EZfare: The Gateway

MULTIMODAL STRATEGY AND TECHNOLOGY ASSESSMENT

Prepared by CALSTART

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SARTA NEORIDE EZFARE

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EXECUTIVE SUMMARY

NEORide, a Council of Governments (COG) comprised of at least sixteen transit agency members across Michigan, Ohio, and Kentucky, launched EZfare, a new fare collection solution in June 2019. EZfare seamlessly connects public transit across the region by utilizing a single payment platform between all NEORide member agencies. Using the free EZfare app, transit riders now have the option to purchase tickets in-app that can be used to travel between the more than thirteen participating counties' transit networks. By offering on-demand ticket purchases via a mobile ticketing system, riders save time by purchasing directly through their smart phone or tablet, eliminating the need for transfer paper tickets.

A critical component of the EZfare integration is the new JustRide Fare Payments as a Service (FPaaS) validator platform provided by Masabi. This platform is aiding in lowering barriers and empowering riders by providing increased regional access, convenience, and transparent trip information. The introduction of EZfare is a significant step to towards achieving NEORide's goal of increasing the use of public transit across the states of Michigan, Ohio, and Kentucky.

EZfare can be expanded to include the integration of innovative mobility services which further strengthens NEORide's regional public transit network. Mobility platforms such as on-demand microtransit, bike/scooter share or car/vanpooling, will increase transit network access points for riders. According to a survey administered by CALSTART to NEORide transit partners received responses from 12 survey participants which indicated interest in a variety of innovative mobility options, key takeaways include:

- 66% of respondents selected **microtransit** as the mobility service that would have the **most impact** on their county.
- 50% of survey respondents selected **limited public transit availability** (ex: nights, weekends) as the primary challenge for traveling through the **downtown core;**
- 42% of survey respondents selected **public transit wait time**, and 25% selected limited public transit availability (ex: nights/weekends) as the primary challenge for traveling through **residential areas.**

This Multimodal Strategy explores building upon EZfare's seamless fare collection by integrating EZfare on to innovative mobility services and details key considerations for operating a tech-based transportation service.

A Technology Assessment is a key component of this strategy as it provides an overview of shared mobility service providers in the market today with existing payment integration capability and as we look at global transit market conditions, an overview of zero-emission vehicles that may be deployed as part of a future multi-modal implementation plan. Within this study Equitable fare collection options for riders who are unbanked or do not have access to a smart phone/tablet has also been included to provide a holistic overview of integrating transit-complementary services to serve all.

MULTIMODAL STRATEGY

SARTA, NEORIDE, EZFARE OVERVIEW

Multimodal access to public transportation is focused on the various transportation platforms which meet diverse demands and get riders to and from bus stops, transit centers and other destinations. Disadvantaged individuals, such as the unbanked, underbanked, low-income, disabled, students, elderly, and other underserved populations in particular need access to diverse mobility options: microtransit, cycling or walking for local travel, public transit for longer distances, and ridesharing, taxis, or automobiles when necessary. In recent years, multimodal transportation is becoming even more important as Mobility as a Service (MaaS) platforms grow not only across the US but around the world to include but not limited to microtransit, ridesharing, car sharing, bicycling, and scooters. Of course, all riders do not use all transportation options, but communities need to provide options that fit the needs of all riders. The goal of multimodal transportation is to increase the use of public transportation by providing reliable, safe, and accessible services to riders under a single transaction with at least two modes of transportation. For transits to be successful in implementing their multimodal services, they need to have a clear strategy and plan in place that communicates they understand their riders and their individual needs.

Every week, thousands depend on transit for transportation across Ohio, Kentucky, and Michigan. NEORide, a council of governments, including membership of the sixteen regional transit agencies recognized there was a need to create a multi-agency travel solution making travel between agencies seamless. In 2019, NEORide was granted $3.3 million, by the Ohio Department of Transportation (ODOT) for the installation of Justride validators provided by Masabi to aid in providing transit riders a single payment system. The technology upgrade allows customers to use barcodes on their mobile devices, transfers, or tickets to pay for their fares. To expand on the innovative mobility project NEORide was also awarded $1.9 million by the FTA IMI grant to implement their single payment system EZfare to include stored value (prepayment), fare capping and smart cards. EZfare offers a free electronic fare payment app that enables users to purchase and use tickets across multiple transit agencies and many innovative mobility providers.

The integration of the Justride validators and EZfare payment system are two critical strategic elements of a successful multimodal transportation strategy. The first of many benefits include reduced boarding times for riders as well as operational demands on operators. The EZfare app allows integration across various payment options, stores tickets for easy and fast use, and allows for expansion of services across multimodal platforms. For any multimodal strategy to be successful, transit agencies need to develop systems that work across the population (i.e., unbanked, underbanked, low-income, disadvantaged, disabled, student, elderly, and other underserved populations). Understanding this, NEORide is also integrating a smartcard system that does not require riders to own a smartphone or have a personal bank account to use the system. Riders can purchase a SmartCard or agencies can give SmartCards to riders giving them access to transit.

The next strategic element for a successful multimodal strategy is dependable and reliable services. Riders need access to platforms where they can plan out their trips, modes of transportation, see schedules and plan trips either immediate or future. To date, NEORide has integrated the EZfare platform into Moovit, Uber and Transit, wide-reaching mobile apps for public transportation across North America. By integrating EZfare, customers will be able to plan and track trips through Moovit, Transit and Uber functionality and purchase fare too using the EZfare system. The JustRide validators are making the process even easier, as riders can scan mobile phones, tickets, and Smartcards alike.

CREATING MULTIMODAL NETWORKS USING INNOVATIVE MOBILITY OPTIONS

There is great potential for EZfare's expansion across the region to further coordinate transit ticketing and innovative mobility provider purchases, building upon integrations already completed with Moovit, Transit and Uber. Creating a multimodal network using mode planning and the modes profile shown in Tables 1 and 2 below is key to accelerating the adoption of more flexible and efficient mobility options. Understanding these factors helps to transition commuters into cleaner, lower-carbon modes while improving access and convenience. To encourage multimodal activity, adding options to create more points of access and modes of travel will aid in solving one of public transit's greatest challenges – first/last mile gaps. Expanding these services to include seamless fare payment integrations between services that will further increase ridership. Public and private stakeholders alike are developing first-of-its-kind partnerships and pilots to test these new technologies to create holistic multimodal networks.

MULTIMODAL TRANSPORTATION

Multimodal transportation refers to transportation planning that considers multiple modes of moving people and goods and how those modes can interact.[1] The basic premise of multimodal transportation is to plan around a diverse set of needs and to allow transportation offerings to be flexible in this regard. As such, multimodal transportation includes at least two modes of transportation for a trip and involves a level of optimization to needs. In essence, using multiple modes of transportation by connecting them to form a trip constitutes multimodal transportation. With improvements to multimodal systems and infrastructure planning and deployment, single mode transport is projected to fall out of favor. Riders benefit from having a variety of options from which to choose and ways to combine those different means of transportation.

Multimodal transportation systems serve a variety of needs for cities and are posed to grow in the future. In the Midwest, Indianapolis, Kansas City, and Columbus are all currently reinvesting in their transportation and urban centers in the form of the development of multimodal transportation systems. In cities without legacy mass transit systems, investing in and organizing around multimodal transportation presents an opportunity to improve mobility and economic activity.[2] Columbus, for example, is adjusting to account for growing population in Central Ohio Transit Authority's (COTA) service area and laying out creative solutions that offer improved access to transit and better service.

Citing transit stops that are far from key destinations, long wait times, and a lack of first- and last-mile options in some areas, Smart Columbus[3], a smart city and mobility initiative under the city government of Columbus that serves the Columbus Region, created the Multi-Modal Trip Planning Application and Common Payment System, giving riders a unique platform to plan and execute their trips in COTA service territories and surrounding areas. The application features smooth integration for planning trips across various modes of transportation In Kansas, the Mid-America Regional Council (MARC), a metropolitan planning

[1] Victoria Transport Policy Institute. *Introduction to Multi-Modal Transportation Planning*. (2020). Retrieved from https://vtpi.org/multimodal_planning.pdf
[2] Congress for the New Urbanism. *Midwest cities invest in transit.* (2019). Retrieved from https://www.cnu.org/publicsquare/2019/09/12/midwest-cities-invest-transit
[3] Smart Columbus, The City of Columbus. *Bringing Multi-Modal Trip Planning to the Columbus Region.* (2020). Retrieved from https://smart.columbus.gov/playbook-assets/multimodal-trip-planning---common-payment-system/bringing-multi-modal-trip-planning-to-the-columbus-region

organization (MPO) for the bistate Kansas City region, is promoting the creation of multimodal streets and systems, which comprise spaces that balance rider needs and support the development of the community.[4]

Today, multimodal mobility capacity exists in some cities, such as in Columbus, but is not yet common across the country. A multimodal trip in many areas today consists of using, for example, a personal bicycle and public transit to complete a trip. However, some areas are better suited to this than others and trip-planning is not yet smoothly integrated. As multimodal transportation and mobility grows and cities redesign urban and suburban centers to support it, agencies can facilitate multimodal planning by consolidating modes into one single centralized activity. As an example, one can plan, pay for, schedule, and track a trip from home to work that combines private car, bike-sharing, and public transit all in one user experience. The future of this type of planning is a geospatial and technological integration. Cities, such as those listed above, are being redesigned to support such travel and where the trip-planning software and interfaces are smooth and consistent, where multiple modes become one unified trip.

Multimodal transportation planning includes integrated institutions, networks, stations, user information and fare payment systems. Planning should consider all significant impacts including:

- Congestion
- Infrastructure Costs
- Parking Costs
- Customer Safety
- Land Use Impacts
- Special Considerations for Handicapped
- Energy Use
- Pollution Factors
- Equity Impacts
- Health and Wellness
- Community Improvement
- Universal Designs for All

COMMUNITY TRANSPORTATION NEEDS ASSESSMENT (CTNA)

To determine which modes are best suited to fill first/last mile gaps, conducting a community transportation needs assessment (CTNA)[5] will highlight challenges and opportunities for improvement based on end user experiences. It is critical the CTNA be completed before beginning to evaluate and engage mobility providers. A comprehensive market analysis taking into considerations listed in Table 1: Multimodal Planning Factors, user surveys, and outreach activities will allow value-driven parameters to guide modal and provider selection. Creating rider profiles and use-case typologies will further aid in evaluating appropriate vehicle types and service features. For example, if the first/last mile distance is under 3 miles, micromobility, which is defined as transportation using lightweight vehicles such as bicycles or scooters. This is especially electric ones that may be rented as part of a self-service rental program for short-term use. A town or city is naturally a top candidate for this trip type, if the identified population to be served are under-18 students and seniors, other modes may be explored to accommodate these groups. CTNA surveys will solicit feedback on other features to be implemented in such as operating model, alternative payment methods, and incentives.

[4] Mid-America Regional Council. *Complete Streets Handbook.* (2018). Retrieved from: https://www.marc.org/Transportation/Special-Projects/assets/Complete-Streets-Handbook-2018-web.aspx

[5] Clean Mobility Options (CMO). *Data Collection Guide for Community Needs Assessment.* (2019). Retrieved from: https://www.cleanmobilityoptions.org/project-development-tools/

Table 1: Multimodal Planning Factors

Feature	Description	Performance Indicators
Availability	Times of service	• Geographic coverage • Daily hours of service • Hours of service
Frequency	Average wait time	• Operating frequency • Headways (time between trips). • Average waiting times
Travel Speed	Speed to reach next destination	• Average vehicle speeds • Door to door travel time
Reliability	Keeping to an on-time schedule	• On-time operations • Down time frequency
Boarding/Unboarding Time	Vehicle loading and unloading speeds	• Dwell times • Boarding and unboarding time frames
Safety	Perceived passenger safety	• Accident rates • Reported incidents • Absence of issues
Price/Affordability	Fare options, prices, and ease of purchase	• Fares relative to average incomes • Payment options • Fare purchase accessibility
Integration	Ease of transferring between modes	• Quality of connections between modes • Quality of connections between transits
Comfort	Rider comfort	• Seating availability and quality • Space • Air quality • Cleanliness • Creature comforts
Accessibility	Ease of accessing platforms	• Distance between stops and destinations • Walkability
Baggage Capacity	Accommodations for baggage	• Ability to stow baggage
User Information	Ease of obtaining user information	• Availability and access to route planning, schedule, and fares
Attractiveness	Condition of facilities or vehicle platform	• Attractiveness vehicles or facilities • Marketing that draws in customers
Marketing	Encouraging public usage	• Popularity of promotional programs • Effectiveness at improving quality of life • Increased ridership

MODE TYPOLOGIES

The rapid pace of development and increased competition are driving forces of disruptive transportation innovation. This has led to not only more multimodal options, but also variations within core modes typologies: bike/scooter share, carshare, rideshare, car/vanpool, and microtransit. The great variety of available options allows transit agencies to be highly selective and the ability to provide localized solutions. New terms to describe these services have emerged in recent years. While some may sound similar and have been used interchangeably, there are clear distinctions between each.

MICROMOBILITY: BIKES AND SCOOTERS

The term micromobility has become part of the public consciousness in recent years due to the swift introduction of shared bike and scooter services beginning in 2017. Micromobility refers to fleets of small, low-speed vehicles (primarily bikes and scooters) for personal transportation, which can be either human powered or electric. There are also varying operating models and trip end processes which include docked/station-based, dockless/free-floating, or lock-to (using a provided cable to lock the asset to a designated fixture such as a public bike dock). Bikes and scooters are low impact and convenient options for trips between 1-3 miles. These modes are best suited for built environments with safe pedestrian and bicycle infrastructure, including well lit-streets and bike lanes. Density should also be considered to determine potential utilization and how that may impact fleet size and operating model. Although the industry is striving towards making micromobility Americans with Disabilities Act (ADA) accessible, options today are still limited. In the future, improved ADA compliant vehicles may include three or four-wheeled bikes to aid with balance or scooters with wheelchair-attachment capabilities.

VEHICLE BASED SERVICES

Vehicle-based services include carshare, rideshare, microtransit and car/vanpool. While the operating model of each varies, vehicle-based options are suited for longer trip distances of 5 miles+, multiple passengers, and goods movement.

CARSHARING

Carsharing is operated by the user and is available in a variety of models including B2C (business-to-consumer), B2B (business-to-business), P2P (peer-to-peer) and not-for-profit. The main distinction between the models is the fleet owner and end user. B2C is a private fleet operator renting to consumers, B2B is a private fleet providing vehicles to a fixed population like corporate fleet or residential amenity, P2P are vehicle owners renting their personal vehicles, and while non-profit operators are less common, they were among the first carshare operators. Within these business models are also a variety of operating models, including station-based and free-floating.

RIDESHARING VS MICROTRANSIT

While ridesharing and microtransit are both operated by drivers, ridesharing typically relies on gig economy labor while microtransit typically employs their drivers directly or subcontracts with a fleet management vendor. The gig economy is comprised of short-term freelancers with no geographical boundaries in proximity to those that are

employing them.[6] The key distinction between the two is that microtransit, also known as demand responsive transit, supports high-capacity passenger movement while ridesharing is typically single occupancy vehicle (SOV) trips. Although carpooling is a feature available through ridesharing platforms, the total maximum passengers is limited in comparison to maximum capacity for microtransit vans. In upcoming years, more zero emission vehicles (ZEVs) models will be available for vehicle-based services. To accelerate the transition of shared vehicles to ZEVs, more charging infrastructure availability continues to be a barrier to support daily fleet operations.

CARPOOL VS VANPOOL

Carpool is operated by a private vehicle owner using their own car, while vanpool is typically coordinated and administered by a public agency, business district, or workplace. Vanpooling programs typically lease and make the vehicles (minivans or passenger vans) available and participants share a monthly fee that covers the vehicle cost, insurance, maintenance, and gas. Both carpool and vanpool are suitable for trips 5+ miles in less dense cities that are typically auto dependent.

Table 2: Multimodal Profiles

Mode	Description	Speed	Pass Capacity	Costs	Potential Users	Challenges
Walking	to advance or travel on foot at a moderate speed	2-5 mph	1-3	Low	Most able individuals	Handicapped and limited mobility
Bicycle	to advance or travel on a 2, 3 or 4 wheeled pedal or electric drive	5-15 mph	1-5	Medium	Most able individuals	Handicapped and limited mobility Requires bicycle and ability. Limited distance and carrying capacity.
Taxi	to travel by car payment by distance	20-75 mph	1-14	High	Most able individuals, in urban areas	Costs and availability
Fixed Route Transit	to travel on a predetermined route	25-45 mph	1-100+* **light rail*	Medium	Most able individuals	Limited availability
Paratransit	to travel on-demand for ADA	25-65 mph	1-14	Low	Most able individuals	Limited service

[6] Forbes. *Why The Gig Economy Will Drive The Future of Employment.* (2020). Retrieved from https://www.forbes.com/sites/forbescoachescouncil/2020/03/27/why-the-gig-economy-will-drive-the-future-of-employment/?sh=154d82754f52

Microtransit	to travel on-demand for public	25-65 mph	1-15	Medium	Most able individuals	Limited Service
Automobile	to travel by passenger car	25-75 mph	1-9	High	Most able individuals	Costs and insurance. Requires driving ability and automobile.
Ridesharing	to travel by mobile request for rides	25-75 mph	1-8	Medium	Most able individuals	Approved Service Areas. Requires cooperative motorist. Chauffeuring (special trips) require driver's time.
Carsharing	to travel by vehicle that is rented	25-75 mph	1-6	Medium	Most able individuals	Affordability and convenience. Requires convenient and affordable vehicle rentals services.
Scooter	To travel by 2-4 wheeled standing or seated manual or electric platform	5-15 mph	1	Low	Most able individuals	Handicapped and balanced challenged

'AS-A-SERVICE' MODELS

Technology based services have created new ways to approach transportation demand management (TDM). Of these models, Transportation as a Service (TaaS) and Software as a Service (SaaS) are quickly growing in popularity and are being tested in a variety of environments nationwide. When considering integrating TaaS or SaaS, like conducting the CTNA to determine modal selection, a resource analysis should be completed to determine which model best complements existing operations.

TRANSPORTATION AS A SERVICE (TaaS)

TaaS refers to a turnkey solution in which vehicle procurement, backend software, operations, and overall management are covered by the mobility provider. TaaS is well-suited for transit agencies that are not interested in being owner-operators of additional assets and prefer to manage a vendor or mobility provider providing turn-key operations. The mobility provider will purchase, register, insure, and maintain fleet vehicles. Workforce, including drivers and service technicians, are recruited, and managed by the providers. Software, the digital infrastructure enabling these services for operations, may include the user app, trip routing algorithms, and integrated payment solutions.

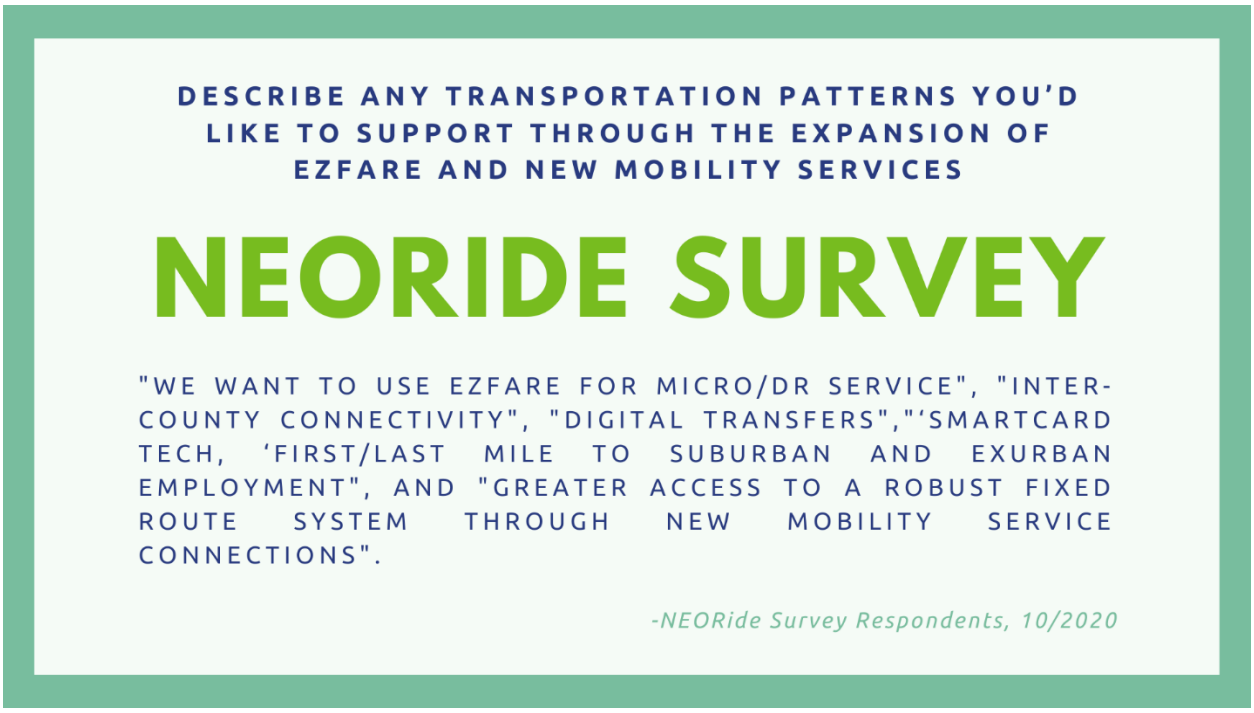
SOFTWARE AS A SERVICE (SaaS)

SaaS provides access to backend software and digital services only; the mobility provider does not engage in fleet operations. SaaS is a preferable option for transit agencies seeking to directly own and operate their own fleet. In this scenario, transit agencies are responsible for their own vehicle procurement, fleet management and staffing. The onus of all operations

falls on transit agencies and the software alone is provided by and outside vendor to support smart trip booking, routing, and payments.

NEORIDE AND MULTIMODAL TRANSPORTATION

A survey administered by CALSTART to NEORide transit partners October 2020 yielded 12 responses from 10 out of the 11 member transit agencies participating in the IMI Grant. The survey was designed to gain insights into the top challenges for transit, characteristics of first/last mile gaps, and mobility services that may have the most impact on the existing transportation networks. The survey results provide an understanding of how multimodal transportation and improve transit by means of distinct challenges related to public transit availability and wait times, particularly travel to and from work.



In response to the question, 'Please describe any transportation patterns or trends you'd like to support through the expansion of EZfare and new mobility services', respondents provided written comments including '*we want to use EZfare for micro/DR service*', '*inter-county connectivity*', '*digital transfers*', '*smartcard tech'*, '*first/Last Mile to suburban and exurban employment*', and '*greater access to a robust fixed route system through new mobility service connections'*.

An analysis of key takeaways from the survey against available mode types highlighted potential value of one typology across all agencies, microtransit. The following Technology Assessment provides an analysis of what microtransit is and why the flexible on-demand service is a top candidate for the region. Survey responses highlighted strong use-cases and scenarios in which microtransit is positioned to be a preferred solution. Below is a sample of questions and survey responses.

The full survey and results can be found in Appendix C, a sample of survey questions are responses are below:

- **In your opinion, what is the primary transportation/mobility challenge for traveling through your county's downtown core?**
  - 50% Limited public transit availability (ex: nights, weekends)

- **In your opinion, what is the primary transportation/mobility challenge for traveling through your county's residential areas?**
  - 42% Public transit wait time

- **What do you perceive as a challenge for public transit riders adopting new mobility options, such as bikesharing?**
  - 83% High percentage of private car ownership

- **Which services are currently available in your county? (Select as many as apply)**
  - 92% Paratransit
  - 75% Rideshare (Uber, Lyft)
  - 41% Microtransit
  - 16% Scooter/bike/carshare
- **Which new mobility services do you believe would have the biggest impact in your operational area?**
  - 67% Microtransit

- **Has your agency considered bringing any new mobility services (bike/scooter/carshare, microtransit) in-house, assuming the role of owner/operator?**
  - 50% Yes
  - 42% No

- **Based on ridership data, which first/last mile trip distances have the greatest need to be supported by new mobility services?**
  - 55% 1-5 miles
  - 27% < 1mi.
  - 18% >15 mi

- **Based on ridership data, which use-case categories are the best candidates to be supported by innovative mobility?**
  - 75% Travel to and from work

- **Are there any existing services which new mobility services may be used to improve?**
  - 58% First/last mile connectivity to public transit

DEPLOYMENT STRATEGIES

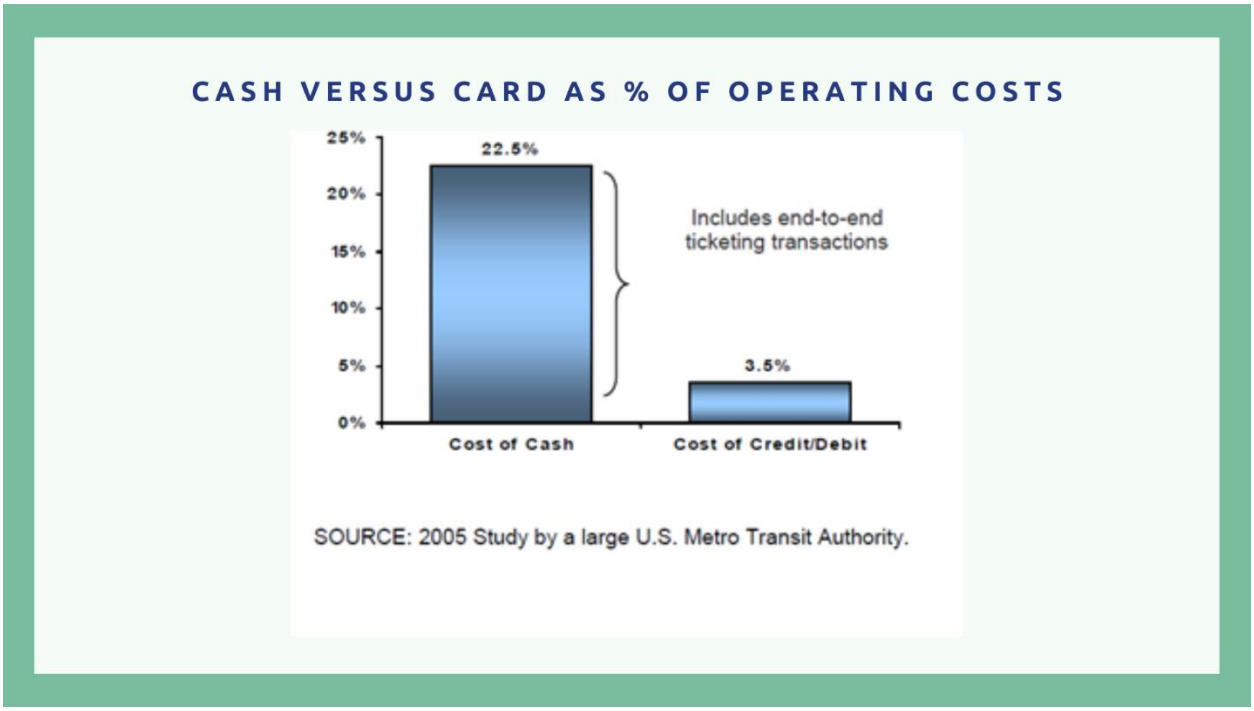
As industry operators and technologies are frequently shifting, the deployment strategy should be approached as a working evaluation process. Taking stock of the proposed

municipality's current state of play is essential to inform operating area locations, modes, and operating models, as well as features to meet local needs. The agencies should begin by completing market analysis, CTNA, and evaluating current resources. This will shape the goals, objectives of the service, and operational parameters. The pros and cons of different modal typologies, TaaS versus SaaS, vehicle technologies, and payment options will emerge as insights are learned through the comprehensive evaluation process.

After completing a comprehensive analysis, transit agencies interested in deploying innovative mobility options should request demonstrations directly from providers. Building baseline knowledge of available technologies will help to inform a Request for Information (RFI) or Request for Proposal (RFP) for mobility providers.

As highlighted in Integrating with Microtransit Providers in the Technology Assessment, one of the great benefits of technology-based services is flexibility and the ability to customize. If the transit agency seeks to implement features, such as EZfare payment integration, providers often can work collaboratively with transit agencies to modify their products. If not already available, feature requests should be highly considered by the provider or planned for in the next development phase for availability in future developments. As described in Integrating with Microtransit Providers, while integrations with Masabi, EZfare, and SmartCards are possible, backend development and hardware investment are typically required to make compatible platforms. Associated costs for development are determined by the provider based on time and complexity of development.

Beyond knowledge building of product capabilities and features, the transit agency's resource evaluation will illuminate which operating models are best suited to complement the agency's existing operations. The variety of options described in Integrating with Microtransit Providers illustrates the range of software, asset management, and payment options that are available today.



When considering implementing new fare payment options, the agency should also consider transactions costs of cash versus digital services. According to a report published by the Federal Reserve Bank of Boston in 2008, alternatives that can reduce the amount of cash received in fare collection systems was a top consideration as transit agencies explored transitioning to digital payments. The report advised although quantifying savings opportunities is difficult given the proprietary nature of certain information, one study conducted in 2005, which examined the costs and benefits of introducing a regional contactless fare card system, showed that moving from cash- to electronic-based collections can result in up to a six-fold reduction in aggregate operating costs.

Introducing more innovative mobility options not only improves the user experience but is a cost-effective payment collection method for transit agencies.

TECHNOLOGY ASSESSMENT

TECHNOLOGY ASSESSMENT

WHAT IS MICROTRANSIT

Microtransit is a new and emerging means of demand-response transportation. SAE International[7] has broadly defined the term as a privately or publicly operated, technology-enabled transit service that typically uses multi-passenger/pooled shuttles or vans to provide on-demand or fixed-schedule services with either dynamic or fixed routing. It is a transportation option that exists at the intersection of fixed-route transit and ride-sourcing options. The role of microtransit is adaptive to consumer needs and seeks to make public transit more accessible in an affordable and highly individual way. Microtransit can be thought of both as a part of multimodal transportation and a standalone option that brings public transit directly to the riders that need it. It stretches the service territory, responds to demand, and streamlines scheduling, in addition to increasing access to other modes of transportation, as it is a first- and last-mile and short trip service.

Riders enjoy on-demand service, reduced wait times, and availability during times of day that were not previously provided. As Integrating with Microtransit Providers describes in detail, there are a variety of ways to design, operate, and ride microtransit. A rider will typically request a ride/reserve a seat and pay for the trip in-app. Route optimization algorithms determine where and when the rider should meet the microtransit vehicle, making the trip efficient for all.

WHY MICROTRANSIT

Microtransit represents an innovative approach to revitalize ridership of public transportation services. KPMG's Accelerating Mobility Study found that in the last decade, public transportation ridership has declined by nearly 5%, featuring a 15% decline in bus ridership.[8] Persistent, year-over-year decline in transit ridership is a strong indicator that the industry requires change and adaptation. Microtransit improves mobility and transit ridership by improving access and coverage. In fact, microtransit widens the coverage area and brings more riders into fixed routes in addition, using lighter vehicles on more rider-friendly routes lowers costs, which should also have a positive effect on ridership.[9] Revitalizing ridership and constructing new modes of moving people and linking them to other transit offerings will altogether create a more robust transit network. This stronger transit network will aid in economic development when compared to flat ridership and current spending levels.[10] Investment into microtransit presents an opportunity to propel forward the transportation industry and the economy as transit providers are faced with declining ridership, as a way to improve the system and boost ridership. Put another way, microtransit is an opportunity to

[7] Surface Transportation Recommended Practice, SAE International. *SAE J3163™, Taxonomy and Definitions for Terms Related to Shared Mobility and Enabling Technologies*. Retrieved from https://www.sae.org/standards/content/j3163_201809/

[8] KPMG. *Accelerating mobility: Optimizing transit in response to rapid disruptions in technology and consumer behavior*. (2019). Retrieved from https://institutes.kpmg.us/manufacturing-institute/articles/2019/accelerating-mobility-optimizing-transit.html

[9] American Public Transit Association. *The Delicate Balance of Microtransit: Service vs. Efficiency, or Transformational Opportunity vs. Just the Latest Fad?* Retrieved from https://www.apta.com/wp-content/uploads/PT_081919_Microtransit-in-depth_reprint-002.pdf

[10] Economic Development Research Group, American Public Transportation Association. *Economic Impact of Public Transportation Investment: 2020 Update*. (2020). Retrieved from https://www.apta.com/research-technical-resources/research-reports/economic-impact-of-public-transportation-investment/

investigate and invest in services that can strengthen public transit networks and, in turn, improve societal outcomes.

With transit ridership on the decline and transportation technology solutions evolving rapidly, the time is now to evaluate the types of mobility modes available to the industry. Competing with on-demand transportation startups and the comfort of one's own private vehicle, public transit services must attract consumers by considering their preferences. These preferences may be based on travel costs, comfort, and travel time; each varies with age, sex, and income.[11]

Microtransit aims to be an improvement on existing means of transportation by making it more accessible and on-demand for those who would like to use it. For example, some people that can afford to use Uber and Lyft, may not physically be able to use it. In other cases, transit may be available, but it is just out of reach in terms of distance or accessibility. Microtransit meets the on-demand transportation needs and can do so in a straightforward manner using fare payment systems like EZfare that uses a smartphone or web-based application. More importantly, microtransit is simple and easy to implement and deploy. Agencies such as Sacramento Regional Transit District, the Alameda-Contra Costa Transit District, and the City of West Sacramento in Northern California[12], LA Metro in Southern California[13] and the Utah Transit Authority[14], are some of the few that have begun to deploy microtransit.

Jaron Robertson, director of innovative mobility solutions at Utah Transit Authority (UTA), praised the service's flexibility to changes that may come up (Davidson, 2020). LA Metro is also having success has decided to expand its microtransit pilot program.[15] The technologies are user-friendly and use mobile apps as a primary option (with alternatives for those riders without smartphones) makes for easy payment and booking on the consumer side. It is also easy to employ on the agency side, as most of the technologies already exist and one can adjust and adapt systems to changing needs, as schedules and routes are subject to variation. In effect, by focusing on the demand of individuals that make up a greater collective, microtransit affords both consumers and agencies improved flexibility. Simple and easy-to-employ technological solutions can begin to address ridership decline in the public transportation industry and improve riders' experiences, and therefore deserve increasing attention. Microtransit is therefore another tool that emphasizes—by nature—access and ease-of-use for riders of public transit.

MICROTRANSIT BENEFITS

The goals of microtransit are to provide distinct benefits to three unique groups: the riders, the public transportation providers, and society. That is, according to the Local Government

[11] Frontiers in Psychology. *Consumer Behavior in the Choice of Mode of Transport: A Case Study in the Toledo-Madrid Corridor* (2017). Retrieved from. https://doi.org/10.3389/fpsyg.2017.01011

[12] Local Government Commission. *Microtransit: Right-sizing transportation to improve community mobility*. (n.d.)Retrieved from https://www.lgc.org/newsletter/microtransit-right-sizing-transportation-to-improve-community-mobility/

[13] The Source (Los Angeles County Metropolitan Transportation Authority). *Update on the MicroTransit pilot project.* (2018). Retrieved from https://thesource.metro.net/2018/10/17/update-on-the-microtransit-pilot-project/

[14] The Salt Lake Tribune. *UTA's 'microtransit' experiment working well, offers flexibility during COVID-19 outbreak.* (2020). Retrieved from https://www.sltrib.com/news/2020/04/09/utas-microtransit/

[15] LA Metro. *LA Metro Board of Directors Approves Creation of Innovative New MicroTransit Pilot Project*. (2020). Retrieved from https://www.metro.net/news/simple_pr/la-metro-board-directors-approves-creation-innovat/

Commission, microtransit is a mobility option that aligns with environmental, social, and economic objectives, promoting efficiency and equity while maintaining convenience.

Riders benefit from microtransit in increased accessibility, safety, and convenience. In many ways, microtransit fills a vacuum of public transit by providing first- and last-mile access to transit stops and regional hubs where parking and alternative means of transit are sparse, as well as demand-response transportation to all destinations within the transit operating region. In this way, microtransit addresses unequal access to public transit offerings; by providing innovative and affordable solutions to first- and last-mile trips, microtransit opens public transit options to people who could not reach them easily or reliably before. In addition, microtransit can improve rider wait time. Through interventions including the installation of easy-to-use technology fare payment technology such as EZfare or simply by increasing microtransit offerings in an area, riders can minimize the amount of time they spend waiting on trips or traveling in transit. In addition to wait time, microtransit improves safety and affordability, giving people the ability to use public transportation in a secure and convenient way.

Illustrative examples of microtransit simplicity and convenience is the service offered by Via in Los Angeles, as part of LA Metro's microtransit pilot, and in Utah, as part of UTA's Southern Salt Lake County Authority's pilot.[16] Through a smartphone app or landline, one can quickly request a ride and any special assistance that may be necessary (i.e., wheelchair assistance, mobility assistance). Once booked, riders are prompted with their expected wait time, the vehicle/driver information for their trip, and can easily track the current location of their driver and their ride on a map. They can also see drop-off time and location. In addition, at LA Metro locations, signage indicates where to wait and meet your vehicle.[17] Overall, the service is very streamlined and responsive to individual demand. In January 2020[18], LA Metro and Via announced they will receive $2.2 million in funding for a six-month service extension, with the option for a second six-month renewal at $2.7 million. Service hours will also be expanded, including the introduction of weekend service. According to Via, in its first year of service beginning in January 2019, more than 75,000 rides were provided, exceeding overall goals for rides per week, rides per driver hour, wait time and customer satisfaction, with an average score of 4.85 out of 5 stars. More than 1,000 riders used Via's call-in center, indicating that people without smartphones are using the service. The service provided more than 800 rides to passengers requiring special assistance or wheelchair accessibility at roughly a third of the cost to taxpayers of a traditional Access Services ride.

Microtransit aims also to benefit the public transportation industry through this increased ridership and increasing access to potential riders that now become riders because they have a means to get to the bus stop or to a personalized location of choice. By resolving issues of access and safety, microtransit incentivizes public transit services that were once out of favor. Increased ridership means improved revenue for transit agencies, as well as a clear sign that the transit agency is providing a mobility service for the public that the public can depend on and experience the benefits.

Finally, society benefits more broadly from microtransit improving ridership as well. By emphasizing first- and last-mile trips and connecting riders with existing public transit

[16] UTA. *UTA on Demand by Via.* (2019). Retrieved from https://www.rideuta.com/Services/UTA-on-Demand-by-Via

[17] LA Metro. *Ride with Via – How to Ride*. (n.d.) Retrieved from https://www.metro.net/projects/mod/

[18] Mass Transit Magazine. LA Metro and Via Announce Extension and Expansion of Shared Ride Service. (2020). Retrieved from https://www.masstransitmag.com/alt-mobility/shared-mobility/car-sharing/press-release/21122780/los-angeles-county-metropolitan-transportation-authority-metro-la-metro-board-approves-extension-expansion-of-rideshare-pilot-partnership-with-via

offerings, people are more likely to take advantage of those offerings, especially if they are cost-effective compared to driving or using personal vehicles for the entire trip. As such, microtransit can also decrease congestion on roads, as people have cost-effective and safe alternatives. In addition, microtransit can decrease congestion by allowing the public to share vehicles for their first- and last-mile or short-distance trips, which in turn also frees up parking around and at local transit hubs and popular destinations. Lastly, microtransit serves in-need populations for whom fixed-route transit options are difficult to use, such as seniors and families with school-aged children. Microtransit allows them to access the routes that work for them and do so in a manner that is both affordable and easy to use.

MICROMOBILITY'S ROLE IN THE OVERALL TRANSIT NETWORK

Micromobility, as previous sections illustrate, is another quickly growing means of transportation based on giving riders on-demand access to, typically, small, low-speed vehicles such as bikes and electric scooters. Based on the basic nature of micromobility, it is best suited for situations where a rider has short distance needs and requires the greatest flexibility to meet their immediate needs. In certain settings, such as a crowded downtown center, a high-traffic area of a city, or other contexts where congestion and density are high, micromobility can be a favorable option in allowing individuals to leave their cars behind. In many instances, using a car appears necessary but comes with its own drawbacks such as finding parking and dealing with high congestion. Micromobility solutions make it easier to no longer need the car in those situations.

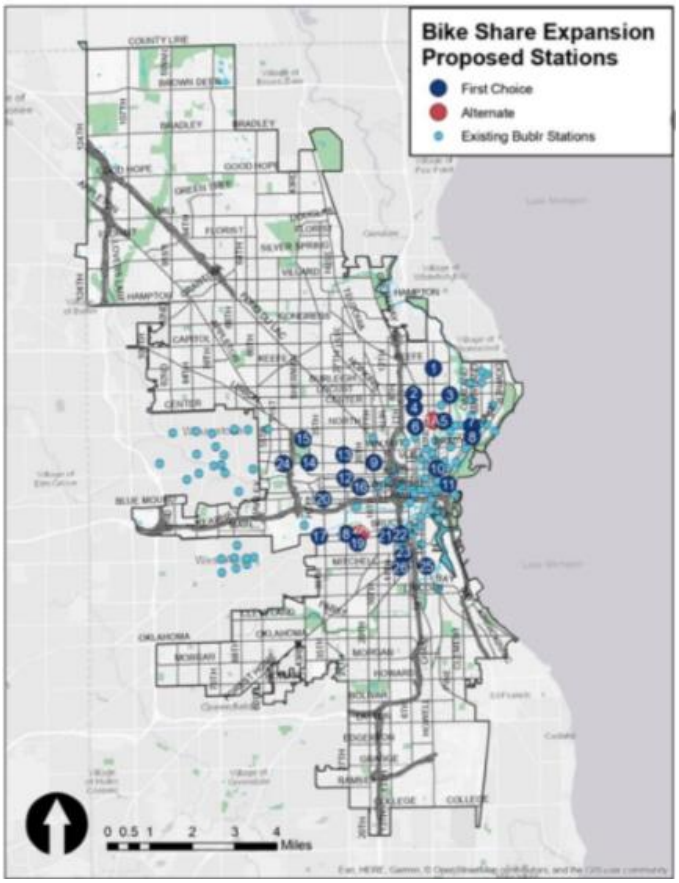
Micromobility works by extending the perimeter of the destination or origin, as it is ideal for first- and last-mile trips. As a result, riders can use micromobility options to fill in the gap between the location and other transportation means. For example, when commuting in a dense urban area a rider's workplace is between one and three miles from the closest bus stop, which may feel too far for an everyday walk. However, the rider might not want to drive because of the cost, their inability to drive, congestion, or difficulty to find a parking space. The result is a situation where the rider must choose between a significant walk, the hassle of bringing another mode of transportation such as a bike onto the bus or paying for/searching extensively for parking. Micromobility options make it easy to plan a trip from A to B and everywhere in between when walking or other options are not favored as it provides a link between the destination and where the other transportation lets off (or where the rider could feasibly park).

There has been an explosion of micromobility offerings in recent years. In 2018, for example, e-scooters and e-bikes came into the mainstream and each quickly amassed millions of annual rides.[19] Station-based bike-share systems and e-scooters each had over thirty million rides in 2018 alone. This growth continued in 2019, before the trend was reversed by the effects of the coronavirus pandemic. However, despite the effects of the pandemic, McKinsey & Company projects that micromobility is here to stay and will continue to grow as the effects of the pandemic on travel behavior wear off.[20]

[19] National Association of City Transportation Officials (NACTO). *Shared Micromobility in the U.S.:* (2018). Retrieved from https://nacto.org/shared-micromobility-2018/

[20] McKinsey & Company Automotive & Assembly. *The future of micromobility: Ridership and revenue after a crisis.* (2020). Retrieved from https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/the-future-of-micromobility-ridership-and-revenue-after-a-crisis

The micromobility field, being so novel, has seen the emergence of many new actors and companies. For e-scooters, Lime, Bird, Jump (acquired by Lime from Uber this year[21]), Lyft, and Spin are just some of the main actors in this area according to NACTO. However, micromobility is not limited to these companies or to start-ups. Local governments have launched their own micromobility programs, such as the LA Metro Bike Share program. Riders are able to pay for multimodal transportation using TAP cards, a fare payment system using a pre-loaded card currently used for Metro transit, or with debit, credit, or prepaid card used throughout LA County, as they would for other LA Metro services such as the metro train. Riders gain access by simply enrolling in the Metro Bike Share through the TAP website.[22][OBJ]



Unlike California, Midwest markets must plan their micromobility around all four seasons and especially colder conditions. To date many have been successful in implementing micromobility that programs including Cincinnati. Ohio. Milwaukee, Wisconsin, Rochester, Minnesota, and Oklahoma City, Oklahoma. Cincinnati has implemented a non-profit bike-share program named Red Bike[23] which offers at least 425 bikes and 57 stations from which riders can access and rent the bikes from. Their bikes offer an electric solution with a 400Wh battery pack. The mission of this service is to provide low cost, healthy, and no emission transportation solution. A solution that provides for a connects the community. What is unique about the Red Bike solution is the offer a paid subscription membership for unlimited 2-hour rides for 365 days a year. This is offered through local businesses and organizations. In Milwaukee, the city partners with Bublr Bikes, Milwaukee's nonprofit that runs the bike-share program in the city and surrounding area, with at least 250 bikes and at least 89 stations[24] from which to rent them. To ensure their riders safety the bikes are equipped with front and back flashing lights. A similar program, Spokies, exists in Oklahoma City.[25]Spokies offers 8 stations and 25 dockless from which riders can rent Trek bicycles. These bicycles offer 3-speed internal hub, safety components such as reflectors and front and rear brakes and Global Positioning System (GPS). In Rochester, this is an example of a smaller city's ability to implement a bike-sharing program that includes cargo bikes located across

[21] The Verge. Lime squeezes $170 million from Uber and Alphabet as scooter-sharing plummets under COVID-19 https://www.theverge.com/2020/5/7/21250420/lime-funding-uber-deal-alphabet-scooter-jump-bike

[22] LA Metro. *FAQ. Metro Bike Share.* (2018). Retrieved from https://bikeshare.metro.net/how-it-works/faq/

[23] Cincinnati Red Bike. About Us, (2020). Retrieved from: https://www.cincyredbike.org/about#aboutus

[24] City of Milwaukee Department of Public Works. *Bublr Bikes.* (n.d.) Retrieved from https://city.milwaukee.gov/mpw/infrastructure/MilwaukeebyBike/Shared-Mobility1/Bublr-Bike-Share

[25] Spokies. *About Spokies.* (2020). Retrieved from https://spokiesokc.com/about.html.

various that began in 2016. [26] [27] Here even though the bikes are available from the start of May through mid-October and are free of charge they found that half the bikes were not being used. They assessed the market and adjusted the number of bikes available from 200 to 100, while ensuring the solution met their rider's needs. Rochester also offers Lime e-scooters as another micromobility option for riders. The growing micromobility market is well suited to using a wide range of vehicle technologies and across various environments, from e-scooters to bike-sharing, from large cities to small. All it takes is proper planning, assessment, and implementation to meet the needs of riders and to ensure successful deployments.

MULTIMODAL EZFARE INTEGRATION

The introduction of EZfare to NEORide public transit systems is a significant improvement to ridership experience. The added flexibility, convenience, and streamlined payment process now available through Mobility as a Service (MaaS) platforms is possible through innovative public-private partnerships. Centralizing payments into a single platform may seem like a simple task, however it requires significant development and engineering to make such digital integrations possible. Service providers, transit agencies, and mobile ticketing platforms must work together to make backend systems compatible to create seamless frontend experiences.

In 2019-2020, NEORide launched landmark partnerships with MaaS pioneers, Moovit, Uber and Transit. Fare Payments as a Service (FPaaS) is now available through Moovit, Uber Transit Ticketing and Transit for riders of all NEORide member agencies. These apps offer features including in-app payments and trip routing/planning. Ben Capelle, Board President of NEORide and CEO of Laketran, has remarked that the integration of a public transit option into the Uber app can help people realize the benefits of public transit as an option. In this same light, including multiple transit options for people in one uniform app has the potential to improve access, increase use, and benefit both riders and transit providers. In December 2020, Denver Regional Transportation District (RTD) and Masabi launched mobile ticketing through Lyft, meaning integrating with NEORide members may be possible in the short to mid-term future. Lyft, in addition to offering its initial service of ridesharing, now offers bike/scooter share, carshare, and transit fare purchasing; creating a centralized location for users to access a suite of mobility services that caters to a wide variety of needs and use-cases.

Building on the successful integrations with Moovit, Uber, Transit, and Lyft, the next wave of digitizing and upgrading NEORide's mobility services includes expanding to other transportation mode typologies. Coordinating a holistic multimodal network can be achieved by creating a centralized source to access and pay for a variety of services. In practice, riders can use a single app to choose from a menu of mobility options, plan their route, and pay in-app. In an ideal scenario a rider opens an app to see all available mode options in real-time including bike/scooter share, carshare, microtransit, and car/vanpool. The live app displays available inventory across all providers and proximity to current location. The app accesses real-time transit information to show route options for all modes. Based on real-time availability and access to information, the rider is empowered to choose which mode best suits their needs in that moment. To facilitate connections to public transit, riders may either

[26] City of Rochester *Rochester Bike Share Program*. Parks & Recreation. (n.d.) Retrieved from https://www.rochestermn.gov/departments/parks-and-recreation/activities-classes/bike-share

[27] City of Rochester. *Micro-Mobility*. Retrieved from https://www.rochestermn.gov/departments/community-development/sustainability/micro-mobility

show their payment confirmation for free transfers or have total trips across all modes deducted from a monthly transit pass.

Variations of these integrations are available on the market today. Transit has the capability to integrate payment and trip planning with transit agencies, micromobility operators, carshare operators, microtransit and rideshare companies.[28] Through the Lyft app, users can complete a rideshare trip, use bike/scootershare via Lyft-subsidiary Motivate, complete a carshare trip via Sixt, and view route planning for local public transit. Lime recently integrated Wheels, a shared electric bike startup, so users may select a Lime, Wheels, or (recently acquired) Jump device for their trip.[29] Lime users can also access trips through Uber's app, which also includes ridesharing, food, and grocery deliveries.

EZfare is a one-stop solution for paying for using, storing, and managing transit tickets and as it becomes compatible with more MaaS platforms for trip-planning and tracking, exploring how this can be applied to complete payments for other modes is a natural next step. In Dayton, Ohio the Greater Dayton Regional Transit Authority (RTA) launched Tapp Pay, a mobile fare payment system in partnership with Transit and Masabi. Passes can be activated and visually validated by the bus driver from a safe distance, which also speeds up the boarding process and limits issues at the fare box, Greater Dayton RTA officials said. Passengers can purchase both regular and reduced-fare passes using Transit and store their purchases in a wallet inside the app for later use.[30] Equitable payment options for unbanked and riders without access to smart phones or tables also require consideration. As with EZfare, stored value (prepayment) and smartcard capabilities would allow everyone to access their transit options in an integrated and easy way, regardless of digital barriers.

Developing a multimodal strategy that addresses seamless and equitable payments requires evaluating not only mode types, but also backend integration capabilities. Although the industry is moving in the direction of single-source services, these types of integrations are relatively new. While there are mobility providers that are equipped to do this, many are in the early phases of developing these technologies. NEORide is a pioneer leading the nation in regional, integrated fare collection. To better understand how to expand EZfare and equitable payment options to other modes, an analysis of Masabi and three leading microtransit providers illuminate the types of integrations that can be realized today.

MASABI FARE PAYMENTS AS A SERVICE

Masabi is a global leader in developing mobile ticketing systems for public transportation companies. The company has a range of products for electronic ticket and fare collection, allowing users to buy tickets by app and the fleet operator to validate tickets by mobile phone.

Expanding EZfare to other mode typologies and MaaS providers is a core component of the work being performed under the IMI grant. As a prerequisite, NEORide agencies will activate Stored Value Accounts (SVA), which also enables agencies to adopt Account-Based Ticketing

[28] Transit. Mobile Payments. (n.d.) Retrieved from https://transitapp.com/partners/payments

[29] The Verge. Lime adds Wheels shared e-bikes to its app as it seeks to become a one-stop shop for mobility. (2020). https://www.theverge.com/2020/10/8/21506805/lime-wheels-app-integrate-scooter-bike-mobility

[30] Mass Transit Mag. *Dayton RTA teams up with Masabi and Transit to launch Tapp Pay mobile fare payment option* (2020). https://www.masstransitmag.com/technology/fare-collection/mobile-applications/press-release/21140596/transit-app-dayton-rta-teams-up-with-masabi-and-transit-to-launch-tapp-pay-mobile-fare-payment-option

(ABT) for the transit portion of their journeys. Stored Value Accounts require the user to create an account and load funds prior to their first journey, with multiple options to replenish their account over time. ABT is a token-based system and does not require riders to pre-purchase a ticket, meaning riders can tap or scan using a secure token, linked to an account in the system's primary source of truth – the back office. The token-based system enables the rider to use their preferred method of payment including phone, contactless-EMV (cEMV), smartcard or virtual EMV token. Fares based on associated taps to a rider's account are calculated to determine the total fare. Fare-capping can be activated to calculate the best fare a rider could have pre-purchased and allocates this to the passenger as they travel and caps their cost. This gives the rider confidence they will not be overcharged.

Work being conducted by Masabi, funded by the SARTA NEORide FTA IMI grant, will explicitly add application programming interfaces (APIs) for third-party transportation providers (e.g., micromobility companies) and app integrators (e.g., Transit, Uber, Moovit) to access the SVA to pay for transportation services. These, documented, standard APIs will enable multiple agencies to reuse these integrations over time and make it possible for new integrations to be added without any additional work by Masabi or the agency.

Additional work by Masabi, both funded by the IMI grant and not, improve the ability of those without access to smartphones or the banking system to access the transit system and to use SVAs. Retail networks are able to add to SVAs via a web-based interface (as well as other options outside the IMI project scope) and can thus accept cash or other payment methods. Riders will also be able to use smart cards to access their SVAs and ride across multiple participating transit agencies, even if they do not have or wish to use a phone as their token. EZfare.

INTEGRATING WITH MICROTRANSIT PROVIDERS

Success is driven by working from lessons learned and best practices. Therefore, Microtransit providers Circuit, RideCo, and Via were selected as a sample of operators that have successfully integrated their operations with transit payments. The services described offer a comprehensive overview of variety in software, vehicle procurement, and fleet management strategies that is representative of the wider industry. Beyond their technical capabilities, the following providers were selected for their experience in partnering with cities and transit agencies to offer multimodal connections and integrated payment systems.

The specific needs of the Midwest were also considered when selecting these providers, as each can be deployed in NEORide markets and have cold weather experience. Circuit operates nationally in the United States (US), RideCo operates in both Canada and the US, and Via operates globally. To ensure operational success, strategy for vehicle type and service parameters are determined in partnership with the transit agency.

Circuit

Circuit is a last-mile, full-stack, tech-enabled shuttle operator. Circuit provides turnkey operations to transit operators and specializes in providing low cost, last-mile options typically with zero emission electric vehicles (EVs). As such the payment structure includes all services provided based on a per vehicle per month basis and includes drivers, vehicles, insurance, parking/charging, management, technology, data reports, and marketing services. The transit agency is billed monthly to provide free rides, however there is the option to charge riders a small fee. Circuit's dedicated ad-sales team supports clients in

sponsor acquisition which further offsets costs for operations and contribute to a revenue-share with the agency.

The fleet is typically comprised of Polaris GEM E6T Vehicles that operate on lithium-Ion batteries. The E6 is a Low-Speed Vehicle (LSV), described by its manufacturer, as a street-legal, four-wheeled, electric vehicle with a top speed of 25 mph and a gross vehicle weight rating of less than 3,000 lb. Most states allow LSVs to drive on roads marked 35 mph or less. One of the reasons Circuit selected GEM LSV vehicles is because of the last mile focus. As Circuit typically operates shorter routes in more congested environments, the EVs are especially important in congested areas facing air quality issues. The vehicle is ideal for denser areas with lower speed limits and for partners interested in utilizing ZEVs. The service is intended to seamlessly complement existing public transit connections to discourage SOV trips.

While payment integrations with transit agencies is possible, historically Circuit has been free to ride. Using funding provided by cities, private corporations, as well as revenue generated from vehicle advertisement sales, trip fees are covered, and the ride is provided as no cost. Digital integrations are possible through app development and API integration. Circuit's existing app features includes a fare-free/discount model where discounts can be applied for qualified users. Fares, including low-income discount fares, can be deducted from Masabi-provided SVAs over APIs without validators or onboard validators can be integrated depending on the transit agencies existing technology and needs. For example, New York City's Metropolitan Transit Authority's (MTA) Fair Fare program that provides low-income New York City residents with a 50% discount on either subway and eligible bus fares, or Access-A-Ride. A program can be structured where low-income users apply for a fare-free discount code to be used in-app. To accommodate unbanked riders, prepaid cards are accepted, and Circuit vehicles can be hailed (depending on state regulation) for riders without access to a smart phone.

In 2019, Circuit partnered with the City of New Rochelle, the seventh-largest city in New York State situated a few miles north of New York City. A six-month pilot program funded by the city's Industrial Development Agency (IDA) committed $164,000 to operate the service. New Rochelle Mayor Noam Bramson said during a ribbon-cutting and inaugural ride event, "the vehicles will be great for the environment because they are 100% electric and because they reduce our general dependency on driving our own cars and they send a signal about the kind of community we want to be."[31]

Over a year later in December 2020, Commissioner of Development, Luiz Aragon, published an article in National League of Cities stating, "One of the city's smartest investments to date has been its new free, on-demand, electric shuttle service *Circuit New Rochelle (NR)*."[32] In the first year of operation, Circuit NR completed 34,000 passenger trips and nearly 40,000 vehicle miles were saved. The New York State Department of Transportation recently recognized Circuit and the City of New Rochelle with the Clean Air NY Award for their commitment to sustainability.

In San Diego, the City partnered with Circuit to enhance mobility options, reduce parking demand, and reduce greenhouse gas (GHG) emissions. Circuit was selected through

[31] Westchester and Fairfield County Business Journals. *Six-month $164K New Rochelle shuttle pilot program begins.* (2019). Retrieved from https://westfaironline.com/116132/six-month-164k-new-rochelle-shuttle-pilot-program-begins/

[32] National League of Cities. *New Rochelle's Drive To a Smart & Sustainably City*. (2020). Retrieved from nlc.org/article/2020/12/17/new-rochelles-drive-to-a-smart-sustainable-city/

competitive RFP to operate a downtown circulator program. Free Ride Everywhere Downtown (FRED) is an all-electric fleet with ADA accessible options, revenue-share from third party advertising, and free rides. Since its introduction, over 900,000 downtown trips have been made using FRED which has saved 110.5 metric tons of CO_2 per year and prevented 168,000 vehicle miles traveled (VMT) per year.

RideCo

RideCo is a SaaS provider offering on-demand transit software and solutions for transportation providers. With end-to-end solutions to address a variety of pain points, RideCo complements traditional transit with dynamic on-demand microtransit networks. RideCo can be deployed as a solution for low-density area mobility, first/last mile, underperforming bus routes, paratransit, employee commuting, and long-distance commuting. The software includes routing and scheduling optimization components for operational efficiency. The technology expands ride hailing to all public transit customers, including historically underserved communities and populations. RideCo's app design can be customized to the transit agency's branding to create a seamless look and feel, providing a visual cue to the rider that the mode being utilized is within the public transit network.

In response to most partnerships having vehicle and fleet management requirements, although RideCo is a SaaS provider, the organization successfully partners with fleet providers of national and local scale. The fleet provider selected for each deployment manages daily operations while RideCo ensures program key performance indicators (KPIs) are met.

Using the RideCo app, riders can plan multimodal trips —microtransit to bus to train ride – using real-time booking through a single mobile app, internet browser or call center. Payment options for riders include credit card, transfer ticket, travel pass or cash. Virtual stops are optimized so riders are never more than ¼ mile away, except for paratransit which is always door-to-door. These types of apps can integrate with Masabi's FPaaS platform, as described above.

To determine the optimal and most cost-efficient operating model, RideCo engages partners early on to review program goals, potential service hours, to provide a service recommendation plan and overall total cost of ownership (TCO) costs. Partner payment fee structure includes a one-time software onboarding fee, followed by annual fees for ongoing program management and on a per vehicle hourly rate.

In February 2020, a pilot in Los Angeles was approved by Los Angeles County Metropolitan Transportation Authority (Metro) Board of Directors. This $29 million project includes a $8 million set aside in funding for operational expenses and to hire 80 new L.A. Metro employees to operate the vehicles. Riders will be able to pay for the service by using their TAP card and TAP account (which is a pre-loaded card currently used for Metro transit, or with debit, credit, or prepaid card).

Since 2019, RideCo has successfully operated microtransit in Calgary, Canada, known for its harsh cold-weather conditions. Using two 12-seat wheelchair-accessible shuttles, the service operates over 2 square miles and serves a population of 2,000 residents. This low dense area had no previous public transit routes and the program now transports 120+ passengers per weekday[33].

[33] RideCo. Connecting Calgary Communities with High-Efficiency Microtransit. 2020. Retrieved from: https://docsend.com/view/mjc2vd55uce8a7a5

Via

Via provides equitable, sustainable, innovative transportation solutions for cities and transit agencies. The product offerings and services are comprehensive, but more importantly flexible and customizable. This enables the Via Solution to be applied to a range of geographies (e.g., dense cities, suburban areas, and rural communities) and use cases (e.g., microtransit, paratransit, school bus operations, commuting, non-emergency medical transportation). Via's algorithms automatically pool passengers into efficient shared rides and dynamically route vehicles in response to demand — maximizing vehicle utilization while minimizing the time that vehicles travel empty. There are two distinct Via operating models: TaaS and SaaS.

Via's TaaS solution model is a turn-key transit operation which includes their on-demand transit technology, plus service design, marketing, drivers, vehicles, and day to day operations. This model is beneficial to an agency that prefers to minimize their involvement with daily operations. In this scenario, the agency does not procure, maintain, and operate vehicles; or recruit and manage fleet-related staff. Via also provides customer and driver support. Via's TaaS payment structure includes a one-time installation cost and ongoing payments are based on per vehicle hour basis. In other words, the total amount it costs to operate a vehicle and the service is bundled into a "fully loaded" per hour rate. Prior to launch, Via works closely with agency partners to align on an appropriate service design and number of hours to meet their goals.

Via's SaaS solution model provides agencies with a custom-branded, fully localized version of the Via platform. Partners rely on Via to provide, maintain, and support the technology system — including the backend routing and ride aggregation system, service management interface, and the Via Rider and Driver Apps. Our SaaS solution offers a full suite of tools and support services for partners to operate on-demand transit services with their own drivers, vehicles, dispatchers, and customer support representatives. SaaS is valuable if the agency has vehicles and staff available but is looking to improve the efficiency, accessibility, or convenience of their network. Payment structure includes a one-time installation cost and an on-going customer support fee, which is based on number of vehicles in use per month.

Via provides a variety of trip booking and payment solutions to ensure that on-demand transit solutions are both seamlessly integrated into the broader transit landscape and are highly accessible to all riders, regardless of their level of access to technology, bank accounts, or credit cards. For example, in 2019 Via partnered with King County Metro, Sound Transit and the City of Seattle to launch Via to Transit. The service provides free first/last mile connections to transit, and like NEORide's goal to integrate EZfare with multimodal providers, agency validators were installed on microtransit vehicles. Riders can pay using a One Regional Card for All (ORCA) card and if they do, the Via trip will automatically be applied as a transfer toward a trip on a bus or train. The ORCA card is a contactless, stored-value smart card system for public transit in the Puget Sound region of Washington. Seamless transfers were an intentional design element to further incentivize riders to use public transit.

Agencies may also use API integrations to integrate options for fare payment and stored transit pass will appear in app. Finally, Via is equipped to accommodate paper ticketing strategies. If the agency has paper tickets, Via's drivers will collect, validate, and manually update Via's systems to reflect the addition of another rider in its algorithms.

For unbanked riders, Via's services are equipped to handle cash and accept prepaid cards. To accommodate riders without access to a smart phone or tablet, phone booking/payment, web-based booking/payment, hailing a vehicle (as state regulations permit), agency booking (local partners booking on behalf of riders then billed to agency), and physical kiosks installations are all options that have already been used by Via and partners.

Via to Transit (the first/last mile service in Washington state) was designed to specifically encourage first/last mile trips to public transit. The routes are restricted, so riders are only able to take trips to or from light rail hubs in transit-underserved southeast Seattle and Tukwila. In its inaugural year, riders used the service to connect to five transit hubs where they road Sound Transit Link light rail or Metro buses. The pilot was extended for another year to operate from June 22, 2020 to April 2021 and will serve three transit hubs shown to that have demonstrated the greatest need as evidenced by the most riders per service hour. The agency started with a larger pilot area and using data collected over the first year made equity-focused iterations for the extension. Riders enjoy benefits of reduced commute time, increased personal safety versus walking to transit, greater access to the region without needing to own a car and more independence for young or disabled riders.

Via is also using its technology and operational experience to modernize paratransit. Green Bay Metro (GBM) provides ADA paratransit for a community of over 200,000 residents in a 70 square mile area surrounding the City of Green Bay, Wisconsin. GBM Paratransit provides door-to-door service for a flat rate of $4.00, offering service on weekdays and Saturdays, as well as special Sunday hours during home games for the Green Bay Packers. In late 2019, Green Bay Metro issued an RFP seeking an operator capable of delivering reliable and cost-effective paratransit. After proposing to optimize GBM paratransit scheduling with our industry-leading routing and matching algorithms, Via was awarded a turnkey contract to assume full operations of Green Bay's paratransit system, providing day-to-day management, vehicles, drivers, and customer support in addition to our technology.

Via launched operations in April 2020 during COVID-19, with no delay to launch timeline. Via's technology delivers enhanced customer service with automated call and SMS reminders as well as enhanced visibility on real-time vehicle location and trip status. Several months after launch, GBM partnered with Via to launch a hybrid microtransit and paratransit service that has effectively expanded coverage for general population riders and driven more efficient utilization of their paratransit fleet.

STRATEGIC PLANNING

Before launching an innovative multimodal transportation service, agencies should consider key factors that will impact their program's success. Their initial market analysis should include operations, data usage, and evaluating return on investment (ROI). Using CTNA results, in addition to planning for high utilization areas, transportation equity should be integrated into operational planning. Resource evaluation is also critical as this data can be used to determine not only resource management, but also data management. The resource evaluation will highlight gaps in information that help to inform the data parameters collected through the deployment. Beyond revenue generation, ROI metrics should be viewed through a wider scope to determine program success. Considering these elements upfront will address opportunities and challenges to inform an overall successful program.

OPERATIONS

Strategic planning for service operations mainly involves careful consideration of the target populations and how each will benefit from and use all the services available. In the early stages of strategic planning, it is important to survey the population and conduct a community needs assessment that will inform the variety of transportation modes, hours of operation, as well as general operational decisions. Thus, the community needs assessment and other focused outreach will guide these decisions and strategies across the service areas and schedules. In making decisions on operations to meet community needs, key populations may benefit from subsidized fares, which a small fee to all other riders would offset.

Coverage areas, in turn, should serve those in the community who are most in need of improved access to healthcare, grocery stores, schools, and employment. In this sense, operations are heavily reliant on the population survey, as the strategic goal is to serve in-need groups first. The operational area will include others who will benefit from the service, as well, even if they are not those the assessment determines to be the most disadvantaged.

Operational hours will develop and evolve through community feedback. The services can then fill in for gaps in fixed-route coverage and iterate as necessary to become a consistent resource for riders. Finally, in addition to a fare schedule that offsets subsidies for disadvantaged groups, there is the opportunity to offset costs by paying for a service with advertisement revenue, a model used by Circuit. The vehicles offer an opportunity to feature advertisements from local companies and organizations. Advertisers could include local public transit agencies, which would support both operations and increase public transit awareness by visually linking microtransit and other public transit services together.

DATA USAGE

Given innovative mobility services are operated on robust technology platforms and have capabilities to collect and analyze layers of data, a strategic plan for data usage is both prudent and necessary. Data that operators collect help to inform service improvements and aid in understanding where resources can shift to better serve riders. An example of this is in hours of operation or in assessing affordable public transit offerings across low-income neighborhoods. This possibility depends highly on partnership with a provider that will share data and that will ensure the protection of personally identifiable information (PII). Data sharing has historically been a point of contention between cities and fleet providers. In recent years industry stakeholders sought to improve this by creating the Mobility Data

Specification (MDS), a standard format for micromobility data that agencies and operators can use to exchange information in a format allowing the agency to seamlessly collect data to inform overall city transportation demand management. It was first proposed, created, and deployed by LADOT in 2018 and has been adopted by more than 90 cities and public agencies globally.

EVALUATING ROI

Lastly, strategic planning for return on investment (ROI) is important to ensure the sustainability and attractiveness of providing this service. Planning efforts should consider ROI through a broad lens that focuses on more than just fare recovery. That is, beyond the economics of providing the service, strategically the ROI is everything that the service will impact. For example, efficient transportation options give residents reliable access to jobs, shrink cities to manageable sizes for residents, eliminate or reduce the severity of food deserts, and generally improve the quality of life. As such, planning must clearly define success metrics, but those metrics should extend beyond fare recovery and consider the greater social and economic impacts of the service.

UPCOMING ZERO EMISSION VEHICLES (ZEVs)

In addition to the benefits of microtransit in and of itself, combining the service with upcoming zero-emission vehicle (ZEV) technology opens more possibilities and benefits for all. Microtransit offerings can be at the forefront of not only innovative mobility solutions, but also of new ZEV technology adoption.

Class 3-6 vans and shuttles have options in development to commercial fleets that could work well for microtransit offerings. The Ford 2022 E-Transit, which the company recently unveiled, is one such vehicle that would be very attractive in a microtransit setting. Although these new vans have relatively lower range, at 126 miles with a 67-kWh battery, than those of other large OEMs, these vehicles are ideal for commercial customers who prioritize other functionality over range. For instance, microtransit emphasizes first- and last-mile trips, not necessarily lengthy ones. Using trip optimization algorithms and strategically designing operating areas so that vehicles may not require a very large range will use the vehicles' functionality in a way that fits their use. In effect, there are high-performance vehicles like the Ford 2022 E-Transit coming to market that are well suited for microtransit. Microtransit comprises shorter trips that a wide variety of emerging ZEV technologies can accommodate. Other vehicles that could fill this role include the GEM RE6T and the GreenPower EV Star.

Hydrogen fuel cell electric vehicle (FCEV) is another type of zero emission, electric drivetrain. FCEVs are fueled by producing electricity from hydrogen, unlike other EVs that are fueled by drawing electricity from a battery. These vehicles are zero emission and only release water vapor and warm air.[34] While this technology is still in the early stages of deployment, Stark Area Regional Transit Authority (SARTA) in Canton, Ohio is one of the early adopters outside California. The agency operates a fleet of 17 fuel cell electric paratransit and traditional 40'transit buses in Canton, Ohio, along with the Renewable Hydrogen Fuel Cell Collaborative

[34] Alternative Fuels Data Center, Department of Energy. *How Do Fuel Cell Electric Vehicles Work Using Hydrogen?* (n.d.) Retrieved from https://afdc.energy.gov/vehicles/how-do-fuel-cell-electric-cars-work

(RHFCC).[35] Acquiring FCEVs is a valuable option, especially if existing hydrogen fueling infrastructure is available. FCEVs being utilized for paratransit may also be applied to in-house microtransit services. During off-service hours, this combination of vehicle technology and duty-cycle can be tested before committing to capital investments. US Hybrid, a leader in manufacturing zero emission powertrain components for a variety of technologies including fuel cell vehicles, has produced FCEVs for shuttle applications including SARTA and Hawaii Metro Transit (HMT). For cold weather conditions in SARTA's operating area[36], HVAC and defrost are included in the Direct Electric Traction Drive System Specifications, while in the vehicles for HMT they are not.[37]

Other forms of first- and last-mile ZEV technology have been growing exponentially in recent years. Bikeshare and scooter share options, for instance, are an example of how the transportation industry can harness new technology to make mobility solutions accessible to many people. Even these subareas are rich with variety, with bikeshare services that may be docked, dockless, lock-to, and fully electric. These services, as with scooter share, bring mobility options to everyone and are an example of how people can utilize microtransit and micromobility services to enhance their ability to use other transit, reduce congestion and reduce emissions all using personal technology in a convenient manner. Similarly, cargo bikes provide a form of active transportation for shared fleet operations. Coaster Cycles in an example of this type of offering, which provides fleets with low cost, 3-wheeled bicycles that carry cargo and delivery loads. As such, this is an industry where innovation is constant and accelerating with many options available to fleets and consumers.

Even today, carshare services are a prime example of how microtransit can improve mobility and access to jobs, transit, and more for many people. There are both station-based as well as free-floating and point to point ZEV carshare services today. All these present advantages to transit access and, given the growth of electric vehicle supply equipment (EVSE) across American cities, are ideal for microtransit services. BlueLA is an example of a point-to-point service with customers able to pick up the cars at on-street charging stations and do not have to return them to the same station upon the termination of the service. An example of the type of vehicle that works well for battery electric vehicle (BEV) carsharing is the 2020 Chevrolet Bolt. A light duty hatchback, 5 passenger vehicle, with a range of 259 miles, and a battery capacity of 66 kWh, the Bolt can charge up to 100 miles of range in only thirty minutes with a DC fast charger. With a starting price of $37,495, the Bolt exemplifies the type of vehicle that can easily integrate into a carshare system.

At the cutting edge are autonomous electric vehicles (AEVs), which hint toward an exciting future for microtransit. One recent study in *Sustainability* found that AEVs present the opportunity to increase cost-effectiveness for transit agencies by decreasing the total cost of ownership per passenger-kilometer, which is due in part to the increased accessibility and convenience of autonomous vehicles for passengers.[38] Waymo, Cruise, and Optimus Ride are companies in the United States that are scaling up their development of autonomous vehicles and autonomous vehicle fleets, including cars and shuttles, all of which would be beneficial to microtransit solutions of the future. Notable AEVs currently available and well

[35] https://www.masstransitmag.com/bus/vehicles/hybrid-hydrogen-electric-vehicles/press-release/21165607/center-for-transportation-and-the-environment-cte-cte-and-rhfcc-publish-paper-on-joint-procurement-strategies-for-zeroemission-buses

[36] US Hybrid. 2020. H2Para-Transit Ford Van SARTA Specification Sheet.

[37] US Hybrid. 2020. Retrieved from US Hybrid H2 Ride 32Fuel Cell Plug-In Shuttle Bus Hawaii Transit Metro Specification Sheet.

[38] Sustainability. Economic Assessment of Autonomous Electric Microtransit Vehicles. (2019). Retrieved from https://doi.org/10.3390/su11030648

suited for microtransit are the EasyMile EZ10 and the Local Motors Olli, both being Class 4 autonomous electric shuttles. The EZ10 has a range of sixteen hours and a battery capacity of 31 kWh, with wired, on-board charging compatible with both slow- and accelerated charging modes. The EZ10 fits 15 riders, has a fully automated electric ramp, a limited maximum speed for safety, and features Level 4 autonomous driving. An EZ10 typically costs between $225,000 and $250,000. The Olli, with a range of 25-40 miles and a 19-kWh battery has an average charge time of two hours but can be faster depending on the charger. The shuttle fits 8 riders and, as with the EZ10, the Olli has a limited maximum speed with Level 4 autonomous driving. Each of these vehicles is appropriate for microtransit solutions of the coming years, on scheduled and on-demand routes.

APPENDIX A: MICROTRANSIT PROVIDERS

MICRO TRANSIT PROVIDERS

DEFINITION

SAE INTERNATIONAL: MICROTRANSIT IS A PRIVATELY OR PUBLICLY OPERATED, TECHNOLOGY-ENABLED TRANSIT SERVICE THAT TYPICALLY USES MULTI-PASSENGER/POOLED SHUTTLES OR VANS TO PROVIDE ON-DEMAND OR FIXED-SCHEDULE SERVICES WITH EITHER DYNAMIC OR FIXED ROUTING.

BACKGROUND

The operators presented here are currently equipped to integrate with transit payments. The services included here provide a comprehensive overview of variety in software, vehicle procurement, and fleet management strategies that are representative of the wider industry today. All services listed here are able to operate in NEORide areas.

CIRCUIT

OPERATING MODEL
TRANSPORTATION AS A SERVICE (TAAS)

VEHICLE TYPE
ELECTRIC POLARIS G6

SAMPLE DEPLOYMENTS
SAN DIEGO CA, NEW ROCHELLE NY

RIDECO

OPERATING MODEL
SOFTWARE AS A SERVICE (SAAS)

VEHICLE TYPE
VARIES - VEHICLES PROCURED AND PROVIDED BY FLEET MANAGEMENT SUBCONTRACTOR

SAMPLE DEPLOYMENTS
LOS ANGELES COUNTY METROPOLITAN TRANSPORTATION AUTHORITY (L.A. METRO), CALGARY TRANSIT (CALGARY, ALBERTA, CA), OKOTOK TRANSIT (ALBERTA, CA)

VIA

OPERATING MODEL
TRANSPORTATION AS A SERVICE (TAAS), SOFTWARE AS A SEVICE (SAAS)

VEHICLE TYPE
TAAS VEHICLES ARE SELECTED AND PROCURED BY VIA BASED ON MARKET CONDITIONS, SAAS VEHICLES ARE PROVIDED BY THE TRANSIT AGENCY

SAMPLE DEPLOYMENTS
VIA TO TRANSIT (SEATTLE KING COUNTY METRO), COTA PLUS (CENTRAL OHIO TRANSIT AUTHORITY), GOBUS! (THE RAPIDS (GRAND RAPDIDS MI)

APPENDIX B: ZERO EMISSION VEHICLES (ZEVs)

ZERO EMISSION VEHICLES

DEFINITIONS

ZERO EMISSION VEHICLES (ZEVS) REFERS TO VEHICLES THAT DO NOT EMIT TAILPIPE EMISSIONS. ZEV TECHNOLOGIES INCLUIDE:

BATTERY ELECTRIC VEHICLES (BEVS): DRAW ELECTRICITY FROM A BATTERY AS FUEL

FUEL CELL VEHICLES (FCEVS): CONVERTS HYDROGEN TO POWER ELECTRIC FUEL CELL EMITTING ONLY WATER VAPOR.

AUTONOMOUS VEHICLE (AV): DRIVERLESS VEHICLE

PRICE	WEIGHT CLASS	RANGE	RIDERS	
$16,049	3,000 LBS	12-28 MI.	6	POLARIS GEM E6T

BEV. 1 KW ONBOARD EV CHARGER FOR ANY 110 V OUTLET, OPTIONAL 3 KW OR 6 KW J1772 CHARGER; OPTIONAL DC FAST CHARGE CUSTOMIZATION. REGENERATIVE BREAKING; 48V AC DRIVE; VARIOUS BATTERY OPTIONS

$37,495	CLASS 4	259 MI.	4	CHEVROLET BOLT

BEV. 120 V: 4 MI. RANGE PER HOUR; 240 V: FULL CHARGE IN APPROX. 10 HOURS; DC FAST CHARGE: UP TO 100 MI. RANGE IN 30 MIN. ENGINE STORES KINETIC ENERGY BY CONVERTING SOME OF IT BACK TO ELECTRICAL ENERGY.

$45,000	CLASS 4	126 MI.	12	FORD E-TRANSIT

BEV. OPTION TO PROVIDE 2.4 KILOWATTS OF POWER FOR TOOLS; 108 MILES OF RANGE FOR EXTENDED HEIGHT VARIANT; EST 40% LESS THAN GAS-POWERED SCHEDULED MAINTENANCE COSTS OVER EIGHT YEARS/100,000 MILES.

$172,900	CLASS 4	150 MI.	19	GREEN POWER EVSTAR

BEV. J1772 TYPE 2 AND CCS1; CHARGING IN AS LITTLE AS 2 HOURS. MAX CHARGE RATE 50 KW. 10 YEAR LIFE EXPEXTANCY; PARATRANSIT DUTY-CYCLE. DIVERSE ROUTE CAPABILITY.

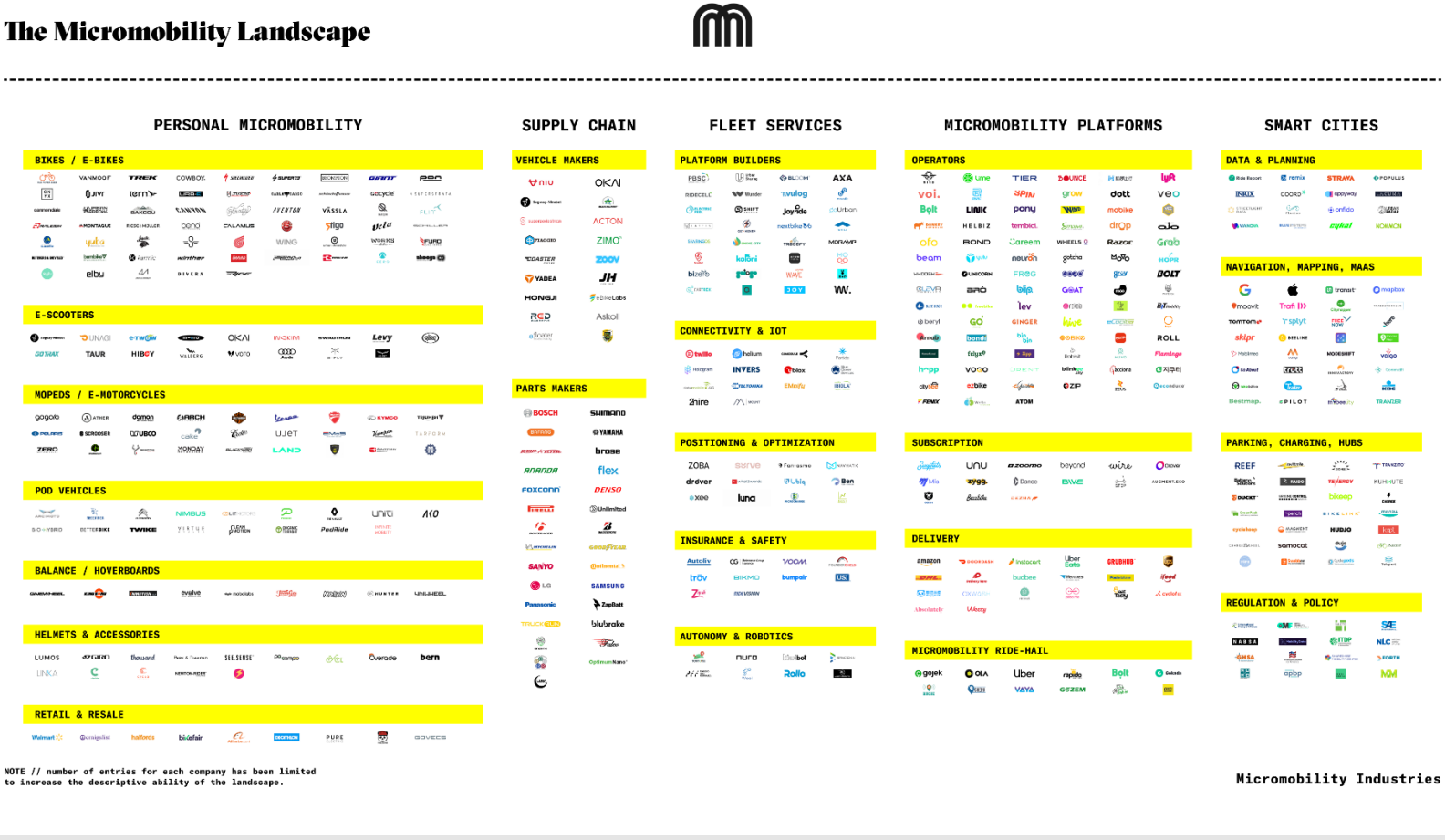
$225,000	CLASS 4AV	14 HOURS	15	EASY MILE E-10

AV, BEV. WIRED, ON-BOARD CHARGING: LEVEL 4 AUTONOMOUS DRIVING (MANUAL OPTION AVAILABLE, TOO); MAX SPEED 30MPH, ELECTRONICALLY LIMITED TO 15MPH, ALL WEATHER CONDITIONS.

REQUEST	CLASS 3	250 MI.	7	US MOTORS H2 PARATRANSIT

FCEV. COLD WEATHER EQUIPMENT AVAILABLE INCLUDING HVAC, DEFROST.

APPENDIX C: THE MICROMOBILITY LANDSCAPE[39]



[39] Micromobility Industries. The Micromobility Landscape. (2020). Retrieved from https://micromobility.io/landscape

APPENDIX D: NEORIDE SURVEY RESULTS

Multimodal Survey for NEORide Members

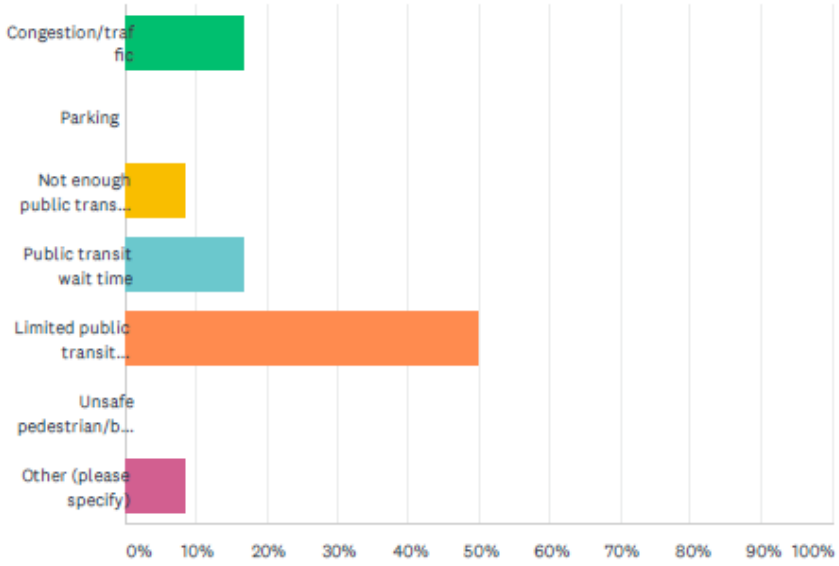
Q1 Name of transit agency:

Answered: 12 Skipped: 0

- Akron METRO Regional Transit Authority
- Butler County Regional Transportation Association
- Laketran
- Lancaster-Fairfield Public Transit
- Medina County Public Transit
- Metropolitan Transportation Authority
- Stark Area Regional Transit Authority
- South East Area Transit
- Southwest Ohio Regional Transit Authority
- Toledo Area Regional Transit Authority
- Transit Authority of North Kentucky
- Western Reserve Transit Authority

Q2 In your opinion, what is the primary transportation/mobility challenge for traveling through your county's downtown core?

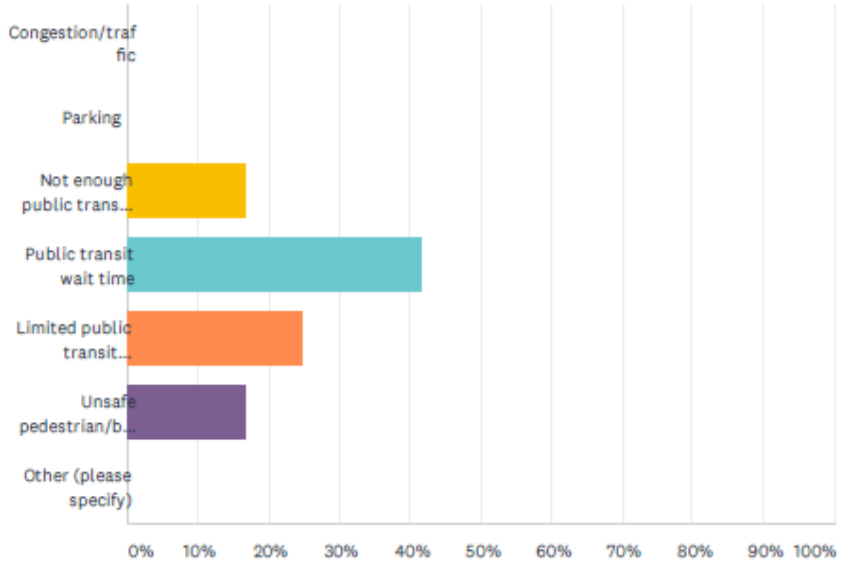
Answered: 12 Skipped: 0



ANSWER CHOICES	RESPONSES	
Congestion/traffic	16.67%	2
Parking	0.00%	0
Not enough public transit stops/access points	8.33%	1
Public transit wait time	16.67%	2
Limited public transit availability (ex: nights, weekends)	50.00%	6
Unsafe pedestrian/bike/scooter lane infrastructure	0.00%	0
Other (please specify)	8.33%	1
TOTAL		12

Q3 In your opinion, what is the primary transportation/mobility challenge for traveling through your county's residential areas?

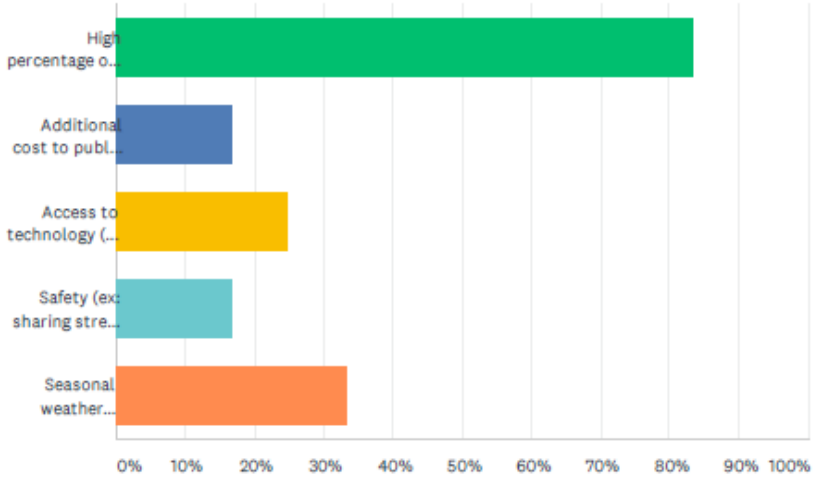
Answered: 12 Skipped: 0



ANSWER CHOICES	RESPONSES	
Congestion/traffic	0.00%	0
Parking	0.00%	0
Not enough public transit stops/access points	16.67%	2
Public transit wait time	41.67%	5
Limited public transit availability (ex: nights, weekends)	25.00%	3
Unsafe pedestrian/bike/scooter lane infrastructure	16.67%	2
Other (please specify)	0.00%	0
TOTAL		12

Q4 What do you perceive as a challenge in public transit riders adopting new mobility options, such as bike sharing?

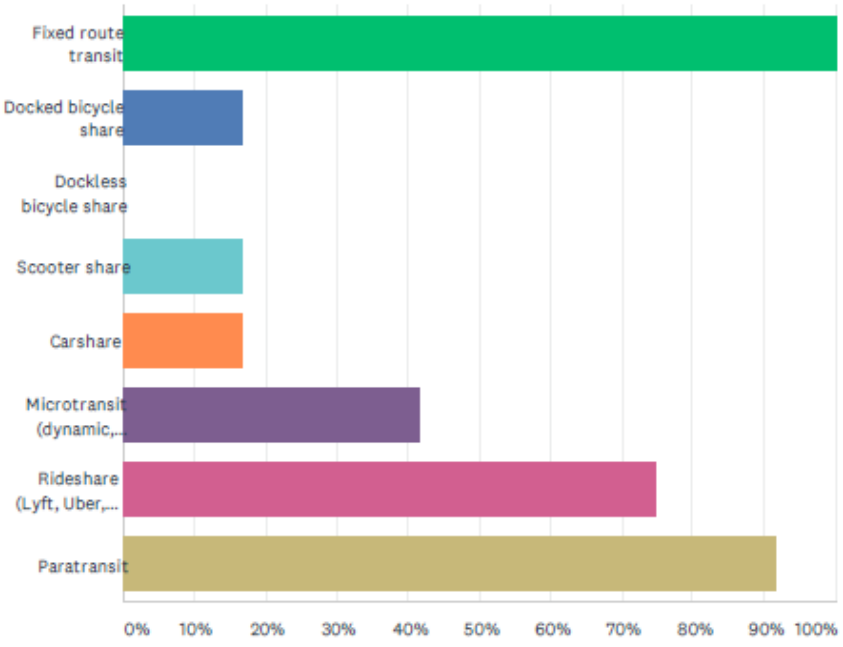
Answered: 12 Skipped: 0



ANSWER CHOICES	RESPONSES	
High percentage of private car ownership	83.33%	10
Additional cost to public transit	16.67%	2
Access to technology (ex: smart phone, credit card)	25.00%	3
Safety (ex: sharing streets with vehicles)	16.67%	2
Seasonal weather conditions	33.33%	4
Total Respondents: 12		

Q5 Which services are currently available in your county? (Select as many as apply)

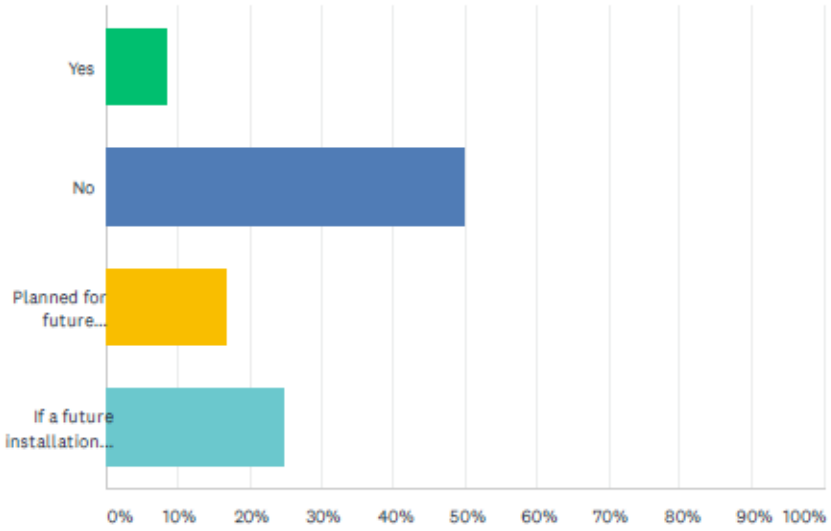
Answered: 12 Skipped: 0



ANSWER CHOICES	RESPONSES	
Fixed route transit	100.00%	12
Docked bicycle share	16.67%	2
Dockless bicycle share	0.00%	0
Scooter share	16.67%	2
Carshare	16.67%	2
Microtransit (dynamic, demand-responsive transit)	41.67%	5
Rideshare (Lyft, Uber, etc.)	75.00%	9
Paratransit	91.67%	11
Total Respondents: 12		

Q6 Are your facilities equipped with Electric Vehicle (EV) charging infrastructure?

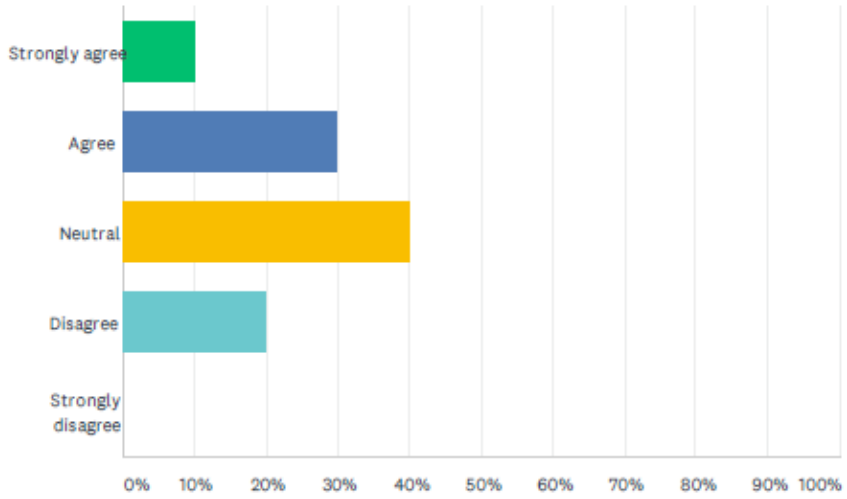
Answered: 12 Skipped: 0



ANSWER CHOICES	RESPONSES	
Yes	8.33%	1
No	50.00%	6
Planned for future installation	16.67%	2
If a future installation is planned, please specify estimated project completion date	25.00%	3
TOTAL		12

Q7 If you answered yes to #5, would you consider expanding this to include micromobility (e-bikes, e-scooters, etc.) charging in the future?

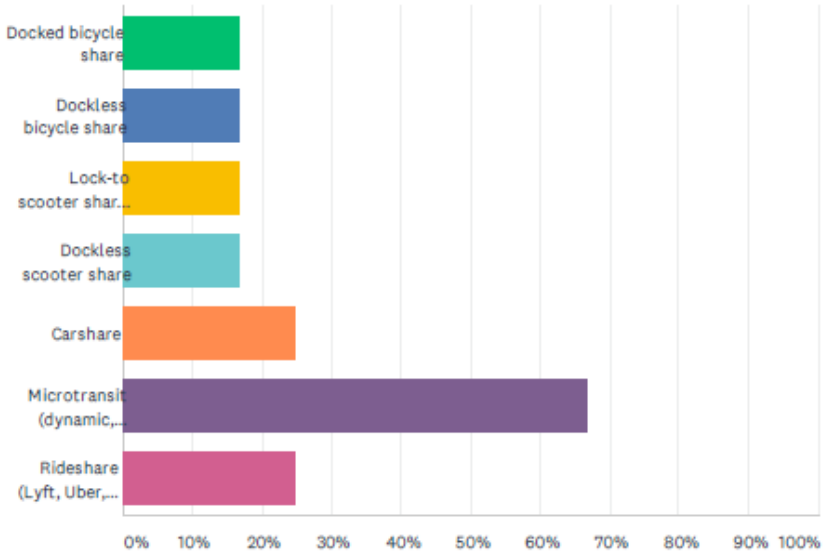
Answered: 10 Skipped: 2



ANSWER CHOICES	RESPONSES	
Strongly agree	10.00%	1
Agree	30.00%	3
Neutral	40.00%	4
Disagree	20.00%	2
Strongly disagree	0.00%	0
TOTAL		10

Q8 Which new mobility services do you believe would have the biggest impact in your county?

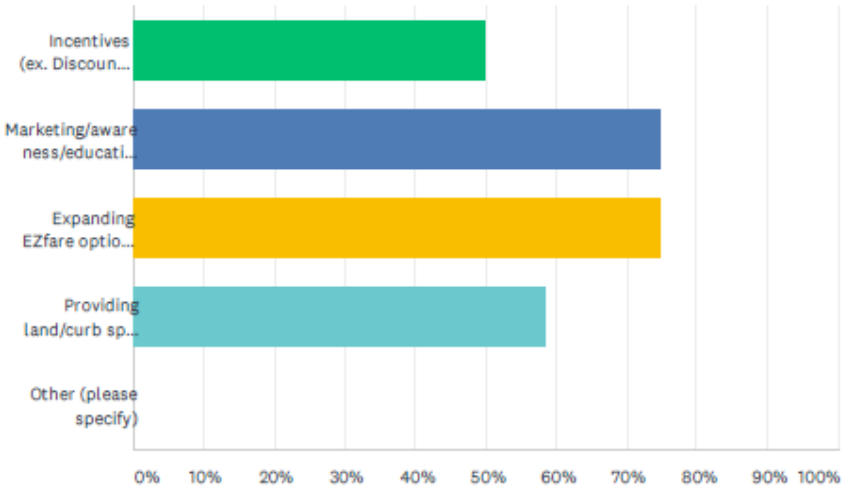
Answered: 12 Skipped: 0



ANSWER CHOICES	RESPONSES	
Docked bicycle share	16.67%	2
Dockless bicycle share	16.67%	2
Lock-to scooter share (lock device to end trip)	16.67%	2
Dockless scooter share	16.67%	2
Carshare	25.00%	3
Microtransit (dynamic, demand-responsive transit)	66.67%	8
Rideshare (Lyft, Uber, etc.)	25.00%	3
Total Respondents: 12		

Q9 Indicate if your agency would be interested in partnering directly with mobility service providers in the following capacities:

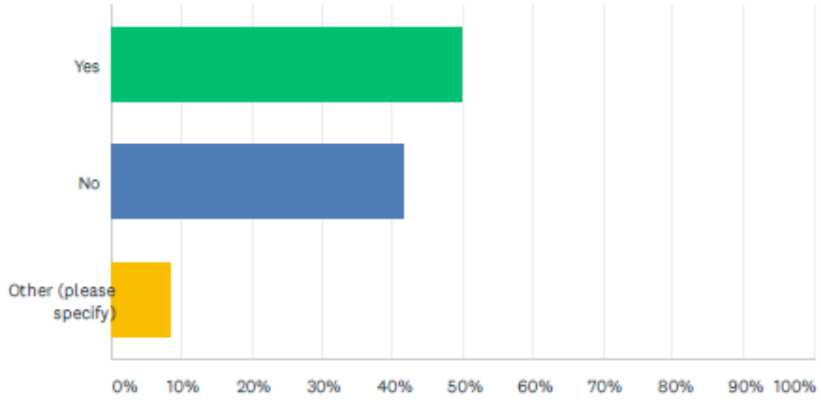
Answered: 12 Skipped: 0



ANSWER CHOICES	RESPONSES	
Incentives (ex. Discounted transit pass, transit credit)	50.00%	6
Marketing/awareness/education for riders	75.00%	9
Expanding EZfare options (ex: EZfare Smartcards, EZfare stored value or fare-capping)	75.00%	9
Providing land/curb space at public transit locations to support first/last mile connectivity	58.33%	7
Other (please specify)	0.00%	0
Total Respondents: 12		

Q10 Has your agency considered bringing any new mobility services (bike/scooter/carshare, microtransit) in-house, assuming the role of owner/operator?

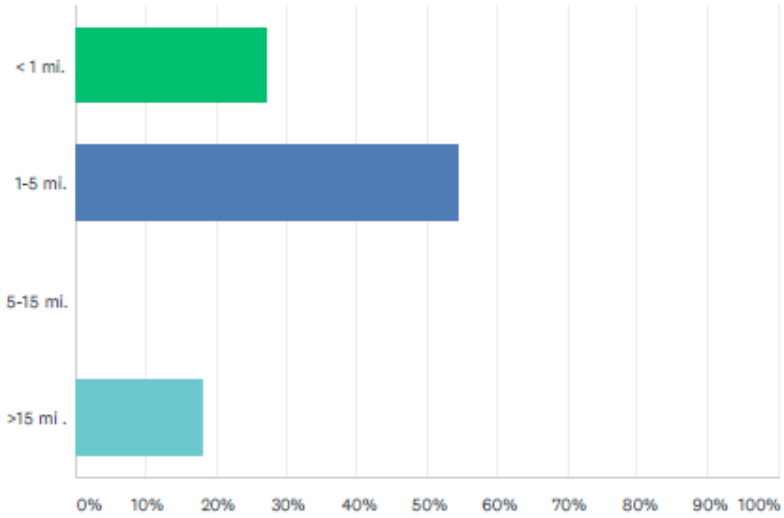
Answered: 12 Skipped: 0



ANSWER CHOICES	RESPONSES	
Yes	50.00%	6
No	41.67%	5
Other (please specify)	8.33%	1
TOTAL		12

Q11 Based on ridership data, which first/last mile trip distances have the greatest need to be supported by new mobility services?

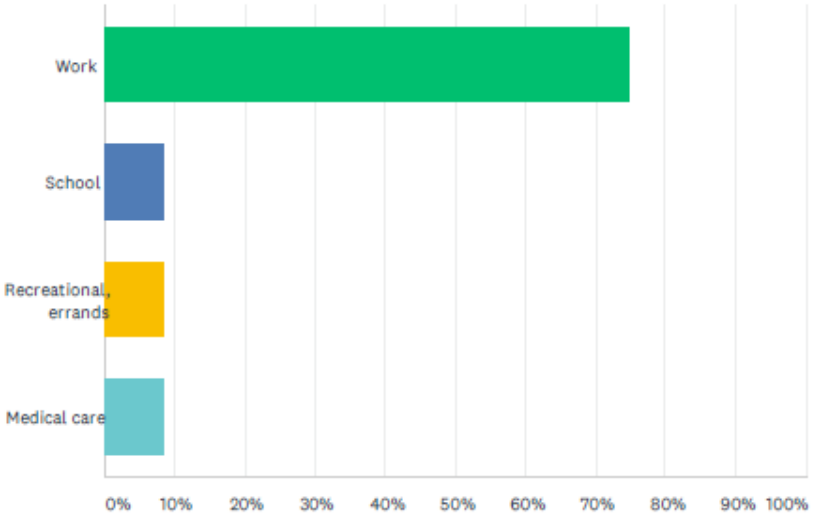
Answered: 11 Skipped: 1



ANSWER CHOICES	RESPONSES	
< 1 mi.	27.27%	3
1-5 mi.	54.55%	6
5-15 mi.	0.00%	0
>15 mi .	18.18%	2
TOTAL		11

Q12 Based on ridership data, which use-case categories are the best candidates to be supported by innovative mobility?

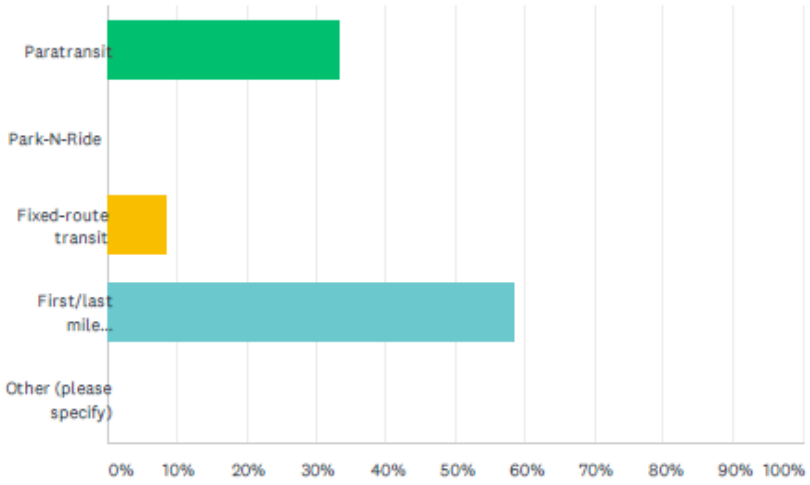
Answered: 12 Skipped: 0



ANSWER CHOICES	RESPONSES	
Work	75.00%	9
School	8.33%	1
Recreational, errands	8.33%	1
Medical care	8.33%	1
TOTAL		12

Q13 Are there any existing services which new mobility services may be used to improve?

Answered: 12 Skipped: 0



ANSWER CHOICES	RESPONSES	
Paratransit	33.33%	4
Park-N-Ride	0.00%	0
Fixed-route transit	8.33%	1
First/last mile connectivity to public transit	58.33%	7
Other (please specify)	0.00%	0
TOTAL		12

Q14 Please describe if there are periods of time where public transit is limited or unavailable in your operating area.

Answered: 12 Skipped: 0

- Sunday transit service is limited to only 3 of 6 lines
- No Sunday service and limited Saturday service
- Early morning
- Overnight hours and weekends in some areas
- Early morning
- Many logistics and warehousing employees operate 24/7/365. There are late night and weekend gaps in transit
- No Sunday services
- No public transit after 9pm or on Sunday
- We have VERY limited headways and weekend service
- Nights and weekends
- 8pm-6amM-F, 7-8pm Saturday and All day Sunday

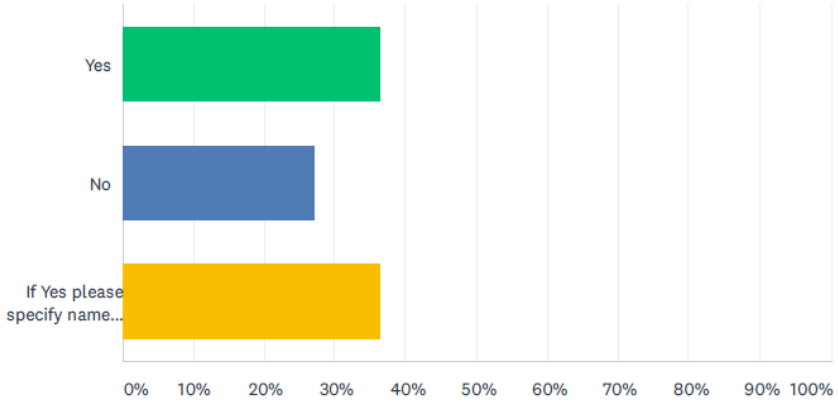
Q15 Please describe any transportation patterns or trends you'd like to support through the expansion of EZfare and new mobility services.

Answered: 9 Skipped: 3

- Greater access to a robust fixed route system through new mobility service connections
- Connection transportation between Medina City, Brunswick, Wadsworth, and Lodi
- First/Last mile to suburban and exurban employment
- Work trips
- We want EZfare for micro/DR service
- Smartcard technology
- Inter-county connectivity; digital transfers

Q16 Please indicate if we may follow up with you to discuss further

Answered: 11 Skipped: 1



ANSWER CHOICES	RESPONSES	
Yes	36.36%	4
No	27.27%	3
If Yes please specify name, title, email and phone number	36.36%	4
TOTAL		11