITY IN THE US: 2019)

Despite the decline in usage due to the COVID-19 pandemic, micromobility rebounded quickly and its usage can be expected to grow in the coming years as the technology becomes more widely adopted. Increasing investment in pedestrian and bicycle infrastructure will help increase usage by making riders feel more comfortable and safer. Further investment in equity programs that address barriers to micromobility usage, such as lack of smartphone access, credit card access, lack of physical access, disability accessibility issues, and familiarity with the concept will help reduce disparities in usage and benefits in the future.

2.6 Micromobility Pricing

As mentioned earlier, micromobility is geared toward serving short point-to-point trips and the pricing of services is often designed to incentivize such usage. Many programs focus on encouraging frequent turn-over so that one user is not in possession of a vehicle for most of the day. The two most frequent fee structures are:

- Time-based pricing, where the user pays based on how long they ride. While a per-minute fee is the most common, some systems charge by other time increments, such as per-30-minutes. Sometimes time-based pricing is combined with an unlock fee of $1 or $2.
- Subscriber based pricing, where users purchase a pass that is valid for a certain length of time, such as one day, week, month, or year. The pass allows unlimited trips below a certain duration. Trips above a duration (typically 30 to 60 minutes) incur additional usage fees to dissuade the rider from keeping the vehicle when it is not in active use.

In rural settings, providers may have less reason to encourage rapid turn-over of micromobility vehicles. Travel distances in rural areas tend to be long, and demand may be insufficient to necessitate short time limits on usage.

3 MICROMOBILITY AND TRANSIT

3.1 How Does Micromobility Interface with Public Transit?

3.1.1 SERVING THE "FIRST/LAST MILE"

Micromobility is a solution to the first mile/last mile problem in transit planning, sometimes called the "missing mile." This problem refers to the segment of a trip between a traveler's ultimate origin or destination and the stop or station where they board or alight transit. If that distance is too far—longer than half a mile, to most Americans—the traveler may consider transit a less desirable option (Jaffe 2016). But micromobility has the power to expand the "catchment area" of transit—that is, the perceived radius of accessible places beyond the actual transit facility. With micromobility situated at transit stations, travelers can reach their final destinations much faster than walking; similarly, if a shared bike or scooter can be found near the start of a passenger's trip, that passenger may be more inclined to take that vehicle to a transit facility and continue their journey on transit.

The need to address the first/last mile is even more critical in small metro, tribal, and rural settings where development densities may be lower and distances between transit services and one's end destination greater. Micromobility services are flexible in meeting first/last mile needs. Unlike fixed-route transit where each additional hour of service carries with it additional operating costs like driver labor and fuel, micromobility costs are more tied to capital costs and utilization. While 100 revenue hours of bus service can cost the same to operate regardless of ridership, a low ridership bikeshare program in a lower-density community would require proportionally fewer resources to operate than a system of a similar size in a high-density location with lots of ridership.

Research on micromobility trip data, which is limited to larger cities, shows that there is some correlation between the location of micromobility trip starts and ends and major transit stops. In Arlington County, Virginia, 42 percent of trip origins or destinations fell within a quarter-mile radius of a metro station, and in Oakland, 30 percent did (Murphy et. al. 2021). In four of the five cities studied by Murphy et. al., at least 75 percent and as many as 99 percent of scooter trips started or ended within one mile of major public transit services. In a different study conducted in Washington, D.C., between eight and 12 percent of all pre-pandemic e-scooter trips connected to Metrorail (Yan 2021).

Some micromobility critics harbor concerns that these shared vehicles replace transit trips; the data show that more often they replace car trips and complement transit trips. A study in the Twin Cities on the relationship between bikeshare and transit found that four percent of bikeshare trips competed with transit, while 30 percent complemented transit; the authors also posited that the competitive trips could potentially have acted as first-/last-mile trips to transit (Song 2020).

In order for micromobility to be an attractive option to access or egress transit, vehicles must be available to be picked up or parked at transit facilities. Whether docked or dockless, this requires a rebalancing effort to suitably meet demand; if, for instance, passengers consistently find that the bikeshare dock at their major transit facility is empty, they will not consider micromobility a reliable last-mile solution. Assuming a micromobility vehicle is available, a passenger's propensity to take micromobility at a transit facility is increased by the presence of safe, convenient, and protected infrastructure in the vicinity of that transit facility, as well as the availability of services that promote and facilitate the integration of micromobility and public transportation, which are discussed in further detail below (Oeschger 2020). Generally, micromobility programs in smaller communities do not need the same scale of rebalancing operations as large city systems due to lower overall ridership.

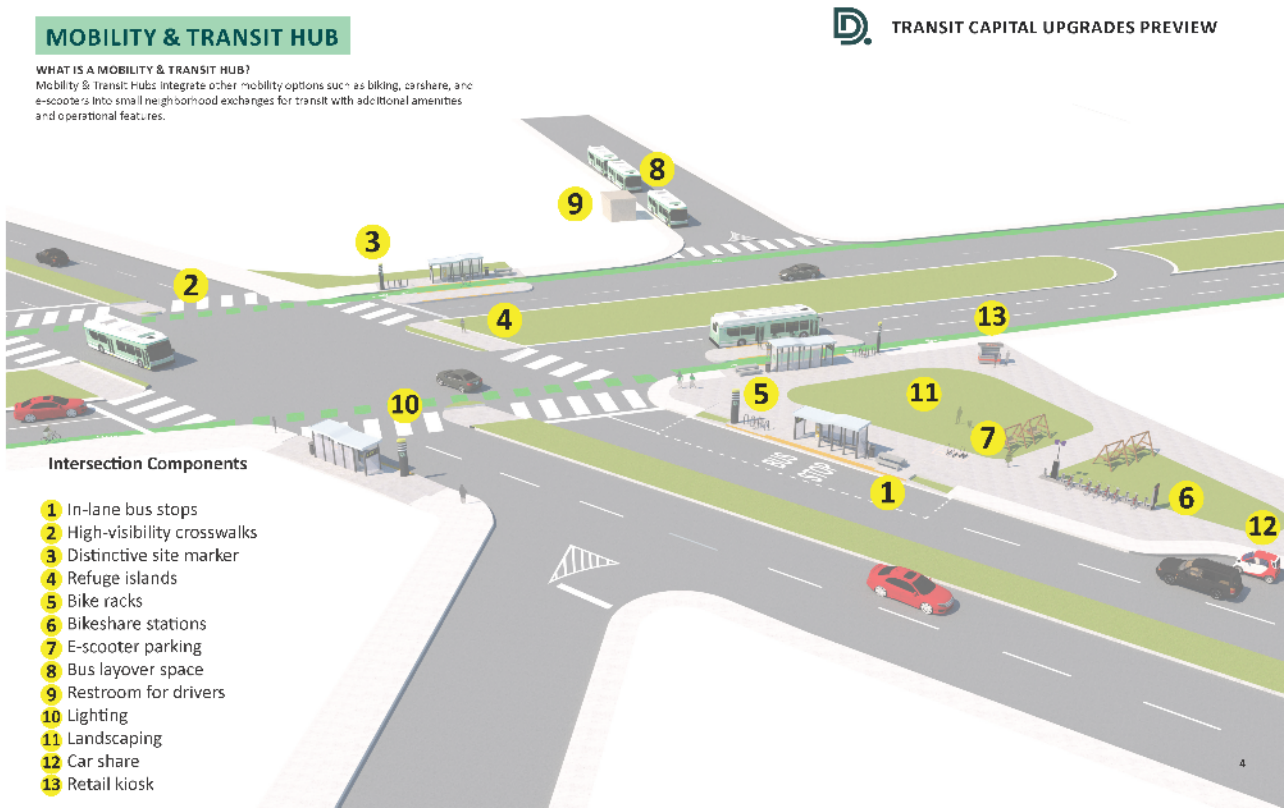
3.1.2 TRANSIT AND MICROMOBILITY INTEGRATION

Riders are more inclined to use micromobility in conjunction with transit when the use of both modes, and the transfer between the two, is simplified. Integrating these modes can take several forms:

- Physical integration, wherein micromobility and transit infrastructure are collocated.
- Informational integration, wherein physical wayfinding markers direct riders between modes.
  - Digital integration, a subset of informational integration, wherein a rider's trip-planning app suggests a transit route that incorporates a share micromobility mode.
- Fare integration, wherein there is a common payment method between modes or there is a discount (partial or full) for transferring between transit and micromobility.
- Institutional integration, wherein one agency is responsible for managing multiple modes.

Taken together, all these types of transit and micromobility integration improve reliability, affordability, and flexibility of multimodal trips; increase multimodal ridership; and expand the population within an accessible distance of transit facilities (Institute for Transportation & Development Policy 2021). These are best practices to ensure micromobility and public transit complement rather than substitute each other.

FIGURE 10: MOBILITY AND TRANSIT HUBS STREET DESIGN (SOURCE: DETROIT DEPARTMENT OF TRANSPORTATION)



Physical integration takes two forms: ensuring that there is safe infrastructure for cyclists and scooter users leading to and from transit facilities and ensuring that micromobility vehicles are available to be picked up or parked at transit facilities. Safe infrastructure is often not the purview of a transit agency but instead a local government department, typically transportation or public works. Transit agencies can work with local governments to coordinate bike infrastructure investments.

In the case of a traditional docked bikeshare program, transit providers should allocate space for a set of bike docks at or near the transit facility. For dockless bikes, scooters, or mopeds, transit providers can designate "micromobility parking corrals," or a painted space on the ground marked for exclusive parking of micromobility vehicles. Geofencing technology can allow dockless vehicles to be locked only in specific areas, facilitate the clustering of these vehicles only in marked areas.

FIGURE 11: A MICROMOBILITY CORRAL LOCATED ADJACENT TO A METRO STATION ENTRANCE IN ARLINGTON, VA (SOURCE: ARLINGTON, VA)

In many settings, the colocation of micromobility infrastructure, transit facilities, and other shared mobility services is branded as a "mobility hub." In Minneapolis, mobility hubs are being deployed not only to grow first-/last-mile connections but also to serve as centers of placemaking for residents to learn about new methods of mobility—thus, achieving both physical and informational integration. They have bright wayfinding signs, shelters and seating, and information about the variety of modes accessible at that hub (Gray 2019). These efforts make conditions more pleasant for users of both micromobility and transit.

FIGURE 12: A WAYFINDING SIGN AT A MINNEAPOLIS MOBILITY HUB (SOURCE: CITY OF MINNEAPOLIS PUBLIC WORKS)

Beyond just physical wayfinding signs, **digital integration** helps connect transit users with micromobility, and vice versa, before they begin their journeys. Trip-planning apps like Google or Apple Maps, Transit, and Citymapper all offer transit directions that can, depending on location, string together transit and micromobility modes into one suggested route. These apps are fed information from a General Bikeshare Feed Specification, or GBFS, which is the open data standard for shared mobility (**see 4.5, Technology and Organizational Requirements**). If a bikeshare or scootershare program generate a GBFS feed—then those services can appear in a third-party trip planning app. If the system is run manually, then operators may need to lean more heavily on physical wayfinding rather than

digital integration. Still, even a smaller system can offer customers information digitally with minimal effort: a bike library's website could show the number of available bikes currently as well as the number due back within the next week.

Fare integration between micromobility programs and transit is still rare but exist in a few systems. In Los Angeles, one can use the regional transit farecard, TAP, to pay for LA Metro Bike Share, as well as any other mode operated by LA Metro or the 25 other transit providers in the region. When Metro brought its bikeshare program under the TAP card, it also reduced the per-trip price in half—from $3.50 to $1.75—to be equivalent to a one-way bus or rail fare. Metro is exploring the possibility of offering a free transfer from bus or rail to bikeshare within two hours—the same window that is currently allowed for a free transfer between bus and rail (Linton 2018). Agencies can also offer a weekly or monthly pass for unlimited transit and micromobility trips at a higher price than a transit-only pass but still priced competitively for someone who rides transit and shared micromobility modes frequently.

While ideally fare integration ideally allows the user to apply one payment platform or physical devise for transit and micromobility, providing such integration can pose technical obstacles. A transit provider could allow for a visual inspection onboard the bus of a fare product purchased for micromobility services that allows free rides on transit. Alternatively, the user may be required to utilize two separate fare payment systems for transit and micromobility, with a QR-code or access code linking the two.

Institutional integration is discussed in the following section, Partnership Approaches.

3.2 Partnership Approaches

Transit agencies can take varying degrees of ownership over micromobility services, operating the system themselves, contracting or subsidizing services, or permitting third-party operators who operate independently. Often, the decision about the governance model is determined by the capacity of the agency to assume operations of a new service and the leverage the agency has in attracting an outside mobility company. These approaches are discussed in further detail below.

3.2.1 TRANSIT AGENCY OPERATED OR SPONSORED SYSTEMS

A handful of transit providers across the US have established their own micromobility programs, principally with bikeshare. This produces natural synergies: for example, as noted above, Los Angeles residents can use the same farecard to access LA Metro rail, bus, and bikeshare, simplifying the payment process for riders. Directly operating a micromobility system allows transit operators to have greater control over distribution of bikes and scooters, pricing, marketing, and goal setting. In return, transit agencies need to be sure they have the staff capacity to take on these responsibilities. Transit providers may choose to contract out actual operations to a third party or operate the program with their own staff.

FIGURE 13: CATA BIKESHARE IN NORTHWESTERN, PA (SOURCE: CRAWFORD AREA TRANSPORTATION AUTHORITY)

One of the few rural transit agencies to directly operate bikeshare is the Crawford Area Transportation Authority (CATA), serving Crawford and Venango counties in Northwestern Pennsylvania. CATA's bikeshare, which began operations in 2021, was sponsored by a combination of funding from a newly established local non-profit that applied for grant funds, an allocation from the CATA board, and donations from private businesses and other local community entities. In its first year, with 20 bikes, the system was run entirely by existing CATA staff, with the agency's general manager frequently rebalancing bikes himself. While this is a big job for the existing staff, the primary reason to pursue this method of funding and direct operations was to allow the goals, dock siting, and marketing to be controlled by the local community.

The Greater Dayton Regional Transit Authority (RTA) may go further than any other transit agency in the country with respect to scootershare: it directly operates its e-scooter service. While the scooter company Spin provides

Dayton its fleet and digital app, RTA is responsible for all maintenance of scooters, including rebalancing. Taking this hands-on approach has allowed RTA to streamline operations and align metrics of success with agency goals. For instance, in Dayton, Spin considered a key success metric to be the number of scooters deployed by 7 a.m., while the city and the agency were more interested in shrinkage rates (i.e., the number of scooters that were lost, damaged, or stolen) and maximizing utilization of the existing scooter fleet (American Public Transportation Association 2020).

Partnerships Case Study: CARTA and Chattanooga Bike Share

The Chattanooga, Tennessee, transit system (CARTA) launched one of the first bikeshare systems in the country in 2012 and was also one of the first to be operated as a partnership with the local transit agency. Originally, CARTA was supposed to operate the bikeshare system directly; labor and liability concerns resulted in the agency opting to pursue a partnership approach instead. Bikeshare advocates convinced CARTA leadership to allow the agency to be the fiscal house of the project by owning and managing the assets, while the management of the operations would be handled by Outdoor Chattanooga, a local non-profit that works with the city's parks and recreation department.

CARTA and Outdoor Chattanooga decided to partner with a private company to operate the system, who is responsible for all bike rebalancing, maintenance, smartphone application, etc. As CARTA promised the city council that the system would be financially stable, in its first years of operation the private operator absorbed the system's losses, but now the system has fully covered revenue through a mix of system revenue, private donors, grant funding, and support from the MPO and RPA. The city recently gave the system $100,000 in matching grant funds, but prior to that had not given any money to the system.

In 2013, the city took over control of asset ownership and management from CARTA, so the transit agency no longer has a direct relationship with bikeshare operations. However, CARTA continues partnering with the bikeshare system in a multitude of ways. CARTA supports grant applications for bikeshare, and the programs coordinate the placement of new bikeshare stations and bus stops. Additionally, CARTA introduced a stored-value RFID card and app-based payment system that works for both transit and bikeshare and provides discounts to incentivize users to utilize both systems.

Furthermore, CARTA operated an electric carshare system from 2016-19 and intended to extend the card and app payment to include carshare and parking garages as well as bikeshare and transit. However, the private operator that ran the carshare system for CARTA was unable to sustain the system's losses, and it closed in 2019. However, CARTA still owns and operates the network of electric vehicle charging stations left behind. Ultimately, CARTA hopes to integrate parking resource management into transit and bikeshare operations and eventually bring back carshare, with the aim of being a one-stop-shop mobility-as-a-service provider for the city.

3.2.2 PERMITTING AND PRIVATE PARTNERSHIPS

Another way that transit providers can work with micromobility providers is through regulations and permitting of those services. As discussed later, a common business model for micromobility is to permit a private firm to operate the service within the city; in exchange for access to the public right-of-way, these micromobility services are required to follow certain regulations, provide specific community benefits, and even share a portion of their revenue with the host jurisdiction. Transit providers (often in coordination with the local governments responsible for overseeing micromobility programs) can leverage the permitting system to better integrate micromobility programs with their services. Several large cities have used their permitting program to generate additional public revenue and achieve public policy goals, such as requirements to locate vehicles in historically disadvantaged neighborhoods.

Generally, large cities have greater leverage to attract a micromobility system than a small urban, rural, or tribal community. For smaller communities, strict or onerous permitting requirements could deter a micromobility operator. Jurisdictions and transit providers instead should consider how regulations and permitting strategies can be a win-win for both the public and micromobility providers. For example, a transit provider may establish a permitting program that allows micromobility vehicles to be parked at designated locations beside bus stops or at transit centers. The permit may stipulate certain performance requirements (e.g., minimum response times in instances of a complaint) in exchange for access to the transit provider's property. Similarly, a micromobility

provider may invest in payment integration between their services and transit in exchange for cross-promotion of the service by the transit provider.

4 MAKING MICROMOBILITY WORK

Even where the ingredients exist to make a micromobility program succeed, there are a range of factors from costs to governance that will impact whether implementation is feasible. For small urban, rural, and tribal communities looking to implement micromobility, the challenges may seem seem insurmountable. Fortunately, micromobility is not one-size-fits all. There are a range of approaches and strategies that can be used to create micromobility programs. The ideal type of program is often shaped by the needs of the community being served.

4.1 Where Does Micromobility Succeed?

It is important for communities, especially smaller ones, to understand their market for micromobility before pursuing a program. A micromobility program does not necessarily make sense in every location and context. Various factors influence whether a micromobility system will succeed.

- **Population and employment** density is a key predictor of micromobility demand. As with any form of shared transportation, people are more likely to use the service if they live close to it. While density is concentrated in big cities, smaller communities have had success implementing bikeshare on places like main streets, historic districts, and college campuses where a high density of potential riders congregate.
- **Mixed-use land uses** are another factor that influences micromobility demand. Locations where there are a range of destination types driving demand at different times of day are going to be more successful for micromobility than a place where demand has distinct peaks and valleys. A good example might be a corporate campus versus a college campus. Even if both are of the same size, the corporate campus will likely generate a flow of people into the campus in the morning and an outflow in the afternoon. Alternatively, a college campus sees student and staff come and go at all hours of the day. Travel demand occurring at the same time can overtax the system and mean it ultimately serves fewer people; a bicycle ridden all day will serve more trips than one only used to bike in one direction in the morning and the opposite direction in the afternoon.
- **Average trip length** may also dictate whether micromobility is feasible. As mentioned in Section 2, Primer on Micromobility, micromobility trips are typically under three miles. If a transit provider is trying to improve access between destinations greater than three miles apart, micromobility may be a poor solution. In 2019, INRIX Research used data from 50 million anonymous car trips and found that almost half of the car trips made in the most congested metropolitan areas in the United States were less than three miles (INRIX 2019).
- **Tourist and leisure destinations** are a key attractor of micromobility trips. There are several programs built around a particular attraction. For example, Valentine, Nebraska may have what is the most rural micromobility program in the nation. The one-station system is located beside a popular recreation trail, with users renting bikes to travel out and back. Visitors to the town and trail represent the bulk of ridership according to an interview with program staff.
- **Infrastructure is key to micromobility**. People need a safe and comfortable route to ride. Several small systems are built around local bicycle facilities like trails. Access to bike lanes, sidewalks, and trails all can contribute to higher system ridership and increased safety for riders.

In addition to the community characteristics, micromobility systems are shaped by who is using the program. Some systems primarily serve out-of-town visitors, others are used by local residents for day-to-day travel. A few systems are restricted to a specific group (employees or college students). Similarly, systems can serve a variety of trip types, from leisure and exercise-related trips to commute trips. While some systems can sustain themselves solely on one type of rider (e.g., a recreation focused system beside a major attraction), most successful programs regardless of size depend on a mix of trips to generate demand.

New micromobility technology is changing where programs are viable. An e-bike pilot program in Aspen found that when using e-bikes, riders arrived an average of four minutes faster to their destinations than conventional bikes while encouraging riders to travel uphill and inducing longer-distance rides (WE-cycle 2020). On a larger scale, e-bikes could open bikeshare use to a wider type of ridership (e.g., seniors for whom a traditional bike is not

feasible). The report also notes the potential for electrified rides to replace 40 percent of car trips that are two miles or less in length if the network is expanded. One interviewee for this project recommended that every jurisdiction planning on implementing bikeshare include e-bikes.

4.2 Ownership and Governance

There are several types of micromobility business models that clarify which parties own the micromobility equipment, such as the vehicles and docking stations, and who is responsible for operating and managing a program. Under some models, jurisdictions may lease or buy micromobility vehicles and equipment from vendors and operate the system on their own. **Table 3**Table 3 outlines the types of program ownership and operation arrangements that exist today.

TABLE 3: COMMON MODELS FOR PROGRAM OWNERSHIP AND OPERATION

Program Owner	Program Operator
• Non-profit • Public entity (including transit agency) • Private firm	• Directly operated by owner (non-profit, public, or private) • Operated by a third-party contractor • Hybrid (certain functions handled by contractors, others by owner)

TCRP Synthesis 132: Public Transit and Bikesharing examined three models: non-profit owned and operated; privately owned and operated; and publicly owned and operated by a third party (TCRP 2018). Based on a literature review and interviews, publicly owned and operated systems appear to be the most common model for bikeshare systems in small urban and rural settings. There are limited examples of scooters in these contexts. Additional information is available in TCRP Research Report 230.

4.2.1 OPERATIONS AND OWNERSHIP CONSIDERATIONS SPECIFIC TO SMALL URBAN AND RURAL COMMUNITIES

In an interview for this guidebook, a vendor described their key considerations when pursuing a new market and determining operating and management models. Vendors focus primarily on locations that could support a viable and sustainable financial business model. Systems in large cities benefit from high population densities and associated ridership with user fees that contribute to financing the system. Since smaller and rural locations do not have high levels of density, public funding or private sponsorships may be required to make a system viable.

Collaborative partnerships with volunteers (such as bike non-profits) and in-kind donations can help reduce some costs associated with operating a micromobility program. Many of the smaller systems surveyed as part of this guidebook rely on volunteers and donations. A key concern for programs is sustaining support over the long-term; volunteers may leave their position or fundraising may become more challenging as time goes on.

Finally, small systems face challenges in right-sizing staff and resources. A small system will not warrant a full-time employee nor require the same robust IT systems as a large program (e.g., enterprise resource management software). Another consideration is the level of staff expertise – servicing a small system requires staff to be experts in all parts of the business (operations, maintenance, etc.), whereas large systems require dedicated, specialized staff (e.g., staff that only focuses on maintenance). Outsourcing some functions (e.g., partnering with a local bike shop for maintenance instead of having dedicated maintenance staff or relying on in-kind donations such as storage or office space) can help smaller systems make their business work with limited resources.

WE-cycle opened in Aspen, Colorado in 2013 and expanded to Basalt, Colorado in 2016. The non-profit is funded through a public private partnership. Founding partners and private donors provided the initial funding for capital infrastructure, and operations are funded by local jurisdictions (WE-cycle 2022). In 2017, the Roaring Fork Transportation Authority (RFTA) entered into a five-year partnership with WE-cycle and agreed to commit $100,000 annually (subject annual approval) (Stroud 2017). The system's 2019 annual report provides data on how the bikeshare addresses first mile and last mile connections to transit, with 35 percent of morning checkouts coming from bus rapid transit stops and 50 percent of WE-cycle rides originating or ending at a Bus Rapid Transit (BRT) stop (WE-cycle 2020). Users can checkout bikes and see real-time bus schedules through the Transit app. Users with an RFTA bus pass can ride the bus and check out bikes with a single card. The system added e-bikes and installed the first two solar-powered bikeshare charging stations in the United States in 2021 (Herbert, Solar E-bike

Stations Are the Future We Need 2021). WE-cycle has also actively engaged the local Spanish-speaking population through its dedicated Movimiento en Bici program.

FIGURE 14: WE-CYCLE BIKE (WE-CYCLE)

Community-led bike lending libraries are another option for small and rural areas. Public libraries, local jurisdictions, or non-profits can run these systems with either donated or purchased bikes. Allen County, Kansas started one of the first of these libraries with initial funding from Blue Cross Blue Shield of Kansas (NCHRP 2019). The Commerce City branch of the Anythink Library in Commerce City, Colorado started a bike library program with 30 bikes that were donated after Denver's bikeshare system ceased operations. The former vendor for the Denver bikeshare contacted Commerce City, but the City did not have the capacity to operate a program. Thanks to a good relationship between the City and the library, the City approached Anythink to ask whether the branch library could implement a bike program.

Anythink went to work on drafting a business plan that identified stakeholders; a project timeline; goals; a budget; a project plan (that identified required research, funding, and setup and support needs); and identified potential risks (including customer injuries; customer dissatisfaction with bike quality; and lost/stolen bicycles). The library worked closely with the city to obtain permits for a new concrete pad, a shed to store the bicycles, extending the fence around the library, and to obtain additional grant funding to pay for the improvements as well as locks and helmets. The bikeshare was also a result of a coordinated internal effort at Anythink, as staff integrated the bicycles into the collection system; solicited and evaluated contractor bids for supporting infrastructure improvements; coordinated maintenance with a local bike shop; and engaged in marketing initiatives.

An interview with Minnesota DOT highlighted micromobility models outside of the Twin Cities. The bikeshare in Rochester, MN launched in 2016 and has a fleet of 200 bikes. The system is currently free to use thanks to a collaborative network that includes multiple City departments, the Mayo Clinic, the Rochester Public Library, and other non-profits that maintain the bikes (City of Rochester 2020). Residents and visitors can check out bikes at the public library on a daily or weekly basis. The fleet includes two electric-assist cargo bikes. Willmar, MN started its own program, BikeWillmar, in 2019 using general funds and support from local businesses (City of Willmar 2021). The bikeshare system has 40 bikes and 11 docking stations and operates from spring through the early fall. Users can check out bikes using the vendor's mobile app (Koloni). Other smaller systems have popped up throughout the state but have not had staying power. Often, shared mobility in rural environments is collocated with recreational opportunities such as trails. First mile and last mile connections to transit are less important in these rural settings since transit in this context is primarily door-to-door and on-demand.

4.2.2 BUSINESS MODEL DECISION MATRIX

Table 4

Table 4: Common Ownership and Operating Models provides an overview of common ownership and operating models for micromobility based on a literature review and interviews. The table includes the strengths and weaknesses for each type of model as well as considerations and specific examples that jurisdictions can refer to while conceptualizing a potential micromobility program. *Transit and Micromobility* (TCRP Research Report 230) includes a toolkit to inform decisions about partnering.

TABLE 4: COMMON OWNERSHIP AND OPERATING MODELS

Types of Models	Strengths	Weaknesses	Considerations	Examples
Non-profit owned and operated	Less red tape Ability to harness passion of local advocates Potential for lower operating costs due to volunteers and/or donations Ability to fundraise through donations	Relies upon funding, which may fluctuate; time and resources needed for fundraising System sustainability and maintaining the program's momentum Leadership or volunteer turnover Vendor could exit market at any moment	Availability of non-profit to lead Funding and sponsorship availability	B-Cycle (Spartanburg, SC) (Owned by Partners for Active Living) Systems in Valentine, Omaha, and Lincoln, NE
Privately owned and operated	Host jurisdiction may not have to pay for service Less public staff resources	Less feasible in smaller markets Driven by user fees Vendor could exit market at any moment Vendor may not have incentives to provide equitable service across a service area Potential for reduced public control over program	System will need to be profitable Jurisdiction may need to lead RFP process; will need to negotiate permitting process Vendors absorb losses and exclusively benefit from profits	SPIN (State College, PA) Most dockless scootershare providers
Publicly owned, third-party operated	Ability to tap into third party expertise and resources Can share resources across an operator Cost predictability (operational costs are established in contract) Less public staff resources	Reliance on third-party partner Costs incurred related to profit and overhead (unless they can make up difference in being more productive than direct operations) Dependence on contract to enable monitoring and enforcement of program standards	Capital and operating costs for host jurisdiction	Valley Bike (Pioneer Valley, MA Mass) TuGo (Tucson, AZ) Capital Bikeshare (Washington, DC)

Types of Models	Strengths	Weaknesses	Considerations	Examples
Publicly owned and operated	Full control of program Ongoing program costs could come out of annual budget (e.g., maintenance)	Less flexibility in staffing Potential lack of in-house expertise to operate micromobility Additional red tape	Require in-house expertise and champion to oversee program. Need to solidify long-term funding source	Anythink Library, Commerce City Branch (Commerce City, CO)
Transit agency owned and operated	Potential for recurring inclusion in budget Full control of program	Labor union concerns Concerns about insurance pool grouping	Obtaining capital and operating costs. Navigating regulatory restrictions.	Meadville Bike Share (CATA)

Some considerations in determining the appropriate model include:

- What is the source of start-up funds?
- What is the source of on-going capital and operating costs? (Note: FTA funds will not cover all aspects of a bikeshare or micromobility system)
- Who will own the micromobility equipment (including vehicles and stations)?
- Where will micromobility vehicles be stored?
- Will the system include e-bikes or e-scooters? If so, is there capacity to address charging needs and necessary supportive infrastructure?
- Who will be responsible for operating and managing the system?
- What role will public, private, and non-profit entities have in the micromobility system?
- What is the appropriate fleet size for the system?
- To what extent will the system need to make a profit?
- How long will permits be issued to vendors? (Year-to-year permitting can lead to vendor turnover)
- Will the system operate year-round, or only during specific seasons?

4.3 Program Governance

Program governance models can help provide a framework for decision making, roles, and responsibilities when multiple stakeholders are involved in micromobility programs. A micromobility program may have multiple stakeholders that help run and maintain the service, but the service may appear as a singular entity to the public. Good governance and oversight can protect the brand and instill trust in the micromobility services that programs provide.

Partnerships and collaboration are critical to a micromobility program's success. Anythink Library in Commerce City, Colorado received 30 donated bikes and went to work on preparing a business plan. The plan incorporated library departments that would be involved with the bikeshare and identified where external assistance was required, such as with the City for permitting and a local bike shop for maintenance. Anythink was the lead decision maker but relied on City and vendor support to establish the program. In Meadville, Pennsylvania, CATA formed a non-profit to apply to grants and funding for which municipal agencies are not eligible. The subsequent bikeshare system is operated directly by CATA and funded by the non-profit organization they control.

Jurisdictions have the power to stipulate the conditions to which vendors must adhere and provide oversight. One interviewee encouraged jurisdictions to be active partners in any new micromobility program. Micromobility is an innovative product that requires time and opportunity to take off. The interviewee emphasized that jurisdictions should be very involved to make sure that new systems have the resources they need and that they serve community needs.

CARTA provides an example of the potential role that transit agencies could play in implementing micromobility systems, and how that role may change over time. CARTA funded an initial bicycle fleet project in 2007 and later sponsored a permanent bikeshare program (now known as Bike Chattanooga) as an FTA project. In the early planning phases for Bike Chattanooga, stakeholders needed to decide their roles and responsibilities and whether the bikeshare should be run by a non-profit, private, or government entity. CARTA emerged as the fiscal manager, initially owning the bikeshare assets and managing fiscal and funding matters with the original goal of the bikeshare being a managed entity within CARTA. However, early labor and insurance concerns led CARTA to pursue an external vendor to operate the system. The bikeshare's assets were later transitioned to city ownership. In 2013, the city took over direct operation of the bikeshare. Today, CARTA assist with joint grant applications but is no longer directly involved in program management.

4.4 Regulations

4.4.1 REGULATORY APPROACHES

Local jurisdictions are frequently the body that regulates micromobility, and vendors, partners, and transit agencies are the ones that must follow these regulations (TCRP 2021). Jurisdictions regulate new and existing development and the usage of public space, including right of way, and set public policy. They may determine the application process for micromobility vendors, operating fees and terms, the conditions to which vendors must adhere, and the costs vendors may incur (ROW provision, signage, etc.) to establish operations. A jurisdiction's individual choices are important at a larger level if there is potential to build a regional system (requiring all participating jurisdictions to use the same

vendor). Partnerships and coordination between jurisdictions during the vendor selection process may provide opportunities for more favorable pricing or cost sharing.

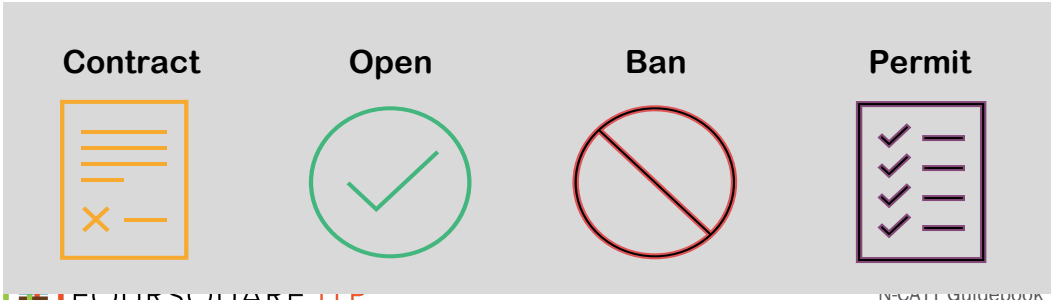
Some common elements of micromobility regulations include establishing areas where micromobility is permitted to operate; determining fleet sizes and parking requirements; safety for riders and the general population; vendor reporting, data, and insurance requirements; and equity considerations (TCRP 2021) as shown in **Table 5**Table 5. Compliance with these regulations determines whether a micromobility program will be allowed to operate and continue operations. The Shared Use Mobility Center (SUMC) maintains a searchable, international Micromobility Policy Atlas of shared bike, e-bike, and scooter policies.

TABLE 5: REGULATORY AREAS AND EXAMPLES

Regulatory Area	Example
Operating service area	Scooters are geofenced to stop working outside a specific zone. Can be used to restrict access to an area, like a park or pedestrian street.
Fleet sizes	50 scooters are permitted for use in a pilot project.
Parking	Scooters may not be left on the sidewalk at the end of a trip or vehicles required to be parked at designated areas in the public right-of-way.
Safety	Operator must develop a communication plan for safety outreach.
Reporting	Operator must provide an annual summary report.
Data sharing and standards	Operator must provide monthly reports that include number of rides taken, number of rides per vehicle per day, anonymized trip data, etc. More information on data standards is in **4.5.1**.
Insurance	Operator must meet insurance requirements to operate in the jurisdiction. Vendor indemnifies jurisdiction of any responsibility / liability related to program operations.
Equity	Operator must assure that unbanked users can use the service. For example, companies holding dockless scooter permits in Washington, DC must provide cash payment options (District Department of Transportation 2021)
Vehicle Distribution	Operator must ensure a minimum number of vehicles are available each day in every ward of the city.

Jurisdictions may also consider their overall attitude and approach towards supporting and regulating micromobility. The American Planning Association's Planning for Shared Mobility (2019) lays out three frameworks to describe the extent to which jurisdictions can view and support shared mobility: either as an environmental benefit with maximum governmental support; a sustainable business with moderate governmental support; or as a business with minimal governmental support. Deloitte Insights summarizes possible approaches to regulating micromobility on a sliding scale of regulation (Zarif, Pankratz and Kelman 2019). These approaches include jurisdictions entering into a public-private partnership with a vendor; a more open approach with limited regulations, in particular for new markets; express bans with potential impoundments; or a formal, permitting process for which vendors must adhere to a jurisdiction's set of rules (Figure 15: Common Approaches to Regulating Micromobility**Error! Reference source not found.**). Deloitte suggests regulation that adapts as a market evolves; micromobility sandboxes that allow for regulatory testing; outcome-based regulation; and risk-weighted regulation (2019) More information on establishing regulatory policies and permitting guidelines is in the Regulations and Permitting Worksheet.

FIGURE 15: COMMON APPROACHES TO REGULATING MICROMOBILITY



4.5 Technology and Organizational Requirements

Transit agencies need varying skills to deploy or monitor a micromobility program, depending on the program's structure and the agency's anticipated level of involvement. This section provides an overview of the skills, systems, and expertise that transit agencies will need as they implement programs and monitor vendors that operate programs. Anticipated requirements are broken into technology-related expertise and organizational capacity.

4.5.1 TECHNOLOGY-RELATED EXPERTISE

From a technological perspective, transit agencies would need to be familiar with industry data standards. This starts with the General Bikeshare Feed Specification (GBFS) (NABSA 2021). GBFS, similar to the General Transit Feed Specification (GTFS), dictates a standardized format for micromobility data that ensures integration with a wide variety of apps and mapping services. GBFS is how systems provide real-time information about micromobility which can be collected, analyzed, integrated into applications, and facilitate trip-planning. The Mobility Data Specification (MDS) is another data standard but differs from GBFS in that it is primarily for communication between municipalities and micromobility providers. Whereas GBFS is only for bikeshare, MDS data can be gathered for any micromobility or MaaS solution. GBFS data is captured in real-time, but MDS data includes historic information like vehicle location over time, which includes sensitive data about user locations and is therefore not for public-facing uses. Common data, as well as data that is not included in MDS, is listed in **Table 6**Table 6. This table does not list all MDS data, but more information can be found here.

TABLE 6: MDS DATA: INCLUDED AND NOT INCLUDED

Included in MDS	Not Included in MDS
Vehicle Location	User Names
Vehicle Status	Payment information
Vehicle Trip Duration / Distance	Unique rider ID number
Vehicle or Device ID	User Contact Information
Vehicle Trip Origin / Destination	Trip History of Each User
Vehicle Trip Route	Demographic User Data

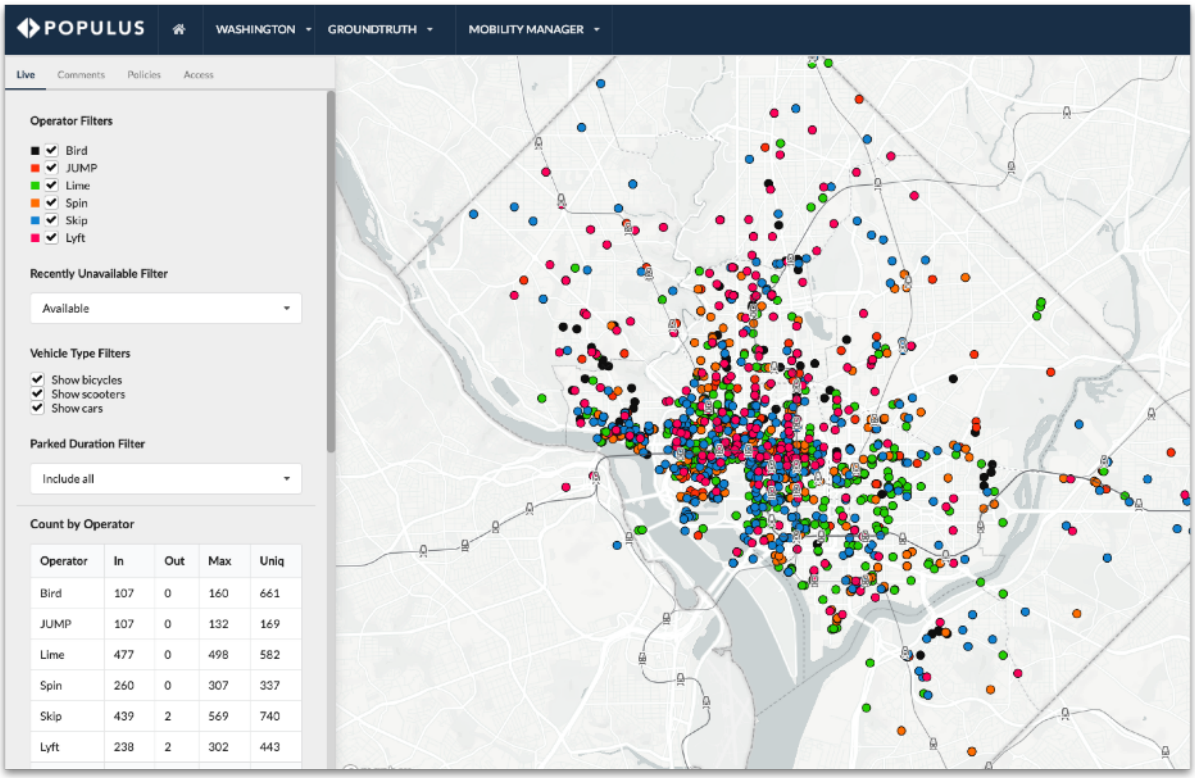
Aside from data, agencies may consider integrating micromobility services into their fare payment systems. Integrating multiple modes of travel onto a single payment method provides a seamless experience for micromobility users and transit riders. CARTA led a pilot program with the goal of integrating Chattanooga's bikeshare, CARTA services, and car share onto a single stored value card which could be used as a bikeshare key fob and a card that could be tapped to ride CARTA. Apps such as Transit already have partnerships with micromobility services that allow users to pay for micromobility rides directly in the app. Integrating payment for micromobility may be easier if transit agencies are already using apps for trip planning and fare sales.

4.5.2 ORGANIZATIONAL CAPACITY

To implement a program, transit agencies would need staffing capacity across several departments. These include procurement and legal to navigate the vendor selection process, and human resources and managers to determine whether the agency has in-house expertise and capacity to fulfill its defined role in the system. Depending on the structure of the program, the agency may need to identify resources to maintain the system (including fleet and any electric charging stations), balance bikes or other vehicles, and monitor vendor performance. Some off the shelf solutions can help agencies or jurisdictions monitor micromobility vendors. Some examples include software to monitor how micromobility vehicles are ridden and parked; operations and fleet monitoring; and street, curb, and new mobility fleet management.

Agencies may also need to coordinate with local jurisdictions for any necessary permitting and regulations (e.g., data sharing, ROW, infrastructure, etc.). Small communities may need to be more active in micromobility programs than their larger counterparts, as vendors may only be willing to provide the vehicles while the transit agency or jurisdiction operates the program.

FIGURE 16: EXAMPLE OF MICROMOBILITY MANAGEMENT SOFTWARE (SOURCE: POPULUS.AI)



4.5.3 RISK MANAGEMENT

Three groups of risk and liability facing transit agencies are in **Table 7**Table 7: Risk and Liability for Transit. The table is not meant to be one-size-fits all given each agency's unique situation. Some topics included in the table are explained in greater detail below.

TABLE 7: RISK AND LIABILITY FOR TRANSIT

Legal and Financial Risks & Liability	Customer Risks	Institutional Risks
Insurance	Accessibility	Vendors are in a volatile industry; operations may cease without warning
Legal requirements	Equity	Vendors subject to jurisdictional regulation
Data privacy and security	Privacy concerns	Agency staffing shortages
Future Title VI requirements	Dissatisfaction with brand	Labor unions buy-in
	Ease of use (e.g., payment, integration with other agency services)	Reputational risks
		Facility space
		Cost and funding impacts

Legal and Financial Risks and Liability

When CARTA planned on operating bikeshare in Chattanooga, the agency ran into two roadblocks, one of which was insurance. The agency was in a public municipal pool and insurance providers had concerns about risks associated with micromobility (limited bike safety metrics were available at the time). CARTA addressed this problem by contracting with a vendor that could obtain insurance and operate the system. Transit agencies interested in in-house operations will need to consider how to secure insurance. Information on federal civil rights requirements is available here: https://www.transit.dot.gov/regulations-and-guidance/civil-rights-ada/civil-rightsada.

Data Privacy

Agencies will need to determine how to keep user data private and secure and understand the importance of being trusted stewards of personal information. For example, routine trips can become so-called personally identifiable information (PII) that can identify an individual when combined with other data sets (NACTO 2019). The Open Mobility Foundation, which developed MDS, published a privacy guide for cities.

Customer Risks

Customers may have accessibility and equity concerns, ranging from the availability of accessible vehicles (such as adaptive bikes); the ability to pay without using a smartphone or credit card; and the equitable placement of vehicles throughout a transit agency's service area. Dissatisfaction with a micromobility system that the transit agency operates or is otherwise affiliated with may lead to dissatisfaction with the overall brand.

Institutional Risks

Agencies that partner with micromobility vendors should consider the industry's volatility, which means that operations could be impacted at any time. These vendors are also subject to jurisdictional regulation. From an agency perspective, agencies should consider whether they have adequate staffing and facilities to accommodate micromobility systems and the impact, if any, on micromobility systems on agency funding. Agencies may also face reputational risks if micromobility programs do not run smoothly.

4.6 Equity

Micromobility promises a revolution in transportation, and to further this promise is aligning shared micromobility programs with universal design principles to provide for services to be accessible to the general population. Programs that promote equity seek to increase the accessibility to, and usage of, micromobility systems to disadvantaged and marginalized populations. These programs may be aimed at benefitting people based on race, ethnicity, income, gender, ability status, residents of underprivileged neighborhoods, those without access to banking or smartphones, and many more. Equity areas refer to places with a high proportion of people who are low income and/or people of color, who lack access to a car, or any multitude of different identities that restrict people's movement. The following section elaborates on the multitude of obstacles that prevent micromobility from being accessible to everyone as well as strategies and programs which can be implemented to remove or reduce these obstacles.

4.6.1 BARRIERS TO USING MICROMOBILITY

Micromobility users are disproportionately white, higher-income, younger, educated, and male, compared to the populations in the areas the systems serve (McNeil, et al. 2019). There are numerous barriers not only to equitable access but achieving equitable usage and benefits from a micromobility system. One key barrier to access is that many micromobility systems have their stations and vehicles located at a higher rate in neighborhoods with a younger, wealthier, whiter population (McNeil, et al. 2019). However, even when systems are located in lower-income communities and communities of color, disparities in usage still reflect higher ridership among privileged populations.

There are many different barriers that uphold this trend. Firstly, though access to smartphones is growing, many disadvantaged populations are less likely to have access to a smartphone or credit card, which are required for using most micromobility systems. Additionally, there is a knowledge barrier: lower-income and people of color are less likely to know someone who uses bikeshare or to have used it themselves, and less likely to know how the system works and therefore less inclined to start using it (McNeil, et al. 2019). Furthermore, micromobility systems are often perceived as accompanying ongoing gentrification and displacement, and thus viewed by low-income and minority communities as not being something "for" them, but rather for the whiter and wealthier residents that are displacing them.

There is often a lack of sufficient bicycle and pedestrian infrastructure in chronically underinvested neighborhoods, as well as a lack of access to parks and other recreational opportunities. For these reasons, lower-income people may be less inclined to ride a bike or scooter as it is unsafe to do so on the streets in their communities or they simply have not had a chance to do so for recreation or otherwise in the past. Finally, many people lack the ability to ride a standard bicycle or scooter, either due to disability status or because they were never given the opportunity to learn how (McNeil, et al. 2019). All these factors combined present a daunting challenge for micromobility systems to overcome and provide disadvantaged communities with equitable mobility choices.

4.6.2 ADDRESSING USAGE BARRIERS

To increase disadvantaged communities' access to and participation in micromobility systems, many systems have implemented equity programs that target the various barriers which prevent many people from using micromobility. Unfortunately, due to funding, staffing, and scale issues, smaller systems are much less likely to have equity programs in place than larger ones. One report by the Transportation Research and Education Center found that of bikeshare systems with more than 150 bikes, nearly 80 percent had ongoing equity efforts. However, of those with fewer than 150 bikes, less than half had ongoing equity programs (McNeil, et al. 2019). The following sections address many possible programs and other efforts which micromobility providers can implement to increase equitable access and use of their systems.

Physical Access Barriers

Lack of physical access in low-income and minority neighborhoods is one of the primary barriers that micromobility systems are attempting to rectify. Of the systems with ongoing equity efforts, more than half had programs focusing on placing more stations and devices in areas that communities emphasized for equity efforts, often referred to as equity areas. Most attempt to expand access in underserved neighborhoods and facilitate access to existing public transit as well as other key destinations for employment, education, healthcare, food, and other community resources such as public libraries and community centers (McNeil, et al. 2019).

Many of these efforts include community outreach through various methods to solicit public input guiding station placement and areas in need of vehicles. Oftentimes, expansion into equity areas is combined with seeking grants or other external funding to support the system growth in places that will likely generate less revenue, either due to lower ridership or higher participation in discount programs.

In Fort Smith, Arkansas, for example, the city received a grant from the National Science Foundation to develop a new bikeshare system with extensive community engagement in the form of workshops, surveys, and virtual development sessions to determine community needs and desires. This engagement was used in station siting; of eight stations, three will be in low-income neighborhoods, two will be in locations where many low-income people work, two will be at major transit hubs (Herbert 2022).

Cost and Payment System Barriers

Another key concern with increasing usage among equity populations is the cost and method of payment. Of systems with ongoing equity efforts, 84 percent had programs focused on this concern, which can take various forms. The most common are income-based discounts, that reduce the overall cost of usage and may reduce or remove many other fees for exceeding a time limit or leaving service area boundaries (McNeil, et al. 2019). Some also offer alternative payment structures for lower-income users, who may not be able to afford the up-front cost of a monthly or annual pass and are therefore penalized with higher per-trip usage fees. Oftentimes, eligibility for these programs is determined via participation in other assistance programs, such as SNAP, Medicaid, public housing, Social Security, or local transit discount programs.

As lack of access to a smartphone or credit card poses a huge roadblock to participation in micromobility, some systems have introduced cash payment options, usually at a local office or community center or by issuing payment cards that can be reloaded at local businesses. Devices may be unlocked using an electronic key or card instead of through smartphone application. Partnering with transit agencies to use one payment card for transit service as well as micromobility is another way to facilitate access for people who likely already use transit. CARTA in Chattanooga, Tennessee has a combined payment card for transit and bikeshare which can be reloaded with cash at transit stops. Some systems, such as bikeshare in Pittsburgh, Tucson, Kansas City, and Milwaukee, go further by giving people who already receive discounted transit fares automatic eligibility for discounted bikeshare (McNeil, et al. 2019).

Ultimately, no matter what discounts or payment systems are introduced, many people still will not be able to afford micromobility. To overcome this, many smaller communities have free bikeshare or similar programs called bike libraries. In Fort Smith, Arkansas, the cost of bikeshare will depend on the location of the station: in lower-income communities, it will be free for short-term rentals (Herbert 2022). In Commerce City, Colorado, the local Anythink public library operates a program where anyone with a library card can rent a bike for up to three weeks, funded by the library's special projects budget as well as grants from the city and local foundations. In Allen County, Kansas, a local rural health advocacy organization called Thrive Allen County operates a free bikeshare program where bikes can be rented with only a photo ID.

Knowledge Barriers

Even if micromobility systems are located in equity areas and programs exist to reduce costs and facilitate access for the unbanked and/or those without a smartphone, lack of awareness of these programs and experience with micromobility in general discourage many from using the system. Systems have implemented various programs to overcome the knowledge barrier. Providing necessary marketing and information materials is an important way to get the word out about the system, especially in languages other than English. Community outreach is a major part of these efforts; sending ambassadors to community events and organizations to help facilitate enrollment and raise awareness of discount programs that exist to help lower-income riders.

Some go further and partner with local organizations to host educational programs that address issues such as how to ride a bike or scooter, how to ride in city traffic, how to access the devices, or simply providing a safe environment for people to become comfortable with the concept. These educational programs often include organized rides to help riders become familiar with using micromobility devices and overcoming the hesitancy to using something for the first time and have fun while doing so. For example, the Anythink public library in Commerce City, Colorado, hosted bike riding lessons prior to launching their successful bike library program. In Chattanooga, CARTA hosted multiple organized group rides both to accustom residents to riding in downtown traffic and to normalize the presence of bikes downtown (and accustom drivers to driving around cyclists) for multiple years prior to launching its bikeshare system.

Accessibility Barriers

Finally, most micromobility devices are simply not accessible to many people with disabilities and older adults. Electric bikes and scooters with seats are becoming more common in micromobility systems and are helpful to those who do not want to or are not able to stand for the duration of a scooter ride or do not want to or are not able to bike long distances or up steep hills without motor assistance. Other adaptive vehicles, such as tricycles, hand cycles, recumbent bicycles, and three- or four-wheeled scooters, are less common.

4.6.3 MODELS FOR EQUITABLE ENGAGEMENT

There are a multitude of ways for micromobility providers to engage with the community to build a system that is accessible to all and viewed as a community benefit for all residents, not just those from privileged backgrounds. When implemented correctly and with a specific intent for equity, micromobility is a powerful tool for helping rectify the historic transportation and land use inequities built into communities. For example, one user of the free bike library program at the Anythink library in Commerce City, Colorado was a formerly incarcerated person who did not have a driver's license and was using the bike to reach job interviews. Without access to a free bicycle rental, the person likely would not have been able to reach many of those opportunities.

Many cities start with equity from the beginning, prioritizing public input in the large-scale planning processes that develop goals for siting stations and rebalancing vehicles. The City of New Haven went even further by hosting public siting workshops in targeted communities to engage the community with interactive activities that help design the bikeshare network (NACTO and BBSP 2018). Additionally, many systems have online tools that allow the public to suggest station locations and have mechanisms to trigger action should a certain number of users prioritize a given location.

To encourage people to become comfortable with micromobility vehicles, many micromobility providers partner with local organizations that already have a relationship with the community, such as churches, schools, and local bike shops, to host events and perform outreach. Often these events can include classes teaching how to ride a bike or scooter. Some go further and host community-organized rides that provide newer users with a comfortable experience to begin riding, as well as the opportunity to see more underrepresented people riding bikes and scooters. These have an enormous impact on encouraging people from disadvantaged backgrounds to start riding and continue riding. Events are most successful when they include ambassadors from the micromobility provider and local community representatives; event materials in multiple languages; are promoted through a wide array of marketing channels; and are free and fun.

In addition to hosting events, micromobility providers should also make every effort to be visible in the community and participate in other local events and goings-on. Examples include open streets events where roads are closed to motor vehicle traffic, tabling at community festivals, and coordinating with events hosted by local business improvement districts and elected officials. These events are most successful when agencies bring vehicles for test rides, have an engaging team of on-the-ground representatives, and have promotional materials for giveaway.

Finally, people from underrepresented groups are more likely to use micromobility if other people they see using it and employees of the program come from similar backgrounds. Oftentimes, when micromobility users are predominantly white and higher-income, others outside of these groups may view it as something not “for” them and are disinclined to try it. Micromobility providers can partner with local bike shops and community organizations to provide skills-based workforce development programs and workshops that both make the agency more visible in the community and creates a talent pipeline for community members to work for the agency, which further encourages more community members to use and work for the system.

5 CONCLUSION

Micromobility has proven to be an effective car-free mode of travel in urban areas, yet there is limited guidance on micromobility that is targeted toward smaller cities and rural areas. This Guidebook explored micromobility use cases in non-traditional settings to offer insight on how transit agencies and local jurisdictions could implement similar programs to support their transit services. This section summarizes key findings from the Guidebook.

5.1 Key Findings

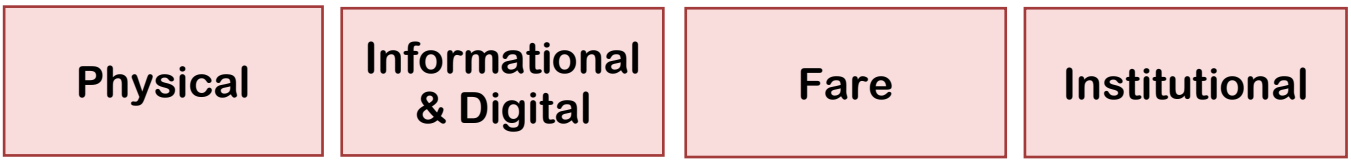
5.1.1 INTERFACE WITH PUBLIC TRANSIT AND PARTNERSHIPS

One of the foremost problems in transit planning in small urban, tribal, and rural settings are the large distances between transit services and potential users' trip origins and destinations. When this distance is longer than one-half mile (a typical ten-minute walk), many potential riders will not use transit. However, due to low development densities of many small urban, tribal, and rural settings, it usually is not economically feasible to run transit services frequently and directly to all of the places people live and activity centers they visit. Micromobility, when implemented correctly and with some degree of integration with transit, is a potential solution to expand the reach of public transit.

Micromobility and transit can be integrated in various forms (summarized in **Figure 18**: Types of Integration):

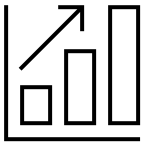
- **Physical integration** includes when cycle lanes connect to transit or there are docks or secure parking for personal and shared micromobility at transit facilities.
- **Informational and digital integration** includes physical wayfinding markers directing riders between modes and/or a rider's trip-planning app suggesting a transit route that incorporates a shared micromobility mode.
- **Fare integration** is when there is a common payment method between modes or there is a discount (partial or full) for transferring between transit and micromobility.
- Finally, the highest level is **institutional integration**, wherein one agency is responsible for managing multiple modes.

FIGURE 17: TYPES OF INTEGRATION



Institutional integration can vary by degree, ranging from partnerships to consolidated operations. For example, CATA in Meadville, Pennsylvania, and the RTA in Dayton, Ohio, both directly operate micromobility programs; they are responsible for all operations and management. To a lesser degree, CARTA in Chattanooga, Tennessee, partners with the non-profit that operates the bikeshare there to support grant applications, bikeshare station placement near bus stops, and has a stored-value payment card that works for transit and bikeshare. The lowest level of integration is through permitting and private partnerships, whereby transit agencies and other government agencies can mandate certain conditions in exchange for allowing a private micromobility company to operate in their jurisdiction or on their property.

5.1.2 FACTORS FOR SUCCESS



Various factors affect demand for micromobility services: higher population and employment density, more mixed-use land uses, lower average trip lengths, tourist and leisure destinations, and infrastructure availability are key drivers. Before establishing a micromobility program, it is important to examine jurisdictional, user, and vendor considerations for feasibility.

From a jurisdictional perspective, it is important to examine:

- Funding availability for startup costs and future operations and maintenance.
- Pedestrian and bicycle infrastructure availability.
- The presence of local partners to support the program.
- The level of support from local residents, businesses, politicians, and city agencies.
- Whether adequate staffing is available.
- What considerations will be made for equity and accessibility.

User considerations to examine include:

- The locations of docking stations.
- Safety when using the system.
- Connections with other modes.
- Ease of use and payment.
- General convenience/ways to ensure a quality user experience.

Vendors must consider whether the market in an area will provide a financially sustainable business model, and if not, if they can partner with transit agencies or other local organizations/government agencies to access long-term, stable funding to subsidize the program.

5.1.3 OWNERSHIP, GOVERNANCE, AND REGULATION

Micromobility systems can have several business models depending on who owns and operates the program. Typically, the program owner is either a non-profit, a public entity (including transit agencies), or a private firm. The operator is either the owner, a third-party contractor, or some hybrid operations model wherein certain functions are handled by different parties. In smaller communities, lower levels of density and associated lower ridership often mean that entirely private systems are not financially viable, and some sort of public funding, private sponsorship, and/or non-profit operations may be required to make a system viable.

Oftentimes, systems in smaller jurisdictions rely on donated or cheaply purchased used equipment for startup. For continued operations and maintenance, they often rely on volunteers and partnerships with local bike shops or other community organizations. Outsourcing certain functions this way is important to helping the system work with limited resources and staff availability. Community bike libraries, run by non-profits, public libraries, or other government agencies, are another model to consider for smaller communities. In these systems, users can check-out a bike for free for a predetermined period of time with only an ID or library card; usually they are funded publicly or through donations.

An organized program governance model is important for providing a framework for decision making, roles, and responsibilities, especially when a system has multiple stakeholders involved. In some instances, one agency may play a lead role, in others, a new non-profit organization may be formed to unite multiple stakeholders and ease grant applications and funding issues. Especially for privately owned or operated systems, regulations are an important way to ensure that the system is aligned with public policy objectives. Common areas for regulation include where services can operate, how big their fleets can be, parking location requirements, safety requirements, data sharing and reporting, insurance requirements, and equity/vehicle distribution requirements.

5.1.4 TECHNOLOGY AND ORGANIZATIONAL REQUIREMENTS

Agencies require varied skills to deploy and monitor micromobility programs depending on the ownership and operations model. From a technology standpoint, agencies need to be familiar with industry data standards and data processing, as well as integrating micromobility into fare payment services, trip planners, and other ways to make transit and micromobility work together seamlessly. From an organizational standpoint, agencies may need to be able to navigate vendor procurement, hiring and staffing requirements, resources required for program operations and maintenance, and coordination with local jurisdictions for permitting and regulations.

The agency must also be able to manage the various risks and liabilities that come with operating or managing micromobility. From a legal and financial perspective, there are insurance requirements, concerns requiring data privacy and security, user safety liability, as well as possible future Title VI and other legal requirements. From a customer standpoint, there are concerns regarding accessibility, equity, affordability, privacy, and ease of use. Finally, there are institutional risks coming from the nature of micromobility being a novel and volatile industry, risks of staffing and knowledge shortages, reputational risks, and the costs and funding impacts of the program.

5.1.5 ADDRESSING EQUITY

Without a specific equity focus from micromobility providers, there are many barriers that prevent micromobility systems from being accessible and equitable. Barriers may be physical, such as when there are not enough stations located in equity areas and/or not sufficient bike or pedestrian infrastructure in equity areas for users to feel safe. Even when physical access is not the issue, many equity populations are less likely to have access to a smartphone or credit card to use app-based micromobility. There are knowledge and disability status barriers as well, from lack of familiarity with the system itself or the ability to ride a standard bike or scooter. Finally, there is the perception of micromobility accompanying gentrification and displacement, and thus not viewed by low-income and minority communities as something “for” them.

Despite these barriers, many micromobility programs in smaller communities have worked to build equitable and accessible systems. In Fort Smith, Arkansas, the city is developing a new bikeshare system with extensive community engagement to determine station siting and pricing. In Pittsburgh, Tucson, Kansas City, and Milwaukee, users can pay for transit and bikeshare with one card that is cash-reloadable and those who receive discounted transit fares are automatically eligible for discounted bikeshare. In Commerce City, Colorado and Allen County, Kansas, the bikes are completely free and can be rented from various community locations for weeks at a time with only a library card or ID, respectively. To address the knowledge barrier, Commerce City hosted bike riding lessons and other community programs to familiarize people with bikeshare. In Chattanooga, the transit agency hosted organized group rides downtown to accustom people to bike downtown and for drivers to navigate around cyclists prior to implementing bikeshare.

5.2 Areas of Further Research

There were several areas of inquiry that the research team sees as knowledge gaps, either due to the lack of research, data, or on-the-ground examples:

- The research team was unable to find any literature regarding micromobility systems operating in tribal areas other than a few news articles about a brief LimeBike program in the Reno-Sparks Indian Colony in Nevada, which is no longer operating.
- All scootershare systems found were privately owned and operated, with the exception of Dayton RTA’s system. There are limited examples of publicly owned and operated scootershare services.
- There is very little guidance on data collection for small systems, especially bike libraries; this data would be useful for determining why and how people are using the system and allowing the agency to plan accordingly.
- More information would be helpful regarding opportunities for smaller communities to upcycle used equipment from private operators or larger jurisdictions.
- Further research on different partnership approaches could provide strategies that would allow smaller systems to more easily acquire and share resources across multiple systems to achieve greater scale and effectively leverage smaller budgets and staffing.

IS MICROMOBILITY RIGHT FOR YOU?

Introduction

Is there a market for micromobility in your area? And if there is, what varieties of stakeholder inputs do you need to consider? Jurisdictions should develop goals for implementing a program (e.g., reducing single-occupancy vehicle trips, providing multi-modal options or recreational opportunities, connecting to transit, addressing first and last mile trips, etc.) and evaluate the extent to which programs can help achieve these goals.

The National Cooperative Highway Research Program (NCHRP) has published *Opportunities for State DOTs (and others) to Encourage Shared-Use Mobility Practices in Rural Areas* (NCHRP 20-65 Task 76), which includes a rural shared use mobility toolkit to help guide decision-making in developing shared use mobility in rural settings (NCHRP 2019). Some key considerations for evaluating the feasibility and success of potential micromobility programs are discussed below.

Market Considerations

Before embarking on micromobility, it is important to consider whether a micromobility program is appropriate for your community. Micromobility exists in a variety of contexts but performs best in areas with a high concentration of destinations located within close proximity to one another. It is important to consider your market, including who would use the service and the types of trips they make take. Some key considerations include:

- What are the population and employment densities in your potential micromobility market? Low density areas may struggle to produce suitable ridership.
- Does the market have an abundance of mixed-use land uses (including housing, employment sites, schools, grocery stores, and major retail and restaurant corridors)?
- Among existing trips in the market, how many are under three miles in length? How many are under one mile? Micromobility largely serves shorter trips.
- Does the market have any tourist and leisure destinations? Many micromobility programs succeed by attracting recreational trips from residents and visitors.
- Are there key institutional anchors such as a local college or university which can help drive ridership?
- Is there already a propensity of people who bike or scooter? Some indicators may be number of carless households, bike/walk commute mode share, the presence of bike shops, bike trails or lanes, or public bike racks.

Jurisdictional Considerations

If it is determined that there is a market for micromobility, then planners must consider if the jurisdiction is able to support the start-up and operation of such a program. Jurisdictions should ask themselves:

- Does the program have a sustainable source of funding to cover future operations and maintenance, aside from the initial start-up costs?
- Does existing infrastructure help support a micromobility program (e.g., safe sidewalks, a connected network of bike lanes, available right-of-way (ROW) for stations, etc.)? If not, can projects be included in upcoming capital improvement budgets (with the caveat that they may take years to build)?
- Are there local partners that may support the program (e.g., cycling non-profits, neighboring jurisdictions that may share costs, sponsors, etc.)?
- Is there support from residents, businesses, politicians, and local stakeholders for a system?
- Is there buy-in among staff in the jurisdiction's departments (e.g., finance, maintenance, public works, etc.)?
- Does the jurisdiction have adequate staffing to establish a micromobility program (e.g., vendor procurement,

in-house maintenance or operations, etc.)?
- What accommodations need to be made for populations without smartphones or mobile data?
- Will the program have accommodations for persons with disabilities, for example providing adaptive bicycles?
- What mechanisms can be established to assure that the program is equitable?

User Considerations

If it is determined that the jurisdiction is able to support the micromobility program, then jurisdictions must set certain goals related to the user experience to ensure that the system is actually used and becomes successful. Jurisdictions should consider:

- Where are docking stations and/or other designated docking areas?
- What is the user experience when using micromobility?
- Who is the target audience for micromobility? Is the proposed system designed to meet their needs?
- Does micromobility allow users to connect to other modes of travel or other areas within the region?
- How easily can a user use the service (e.g., integration with transit app, easy check-out/payment)?
- Do potential users have access to a smartphone and high-speed data?

Vendor Considerations

Finally, jurisdictions should be aware of what potential vendors may be considering before deciding to partner with the jurisdiction in establishing the micromobility service. These considerations may include:

- Will the market support a financially sustainable business model, especially in lower density areas?
- Are there ways to partner with transit agencies, which may have more long-term, stable funding available?
- Does the jurisdiction have infrastructure that would support micromobility?

REGULATIONS AND PERMITTING WORKSHEET

Introduction

Local jurisdictions are frequently the body that regulates micromobility. Jurisdictions regulate new and existing development and the usage of public space, including right of way, and set public policy. They may determine the application process for micromobility vendors, operating fees and terms, the conditions to which vendors must adhere, and the costs vendors may incur (ROW provision, signage, etc.) to establish operations. Vendors, partners, and transit agencies are the ones that must follow these regulations.

Approaches to Micromobility

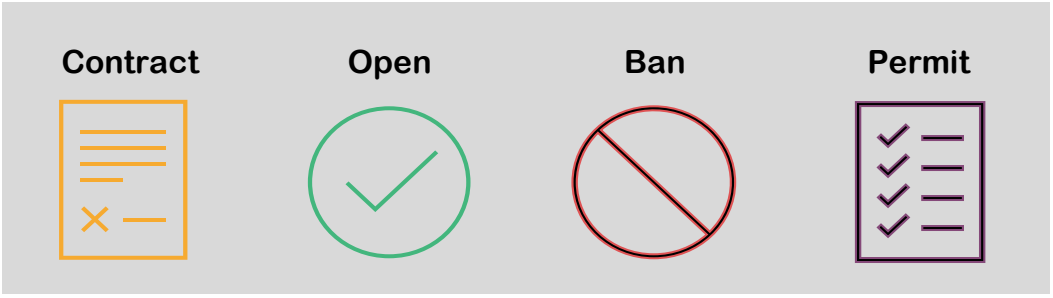
Jurisdictions should consider their overall attitude and approach towards supporting and regulating micromobility, which can steer subsequent regulations and permitting. The American Planning Association's Planning for Shared Mobility (2019) lays out three frameworks to describe the extent to which jurisdictions can view and support shared mobility:

- An environmental benefit with maximum governmental support.
- A sustainable business with moderate governmental support
- A business with minimal governmental support.

Deloitte Insights summarizes possible approaches to regulating micromobility on a sliding scale of regulation. These approaches, shown in **Figure 18** include:

- Jurisdictions entering into a public-private partnership with a vendor.
- A more open approach with limited regulations, in particular for new markets.
- Express bans with potential impoundments.
- A formal, permitting process for which vendors must adhere to a jurisdiction's set of rules.

FIGURE 18: COMMON APPROACHES TO REGULATION MICROMOBILITY



Common Regulatory and Permitting Requirements

Figure 2 provides an overview of the different areas of micromobility regulation and some examples of specific requirements. The overview is not exhaustive but should help jurisdictions identify topics for consideration when establishing micromobility regulations and/or permitting guidelines. The Shared Use Mobility Center (SUMC) maintains a searchable, international Micromobility Policy Atlas of shared bike, e-bike, and scooter policies that may also serve as examples. The National Association of City Transportation Officials developed guidelines for regulating shared micromobility.

FIGURE 2: COMMON REQUIREMENTS

Operating Service Area	Fleet Requirements	Parking	Safety
• Service area in where programs may operate • Restricted zones	• Number of vehicles • Speed limits • Location of vehicles, e.g., equal distribution of vehicles across the service area	• Parking policy, such as where and how vehicles may be parked • Vendors may require users to take a photograph	• Safety metrics • Public communications plan • Helmet usage programs • Safety reporting

Reporting	Data Sharing and Standards	Insurance	Equity
• Annual reports • Monthly ridership reports	• Data standards and formatting (e.g., APIs, MDS, etc.) • Vehicle repair information • Privacy policies	• Establishes the type and level of insurance vendors require	• Accommodations for unbanked users • Discounted rates for low-income users

IMPLEMENTING MICROMOBILITY WORKSHEET

Introduction

This worksheet is a quick reference guide to the key steps to implement micromobility. While any implementation plan starts with the same set of basic questions, the overall approach diverges based on whether an organization is looking to create a program of their own or merely hoping to regulate or permit a program operated by someone else.

Note that this worksheet captures *common* steps to implementing micromobility. There are a wide range of approaches and strategies to implementing micromobility and organizations interested in implementing such a program may deviate from the checklist below.

Finally, community engagement should occur throughout the planning process. Community buy-in is easiest achieved if engagement starts early and occurs often.

Step 1: Create the Plan

Many successful micromobility programs begin with a fundamental planning process that identifies what the community hopes to achieve with micromobility, the market demand for such a system, and potential paths for moving forward, including:

- ☐ Identify key community stakeholders to involve in the micromobility planning process. In addition to transit providers, this may include the affected jurisdictions, key local advocates, the business community, and key institutions.
- ☐ Define your goals for micromobility. What do you want to achieve with a program? How would you define a successful program? What are the key factors that would make or break micromobility in your community
- ☐ Identify your target market for micromobility. Where would the program succeed in the service area? How could micromobility compliment or enhance transit services? Who would use the program?
- ☐ Determine basic geographic scope and size of the program. Does the service area require a large system to be effective? Are there opportunities for a more targeted pilot?
- ☐ Explore the willingness of key stakeholders to be program partners, either through the administration, funding, or promotion of micromobility. Developing partnerships with stakeholders is a long-term process and its helpful to bring potential partners in early to the planning process to build that relationship.

Step 2: Develop Business Model

- ☐ Determine ownership and governance model. Will micromobility be owned and operated by private company, public entity, or as a public-private partnership? Who is responsible for program oversight and regulation? Who is responsible for day-to-day decision-making?
- ☐ Identify who will operate the program. In the case of private operations, will there be a single exclusive operator or multiple firms permitted to operate (and potentially compete with one another) in the community.
- ☐ Identify the types of technology to be used by the system. What are the high-level constraints placed around technology, including type of vehicles (e.g., bikes and scooters), whether it is docked or dockless or a combination, and whether the program will rely on one technology platform or a variety of solutions.
- ☐ Develop a funding approach. Will the program rely on a private operator to run a completely financially self-sustaining system? Will resources like sponsorships, advertising, and public funds be made available?

Step 3: Implement Business Model

- ☐ Finalize program governance and establish group responsible for overseeing system implementation.

Direct Ownership Model

- ☐ Finalize initial program financial plan.
- ☐ Initiate fundraising plan, including acquisition of program sponsor(s), advertisers, and donors.
- ☐ Draft procurement document based on selected operations and ownership model. Ensure procurement reflect desired operating requirements.
- ☐ Complete program procurement.

License and Permitting Model

- ☐ Finalize operating requirements and constraints. How many operators will be permitted to operate? Will there be a cap on system size? What specific permit requirements will the jurisdiction place on the operator?
- ☐ Depending on circumstances, initiate a competitive or open bidding process for micromobility operators. *Note many systems elect to start the program as a pilot with a fixed end date.*

Step 4: Countdown to Launch

- ☐ Initiate launch-focused community engagement, including feedback on station locations (if applicable). Ensure there is adequate dialogue with individuals or groups directly impacted by program implementation (e.g., property owners adjacent to station location)
- ☐ Initiate marketing and promotion of the program, including engagement with the potential ridership market.
- ☐ Complete installation of necessary infrastructure such as signage, sidewalk/roadway markings, and stations.
- ☐ Initiate rider education. Communicate to the public how to use micromobility services, including guidance on user safety, rules, and regulations.

MICROMOBILITY AND EQUITY WORKSHEET

Introduction

Micromobility, in theory, should be a benefit to mobility for disadvantaged populations (based on income, race, gender, ability status, etc.), as it is a relatively inexpensive alternative to using a private vehicle. However, in practice, micromobility users are disproportionately white, higher-income, younger, educated, and male, compared to the populations in the areas the systems serve (McNeil, et al. 2019).

The barriers to equitable micromobility usage are many: stations and vehicles not available in lower-income and minority neighborhoods; too expensive; not accessible without a smartphone and/or credit card; lack of familiarity with micromobility; lack of sufficient bicycle and pedestrian infrastructure and other recreational opportunities in disadvantaged neighborhoods; vehicles are not accessible to disabled people; and more. The following sections offer possible solutions for communities to surmount these barriers when implementing micromobility.

Strategies to Overcome Barriers

PHYSICAL ACCESS BARRIERS

One of the first requirements to promoting equitable micromobility usage is ensuring that sufficient stations and/or vehicles are located in areas that are underserved and disadvantaged. Some best practices include:

- Soliciting extensive community engagement and input to guide station and vehicle placement – this can take the form of in-person workshops, digital and paper surveys, virtual meetings, and more. It is important that public engagement information is widely distributed through a variety of means, not just digital. Additionally, in-person meetings should be hosted at times and locations that are convenient and accessible.
- Responding to community needs and desires, especially in underserved neighborhoods and other key destinations for: employment, education, healthcare, groceries, and other community and civic resources.
- Stations in locations aimed at equity populations may generate less revenue, and therefore it may be necessary to offset the cost by soliciting grants from foundations or seeking additional funding and partnerships.

COST BARRIERS

Micromobility systems may be too expensive for lower-income residents – a ten-minute trip on some scooter services cost more than $5! Some best practices to overcome cost barriers include:

- Income-based discount programs or subsidized weekly/monthly/annual passes. Eligibility for these programs is often determined by participation in other assistance programs, such as local transit discount programs, SNAP, Medicaid, public housing, or Social Security.
- Varying pricing by station/vehicle location: stations located in low-income areas or near places that employ many low-income workers have lower prices compared to those in higher-income or tourist areas.
- Free bike libraries: allowing users to “check-out” a bike for free with only an ID or library card, usually for days or weeks at a time. Typical rental locations include public libraries and community centers among others.

PAYMENT SYSTEM BARRIERS

Micromobility devices often require a credit card and/or a smartphone to rent, which many people do not have access to based on income, job status, immigration status, etc. Some ways to circumvent this include:

- Issuing payment cards that can be used to unlock vehicles and can be reloaded with cash, usually at local

business, community centers, or micromobility system offices.
- Partnering with local transit agencies to use one payment card for transit and micromobility that can be reloaded with cash at transit stops or onboard transit vehicles.
- Once again, free bike libraries: allowing users to "check-out" a bike for free with only an ID or library card, usually for days or weeks at a time. Typical rental locations include public libraries and community centers among others.

KNOWLEDGE BARRIERS

Lack of familiarity with micromobility and/or lack of awareness of programs to make micromobility more accessible discourage many from using the system. To raise awareness and help people become comfortable with micromobility, the following practices are helpful:

- Sending program ambassadors to community events to provide system information, connect with people, and provide an opportunity to try micromobility devices. It is especially beneficial when ambassadors are members of the community.
- Hosting events, such as educational programs on how to ride a bike or scooter, how to ride in city traffic, and how to access/use micromobility devices.
- Hosting organized rides to provide a safe and comfortable environment for people to become familiar with micromobility.
- Partnering with local organizations, such as churches, schools, community centers, and local bikeshops to support outreach and education programming.
- Performing outreach online or in-person, especially in disadvantaged communities or at/near health, employment, education, community, and government institutions.
- Ensuring that all outreach materials are provided in multiple languages that are common among populations in the area.
- Partnering with local bike shops and community organizations to provide skills-based workforce development programs and workshops that both make the agency more visible in the community and creates a talent pipeline for community members to work for the agency.

ACCESSIBILITY BARRIERS

Typical micromobility devices available in the U.S. today are bikes and scooters, which require the user to pedal or stand and are not accessible to many people with disabilities and older adults. Some more accessible vehicles to consider for a system include:

- Electric bicycles, which give the user a boost either through pedal assist or a handlebar throttle. Electric bicycles are very popular in systems that have them and provide an enhanced experience for older users or those who do not cycle frequently; in hilly or more spread-out areas with longer trips; or simply for anyone who does not wish to exercise and get sweaty on their commute.
- Scooters with seats, which enable the user to sit down for the duration of their ride instead of standing on the platform.
- Other adaptive vehicles are less common but include tricycles, hand cycles, recumbent bicycles, and three- or four-wheeled scooters.

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