# M E M O R A N D U M

June 14, 2018

TO:          Transportation, Infrastructure, Energy, and Environment (T&E) Committee

FROM:     Glenn Orlin, Deputy Director

SUBJECT:  "First Mile - Last Mile" connections to transit

PURPOSE:  Panel discussion

One of the difficulties of providing transit service in the suburban portions of Montgomery County is that many potential riders live beyond the walkshed of Metrorail, Metrobus, or Ride On. One means to entice these potential riders is to enhance opportunities for "microtransit": encouraging transportation network companies like Uber and Lyft, to transport them to and from existing transit lines; or, alternatively, to transform certain bus lines from dedicated bus routes to lines that can divert from the scheduled route to pick up or drop off passengers that are off the route. Another strategy is to enhance biking to and from transit routes through the extension of Capital Bikeshare and/or dockless bikes and electric scooters.

A panel of professional planners and engineers working in these fields has been invited to present to the Committee on these subjects:

- **Steve Yaffe** will talk about recent micro transit applications around the country and in the region. He is the proprietor of Yaffe Mobility Consulting LLC, recently retired as the Transit Services Manager for the Arlington County Department of Environmental Services – Transportation Division. He oversaw planning and operations for Arlington Transit (ART) fixed-route transit as well as Specialized Transit for Arlington Residents (STAR). He is a past member of the Transportation Research Board (TRB) Paratransit Committee, is a member of the TRB Transformative Trends in Transit Data Subcommittee, and coordinated, presided over and presented at "Transit's Reach: First Mile – Last Mile" workshop at the 2014 Annual Meeting of the Transportation Research Board.

- **Dan Hibbert,** Chief, Montgomery County Department of Transportation (DOT) Division of Transit Services (DTS), will brief the Committee on DOT's plans to modify Ride On Route 53 to a micro transit service. He will be accompanied by: **Phil McLaughlin,** DTS's Chief of Planning & Implementation; **Dave Kachemov,** Chief of Information Technology and Marketing; and **Deanna Archey,** Planning Program Manager.

- **Kimberly Lucas** will talk about recent micro transit applications around the country and in the District of Columbia. She works at the DC Department of Transportation where she manages the city's Bikeshare and Bicycle Parking programs. With over 460 stations and approximately 4,000 bikes available system-wide, over 20-million trips have been taken by Capital Bikeshare members since its launch. Ms. Lucas began her career is bus transit operations nearly 15 years ago, and has worked in the cornerstones of transportation planning: the public and private sectors, advocacy and research. She is an active member of the Association of Pedestrian and Bicycle Professionals, Young Professionals in Transportation, the League of American Bicyclists, and the Women's Transportation Seminar, and currently serves on the Board of the North American Bike Share Association.

- **Christopher Conklin,** DOT's Deputy Director for Transportation Policy, will talk about the experience with the dockless bike pilots underway in Silver Spring and Takoma Park. He will be accompanied by **Gary Erenrich,** Special Assistant to the DOT Director.
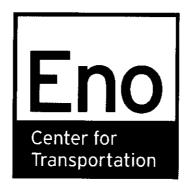
  For background, attached are four documents:

- The Eno Center for Transportation report: "UpRouted: Exploring Microtransit in the United States"
- Steve Yaffe's presentation on microtransit
- The National Association of City Transportation Officials (NATCO) 2017 report on bikesharing in the United States
- Gary Erenrich's presentation to the Transportation Planning Board on DOT's dockless bikeshare pilot program

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# UpRouted:

## Exploring Microtransit in the United States

Eno
Center for
Transportation

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## About the Eno Center for Transportation

The Eno Center for Transportation is an independent, nonpartisan think tank that promotes policy innovation and leads professional development in the transportation industry. As part of its mission, Eno seeks continuous improvement in transportation and its public and private leadership in order to improve the system's mobility, safety, and sustainability.

Cover Photo: Alameda-Contra Costa Transit

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# Executive Summary

In the United States, public transportation agencies are experimenting with on-demand, shared, and dynamic models to augment traditional fixed-route bus and train services. These services—referred to as microtransit— are enabled by technology similar to the mobile smartphone applications pioneered by privately operated transportation network companies. As interest in this technology grows, it is critical for public transportation agencies and departments of transportation to understand the benefits and challenges of incorporating components of these innovations into publicly funded services.

The experiences of several public transportation providers reveal important lessons to be applied to the future public operation of flexible route, on-demand microtransit. First, agencies seeking to test microtransit or dynamic, on-demand options need to prioritize customers' needs ahead of the novelty of new technology and think critically about how to design, develop, and implement a pilot that puts the customer first. Second, agencies should utilize a contracting mechanism that empowers those most familiar with the pilot to make quick decisions outside of the standard processes, in order to be able to fail fast and iterate quickly. Third, the success or failure of the application should be determined based on performance metrics that go beyond ridership changes and farebox recovery, such as improved mobility, increased safety, and enhanced customer experience. Fourth, agencies should establish their goals up-front and work with potential technology vendors to design a microtransit project within those parameters. Finally, agencies should invest in robust marketing and outreach in order to ensure that all current and potential customers understand how to use the service.

There is an opportunity for traditional public transit agencies to leverage the potential of flexible route, on-demand microtransit. However, it is critical to keep in mind that technology cannot solve all of public transportation's challenges. Regardless of the technology available, the customer should remain in the forefront when considering service adjustments and new service models. Agencies should be intentional and deliberate in identifying the problem they are looking to solve or the question they seek to answer when testing microtransit.

# 1. Introduction

Smartphone technology and cellular data connectivity provide the ability for public transportation agencies to meet customers' needs in new ways.[1] In cities and metropolitan areas throughout the world, mobile applications deliver on-demand rides for pick-up and drop-off at or near desired origins and destinations without following predetermined routes as buses and trains typically do.

Private sector firms pioneered and popularized these new services beginning in about 2009.[2] Soon after, the California Public Utilities Commission (CPUC) took a first step in defining and regulating these services, referring to companies such as Uber and Lyft as transportation network companies or TNCs. CPUC defined a TNC as "a company or organization operating in California that provides transportation services using an online-enabled platform to connect passengers with drivers using their personal vehicles."[3] Many other states and dozens of localities have adopted similar definitions. Today, TNCs provide millions of rides per day in hundreds of cities, becoming a global phenomenon.[4]

Following the emergence of TNCs, other firms went beyond the initial concept of utilizing on-demand dynamic route software to provide transportation services and began exploring methods to pool multiple customers with differing origins and destinations into a single vehicle. In 2014, for example, Bridj began providing a privately operated and financed shuttle service in Boston and Washington, DC that utilized on-demand software to provide service optimized for commuters.[5] Chariot was also founded in 2014 and operates "crowd-sourced" fixed-route bus services where riders identify and vote for new routes online. When Chariot identifies a critical mass of unmet need, it deploys a fixed-route, privately operated vehicle.[6] Around that time, the on-demand, dynamic route market expanded with the entrance of UberPool and Lyft Line. These services allow TNC drivers to pick up multiple passengers traveling in similar directions, creating a carpool.[7] In 2017, Lyft launched a fixed-route, shared vehicle, fixed-fare service called Shuttle in San Francisco and Chicago.[8]

While the private sector has taken the lead in developing and deploying these technology-enabled mobility options, they bear resemblance to public transit and taxi services. Yet their popularity suggests they are meeting a need that public transportation is currently not serving, but only for customers who can afford to use them. Further, private providers are not necessarily focused on promoting public policy goals such as accessibility, equity, and mobility in the same way that public transportation agencies or cities are. Nevertheless, transit agencies in several metropolitan areas—including Kansas City, San Jose, and San Francisco suburbs—have experimented using in-house, represented labor and vehicles to provide rides using on-demand, dynamic route dispatch technology in shuttles or 40-foot buses, called microtransit.

This research is informed by limited literature to date as well as a series of interviews with the project teams working on the pilots. It concludes with a set of recommendations intended to inform the design and implementation of future public microtransit pilots and service delivery models.

## Defining Microtransit

The U.S. Department of Transportation (U.S. DOT) defines microtransit as "a privately owned and operated shared transportation system that can offer fixed routes and schedules, as well as flexible routes and on-demand scheduling. The vehicles generally include vans and buses."[9]

Microtransit can be operated on a fixed or flexible route, and by a preset schedule or on-demand schedule. There are several potential configurations as illustrated below. This paper focuses exclusively on flexible route/on demand schedule microtransit, the bottom right quadrant.

| Fixed Route/Fixed Schedule | Flexible Route/Fixed Schedule |
|---|---|
| While routing and arrival/departure times of the shared vehicles are fixed, new and adjusted routes can be "crowd sourced" (i.e., users request origin-destination points on a tech-enabled platform that can inform the operators of which routes to introduce). This configuration most closely mirrors public transit. | Users request shared vehicles in real time through a tech-enabled application, but the arrival and departure times of the shared vehicles are fixed. Routes can be fully dynamic and adjusted in real time based on traffic and demand or can change over the span of a few days. |
| **Fixed Route/On Demand Schedule** | **Flexible Route/On Demand Schedule** |
| Users request shared vehicles in real time through a tech-enabled application along a predetermined route. Alignment of routes can be "crowd sourced." | Users request shared vehicles through a tech-enabled application, and the vehicle will deviate from its route to somewhere within walking distance of the requester. Routes can be fully dynamic and adjusted in real time based on traffic and demand or can change over the span of a few days. |

# 2. Research on Microtransit and TNCs

Despite the interest in technology enabled mobility options, data and information about the effects of dynamic, on-demand transportation is limited. While most of the existing literature focuses on TNCs for personal, private use, many of these conclusions indicate the need for a stronger public sector role in the new mobility space. This could potentially be through publicly operated microtransit models, partnership models, or an expanded regulatory role.

In 2016, the Transportation Research Board (TRB) published a report identifying policy and regulatory considerations for privately operated technology-enabled transportation. It concluded that the necessity for customers to have access to smartphone and data connectivity to access these services can make it challenging for people to access TNCs. TRB recognized the capability of TNCs to enhance mobility, expand travel choices, and change travel and land use patterns. The report recommended that policy makers identify information needed to formulate regulations that protect the public interest.[10]

Also in 2016, the Shared Use Mobility Center (SUMC) published a report on behalf of the Transit Cooperative Research Program (TCRP) on the effects that on-demand dynamic route transportation technology has had on large metropolitan regions in the United States.[11] Based on rider surveys in Austin, Boston, Chicago, Los Angeles, San Francisco, Seattle, and Washington, DC the authors suggested that shared services have the potential to complement public transit. For example, data demonstrated that shared services frequently served social trips when public transit was infrequent or unavailable, such as between 10:00 PM and 4:00 AM. The report recommended that there may be benefit in focusing on partnerships to ensure the delivery of public policy goals around equity and accessibility. TransitCenter also identified opportunities for transit agencies to work with TNCs, including partnering to reinforce transit's strengths.[12]

A 2017 report from the University of California, Davis surveyed riders to determine reasons for selecting ride-hailing over public transportation.[13] The report suggested that ride-hailing may not always be complementary to transit and found the two most important reasons customers were selecting ride-hailing services in lieu of transit were because public transit services are too slow and that they travel at times when no transit services are available. Indeed, completely private TNCs might induce more trips, greater vehicle miles traveled, and less use of public transit.[14]

Early research shows that fully private TNCs might be increasing VMT, diverting trips from transit and leading to more congestion. For example, the UC Davis report found that 49 percent of TNC trips likely would not have been made at all or would have been made by walking, biking, or transit.[15] A 2017 report by Schaller Consulting found that TNCs

generated net increases of 31 million trips and 52 million passengers since 2013 in New York City, and that TNCs accounted for an increase in VMT of 600 million miles in three years.[16] A 2017 doctoral thesis based on data from Denver, Colorado, calculated that TNCs increased VMT by 185 percent while a study by the San Francisco County Transportation Authority found that TNCs account for 20 percent of all local daily VMT.[17] These results suggest that publically sponsored services, like microtransit, might help bolster more efficient of the transportation system.

Other studies evaluated the experiences of public transit agencies and cities partnering with private sector mobility providers, which might have a different transportation outcome than fully private TNC services. In August 2016, the city of Centennial, Colorado launched a temporary pilot partnership service with Lyft to provide first and last mile(s) access to and from the city's light rail station. Centennial also partnered with Via Mobility Services, a private non-profit paratransit provider, to provide a vehicle option for customers that use wheelchairs or need additional assistance. Project evaluation found that the partnership was significantly more cost effective for the public transportation agency in the provision of services for customers that need access to vehicles that can accommodate wheelchairs than the options available prior to pilot.[18]

Another report provided case studies on the partnership between Uber and Pinellas Suncoast Transit Authority (PSTA) and the partnership between the Kansas City Area Transit Authority (KCATA) and Bridj. It evaluated the barriers for the public sector when developing either partnership or licensing contracts with on-demand, dynamic route transportation options. This report identified the need to clarify the regulatory structure enabling these types of partnerships, the need for transit agencies and cities to engage with their in-house, represented labor, and the need to prioritize the planning for compliance with equal access regulations.[19]

Although the research is still emerging, there is broad consensus that innovations in technology continue to allow new mobility models to emerge and evolve. The transformation of the passenger travel space is providing a new proposition for public transportation customers, and not necessarily to the detriment of public transportation service. While research on microtransit specifically is embryotic, the literature on TNCs that exists today is illustrative in demonstrating the wide range of microtransit opportunities that could benefit public transit agencies.

# 3. Experiences with Microtransit Pilots

While the literature provides evidence that there may be potential for service delivery contracts or partnerships between public agencies and private providers, it does not identify approaches for developing and deploying this type of service. The following case studies aim to provide insight into the experiences of public transportation agencies that implemented some of the first microtransit pilots.

## 3.1 Kansas City Area Transportation Authority and Bridj

Upon its launch in 2014, Bridj took the on-demand, dynamic routing components of the TNC model and applied them to a privately financed, shared transportation service model. The service was designed for commuters and was first launched in Boston and later Washington, DC. During peak morning travel times, a set of vehicles would drive from a residential area towards a city's central business district (CBD). The general direction was fixed, but the software that guided the vehicle's driver would dynamically route to pick up customers as they requested the service. In the evening, the service would take customers from the CBD to the residential area from which they originated.

While Bridj was privately operated and financed, it provided a potential model to enable the public sector to leverage the perceived benefits of dynamic route, on-demand transportation within a service that felt more like traditional transit.[20] Like traditional transit, the Bridj model utilized multi-passenger vehicles and operated in a shared-ride model. However, unlike traditional transit operating on a fixed route with a schedule, Bridj operated on demand, with a dynamic route.

The Kansas City Area Transportation Authority (KCATA), a bi-state public transportation agency, was the first agency to test Bridj's service with public sector funding. KCATA designed a microtransit pilot to better understand the local on-demand market and to demonstrate a public-private partnership. Since Bridj's software was designed for commute patterns, the project specifically tested its service during commuting hours to and from the CBD.

To expeditiously move the pilot forward, KCATA's Board of Commissioners granted an exemption to the competitive procurement process, allowing the agency to partner directly with Bridj. The $1.5 million for the pilot came from funds leftover from a local sales tax.[21] By nature of expediting the procurement process, KCATA and Bridj were able to work side-by-side to identify service areas and design the project. At the time, no other public agency had launched a high profile on-demand, dynamic route transportation option with app dispatch, giving the agency incentive to expediently become the first to do so.

The service—RideKC:Bridj—was launched in March 2016. During the yearlong pilot, customers could download the Bridj application on a smartphone, create an account, input their pick-up and drop-off locations within the service area, and book a trip in real time or up to 24 hours in advance. The application provided directions to a pick-up location that aimed to be a five-minute or less walk from the customer's origin. However, data suggest that actual time to walk to RideKC:Bridj stops was longer for nearly two-thirds of customers.[22] A 14-passenger shuttle would pick up the customer, and the software's algorithm guided the operator along the route that the algorithm identified to be the most efficient. The service was only available in the direction of demand (the commuting direction) within the service area.

The service was operated by KCATA union employees and used 10 leased vehicles and two wheelchair accessible vehicles, paid for by KCATA. The vehicles were built and outfitted to serve on this pilot.[23] The service was offered during weekday rush hours from 6:00 AM to 10:00 AM and from 3:00 PM to 7:00 PM for $1.50, the same as the local bus fare. To pay, customers connected a credit card to their account on the smartphone application. Customers could rate their ride after their trip. If any rides were given low scores, a Bridj employee would contact the customer for additional information.

No federal funds were used for this pilot, which meant that KCATA would not require compliance with Executive Orders for environmental justice for low income and minority populations.[24] By omitting this requirement, it was not necessary to identify solutions prior to launch for customers who may not have access to data connectivity, smartphones, or debit/credit cards. As such, the pilot did not include a call center to dispatch rides for customers without smartphones or without digital literacy. This service also did not address solutions for customers without access to debit or credit cards.



*KCATA Bridj vehicle displayed in front of theKauffman Center for the Performing Arts in downtown Kansas City. Photo: KCATA.*

KCATA and Bridj projected the pilot to provide 200 rides in a day, however, within the first six months the service provided 597 rides total.[25] Ridership grew during the final six months, with 1,480 rides provided in total, or about 11 rides per day. Over the final six months of the yearlong pilot, one-third of riders took more than 10 rides apiece, suggesting that while ridership was lower than projected, it was an attractive service to a segment of customers. The pilot concluded with costs amounting to roughly $1,000/per ride.[26]

Despite the high attention to the pilot within the industry, awareness of the service among potential riders was limited. During the pilot, officials recognized that they had not invested enough in marketing within the actual service area. Eventually, KCATA adjusted

their marketing strategy and distributed materials to businesses and residences, marketed to local employers, and conducted geo-targeted digital advertising.

The Amalgamated Transit Union (ATU), the union representing KCATA's operators, was initially concerned that the new service had the potential to negatively affect ridership on their core services. However, by using ATU-represented workers to operate the vehicles, KCATA was able to negotiate an agreement.[27] KCATA and ATU developed a mutually beneficial solution and established a separate wage class in the Collective Bargaining Agreement and agreed to eliminate the need to bid for work, to hire a workforce with hospitality skills, and for drivers to be entered into a qualified pool for operator and maintenance jobs at the close of the pilot.

Initially, KCATA trained fixed-route operators for the pilot. However, staff found it was difficult to transition drivers who were acclimated to operating a larger vehicle with a farebox. Instead, the agency trained paratransit operators who had experience using smaller, cutaway vehicles (shuttle buses), as the RideKC vehicles were similar to paratransit vehicles. KCATA provided tablet training, which included a tutorial on how to use the on-demand, dynamic route software for directions, and operators quickly became acquainted with the technology.

KCATA's primary goal for this pilot was to learn how on-demand, dynamic route services could be utilized by the agency. Bridj's algorithm was built and designed to provide an option for the peak commute, but appeared to not meet the needs of KCATA's customers within the specified geography and times available. Based on ridership, KCATA officials speculate that a commuter service may not have been the best fit for their customers within the specified geographies. A KCATA official noted that RideKC:Bridj did not meet customers' mid-day transportation needs, since it was only in operation during peak commute time.

According to a survey of respondents that had signed up for the service but did not use it, 76 percent reported that they did not use the service because it did not go where they needed to go; 31 percent reported that the service did not operate when they needed to travel.[28] Respondents suggested they would be more likely to use the service if there were pick-up and drop-offs nearby (67 percent), if there was operation during more times of the day (39 percent), or if the service was more flexible (34 percent). For example a service with a larger and less linear operation area with a larger operation window may have provided KCATA's customers their desired flexibility. This data suggest that the specific commuter use-case (or the way the end-user uses the system) within the parameters that it was deployed did not meet the needs of KCATA's customers.

While there may be areas within Kansas City where a commuter microtransit service is viable, a KCATA official noted that the agency does not yet have sufficient data sets to clearly identify geographies with origin and destination that allow service planners to understand where best to deploy this service. (KCATA's bus network is commuter-based, but does not currently have a mechanism by which to collect granular origin and destination pairs.) While KCATA currently does not have plans to revive this pilot, they are working to incorporate on-demand, dynamic route transportation for their paratransit customers through a new app based service called RideKC Freedom On-Demand, which enables customers to use a cellphone app to hail taxis.[29]

## 3.2 Santa Clara Valley Transportation Authority and RideCell

In 2015, Santa Clara County's Valley Transportation Authority (VTA) identified five areas with a need for more transit service but inadequate demand to justify additional fixed routes. In order to build ridership, VTA staff considered several options for solving first and last mile connectivity, including active transportation, bike share, and car pool shares. Looking to the private sector for inspiration and attracted by its potential to be a cost-effective model operating in-house, VTA developed a microtransit pilot to improve mobility in the identified service areas.



*VTA Micro Transit pilot vehicle "FLEX".*
*Photo: VTA*

VTA released a request for proposals (RFP) for an on-demand and subscription solution and indicated interest in a desktop/mobile application to allow real-time vehicle tracking, seat reservation, and online payment.[30] The objective was to increase transit ridership by identifying new service models that may allow VTA to tap into new or minimally served markets such as centralized high-tech employment campuses, first and last mile rail connections, and housing clusters near major transit stations/stops.[31]

RideCell was awarded the contract to license software that enabled on-demand service. RideCell provided both the front and back end of the service. The software used a dispatching algorithm to assign requested trips to vehicles in real-time aimed to maximize operational efficiency. Initially, VTA sought both on-demand and advanced reservation capabilities on the application. However, RideCell was unable to have both features function effectively simultaneously, therefore only the on-demand capability was offered.

The service launched in January 2016 and was branded as an "on-demand transit service" called FLEX.[32] Customers could use their smartphones to download the application, register an account, and request rides within the service area. Staff defined pick-up and drop-off stops marked with sidewalk decals. These stops were selected where vehicles could stop

safely and legally. Operators used onboard tablets that provided navigation instructions based on an algorithm that generated dynamic routes in response to real-time customer trip requests. FLEX had no fixed route or schedule.

VTA used in-house, represented labor and six rehabilitated, rewrapped 26-passenger buses from their retired fleet. While these vehicles were later determined to not be well suited for dynamic response service due to their large size and higher per-hour operation cost, they provided a capital cost-saving measure in comparison to procuring new vehicles. Additionally, all of the vehicles were wheelchair accessible. Vehicle dispatch was accomplished by the RideCell application and a customer service center. Customers had the option to call the customer service center to request a ride. If they did so, a customer service representative would put the request into the RideCell application system and the software determined the appropriate vehicles to dispatch. The service operated on weekdays from 5:30 AM to 8:30 PM. A single ride on FLEX was $2 off-peak and $3 peak; single rides on VTA's non-express service are $2.

VTA set the parameters on the platform limiting wait time and ride time for customers. The average wait time was approximately 7.5 minutes (including time walking to the stop); the average time on the vehicle was a little over eight minutes. The application provided customers with turn-by-turn directions to the closest pick-up location. Throughout the pilot, VTA monitored customer feedback to troubleshoot issues.

At pilot launch, the algorithm prioritized picking up customers rather than dropping off customers. RideCell later adjusted the algorithm to ensure customers' ride time would not exceed 20 minutes. This enabled the algorithm to optimize the number of customers that were picked up and dropped off. The algorithm did not, however, include load factor in its optimization, which made it challenging to utilize the full capacity of the bus.

After trip completion, customers could rate their trip and driver and leave comments. Shortly after the launch, informed by customer feedback, staff identified a need to expand the service area. Initially, VTA defined a 3.25 square mile pilot service area based on the location of greatest unmet demand for transit service. However, low ridership suggested the service area was not meeting the needs of the riders and did not provide access to a nearby light rail. The pilot ultimately expanded to 5.5 square miles, but this process took three months due to the required board approval. VTA did note an average overall increase in boardings across the FLEX area after expansion.

The pilot was discontinued after six months of operation as a result of high operating costs and low farebox recovery. During the pilot, a total of 2,714 trips were completed, with an average of 16 boardings per day in the first three months. This increased to 41 boardings per day once the service area expanded. This amounted to 0.4 boardings per revenue hour over the six-month period; VTA's standard minimum is 15 boardings per revenue hour.

While 2,677 individuals registered for the FLEX application, only 313 individuals actually used the service. Twenty individuals became the core group of FLEX riders and used the service multiple days per week.

VTA conducted customer surveys before and after the FLEX pilot with both riders and non-riders. The survey showed that 42 percent of riders were between the ages of 25 and 34. The results suggest that FLEX generally replaced walking and TNC trips. Data suggest 35 percent of trips were to and from bus or rail service. The survey also highlighted that 41 percent of respondents indicated a willingness to pay more for the service, up to $3 to $4 for a ride, 84 percent of riders rated FLEX as "good" or "excellent". And 70 percent of riders requested options to schedule, reserve, and pay for their ride in advance.[33]

While VTA aimed to integrate FLEX fare payment with the regional smart card system, they were unable to do so.[34] The Clipper Card utilizes card-based (rather than accounts based) technology, making it challenging to integrate mobile ticketing platforms. To effectively integrate, FLEX would need to install physical farebox readers, which proved impossible within the pilot timeframe due to a concurrent farebox modernization at the regional level. Instead, the service used a cashless, separate account-based payment system, which required customers to add a credit or debit card to a user account prior to their first-time use, and was not integrated with the regional system. There was no farebox on the vehicle.[35]

Unbanked customers and those without access to credit or debit cards did not have simple payment options beyond prepaid debit cards. Survey results indicated that 70 percent of customers desired more payment options and the ability to schedule rides in advance.

VTA had a small marketing budget and relied on local businesses and housing developments to promote the pilot, in addition to geo-targeted online advertisements and social media. VTA placed marketing materials at light rail stations, on bus benches, and on posters. The most useful and effective marketing tool was in-person education. Offering free rides to frequent riders was also effective in persuading individuals to try the service. Due to the untested nature of this service, the agency made the decision to limit marketing investment. During post-pilot evaluation, staff identified lack of available information on how to use this service as a substantial barrier to acquiring ridership. Staff indicated that in a future iteration of this type of project, a substantial marketing budget would be critical to the project's success.

VTA's contract with union employees limited VTA to adjusting driver staffing and the service area during the quarterly bidding process, resulting in an overstaffing of drivers. This did not provide the desired flexibility to change service area and meet in real time customer demand.

With the desire to provide a new technology-enabled service to increase demand in their core system, VTA pursued a contract with RideCell that eventually turned into a first and last mile pilot. Due to unanticipated obstacles involving time and technical capabilities, the FLEX service as it was delivered was ultimately different from what the original RFP stated. VTA does not currently have any plans to revive its microtransit pilot.

## 3.3 Alameda-Contra Costa Transit District and DemandTrans

The western portions of Alameda and Contra Costa Counties in the east San Francisco Bay are characterized by low-density single-family residential areas. As a result, high-capacity arterial bus routes are not always the best fit to meet the region's need.



*AC Transit microtransit service "Flex". Photo: AC Transit*

In 2015 the Alameda-Contra Costa Transit District (AC Transit) released an RFP for a vendor to develop and implement a technology platform that would enable "a fully automated scheduling, dispatching, and reservation system for a demand responsive bus service."[36] AC Transit aimed to improve service in two low density and low demand areas, and respond to a changing marketplace, all while ensuring access and equity.[37]

After executing a competitive procurement, DemandTrans Solutions was selected as the technology vendor. DemandTrans was responsible for helping to determine the appropriate size for both service areas, integrating the demand response software known as MobilityDR, and providing the hardware for the vehicles. This program—known as Flex—was piloted in Newark and the Castro Valley beginning in 2016. The pilot was ongoing at the time of this research.

Within the Newark test zone, Flex temporarily replaced AC Transit's bus line 275 which connected Newark, Fremont, and Union City. This line was identified as the lowest performing bus route in the district, and fell under AC Transit's 25th percentile threshold on productivity.[38] The line struggled with low frequency (headways were between 45 to 60 minutes) and poor ridership. To promote positive customer relations and transition riders off of line 275 to Flex, AC Transit implemented a month-long promotional free ride offer, sent out a mailing to everyone who resided/worked within a quarter mile of the line, and conducted outreach on the bus.[39] In addition, Flex operated alongside line 275 for eight months before the fixed-route bus was discontinued. At the end of the pilot in March of 2018, AC Transit will make a decision as to whether or not to restore line 275. Within the Castro Valley zone, one Flex shuttle operates alongside bus lines 48 and 32. Lines 48 and

32 are hourly routes that connect to a Bay Area Rapid Transit (BART) station. The area was identified as a pilot zone because of points of interest including a BART station and a senior center.

Prior to pilot launch, AC Transit buses on line 275 ran every 45 to 60 minutes. The Flex service in Newark now has two shuttles that run every 30 minutes. Castro Valley has one Flex shuttle in operation, which runs every 60 minutes.

AC Transit uses in-house, represented employees as operators and shuttles that the transportation agency already owned (but were unused) to operate the service. A previous general manager who had hoped to replace AC Transit's large buses with the smaller vehicles, which were ultimately never put in service, originally purchased the shuttles. The 16-passenger shuttles are ADA compliant, equipped with Clipper Card fareboxes, and wrapped with Flex decals.

To use the service, customers access AC Transit's website to reserve a pick-up time and location and a drop-off location within designated service areas. However, the service has a fixed schedule for pick-up at designated BART stations, which does not require reservations. At scheduled times, customers can board the service at the BART stations and verbally request drop off locations to the operator. The operator then manually selects the destination from a drop down list on the tablet. Customers can schedule a ride up to three months in advance of a trip, and the transportation agency recommends that they schedule a ride at least thirty minutes before their desired departure. Customers also have the option of scheduling a subscription-type ride (i.e. pick-ups every Wednesday morning) and can schedule on behalf of others. Customers can reserve rides via a call center. Customers can pay using cash, Clipper Card, or Day Pass. The Flex service is not accessible through a mobile application.

Based on trip requests, customers are directed to the nearest bus stop at the closest available time. Customers receive an email or text when the bus is 10 minutes away. While Flex stops are defined, routing is flexible and dynamic. Flex operators rely on mounted tablets that provide turn-by-turn driving instructions based on an algorithm.

As of November 2017, there have been over 25,000 passenger trips taken on Flex, with over 600 unique riders, and 70 percent return customers.[40] While average daily boardings on all Flex routes have been lower than comparable fixed-route service, the Flex service has matched fixed-route productivity during peak periods. Newark and Castro Valley Flex services both reach seven passengers per revenue hour or more during morning and evening peaks. According to AC Transit staff, Newark Flex ridership increased substantially after the elimination of line 275, and then dipped in the summer, likely due to school recess. AC Transit staff estimate that based on ridership numbers, close to a third of line 275 customers switched to Flex, with 50 percent switching to other routes in the area.

Ridership in Castro Valley is at its highest levels since program inception, at close to 45 boardings each day. Similar to transit ridership trends across the country, AC Transit has experienced an overall downward trend in ridership throughout the region.

Based on on-going analyses of the pilot, AC Transit found that almost twice as many passengers board Flex at BART stations, rather than scheduling Flex to go to BART stations.[41] This could be because the Flex service going to BART does not meet their needs or because customers prefer the convenience of the predictability of when they are able to pick up a Flex at the BART station rather than reserving a ride.

According to AC Transit the cost of operating the Newark Flex service and eliminating line 275 is cost neutral, since the two 30-foot diesel buses operating on line 275 have been replaced with Newark Flex. Flex in Castro Valley adds the cost of a bus, as it operates on top of existing service. Costs for all hardware, software, and support for the entire Flex service have been offset by the lower operation and maintenance costs of the smaller, cutaway vehicles. The cutaway vehicles have a 25 percent lower operation and maintenance (O&M) cost per mile than line 275. However, the Flex fleet has had ongoing issues and costs associated with technical repairs related to the onboard navigation tablets, which is covered by DemandTrans as warranty repairs.

Prior to procurement, AC Transit identified specific use-cases to test, along with an overall vision of what the future of Flex would look like in the region. Headways for AC Transit's preexisting services were 45 to 60 minutes, yielding a service that was not useful for most customers. Staff hypothesized that if they could bolster service on the core, high frequency routes and deploy flexible, on-demand options across existing low frequency feeder routes to create a network effect, they would be able to grow overall ridership and in a cost neutral way. They chose line 275 to test whether Flex could provide a better service than current bus operations.

Staff emphasizes that they were not trying to create a service that was competitive with TNCs. Instead, AC Transit aimed to create a publicly operated mobility option with a more frequent headways and more flexibility in scheduling than the preexisting option. Upon completion, the pilot will be evaluated based on productivity, on-time performance, and customer feedback.

Upon service launch, marketing was limited to a brochure and a website. As a result, nearly all Flex riders had to self-educate, and awareness of the service remains limited. However, prior to the elimination of line 275 in March 2017, substantial investment was put towards marketing. This investment included direct mail to 11,000 Fremont/Newark area residences and business; brochures, flyers, seat drops, and car cards; ads on buses,

bus shelters, and light rail stations; and the use of bilingual brand ambassadors at Union City BART station and on line 275, among other tactics. AC Transit staff indicates that this increased marketing was effective for their region.

AC Transit's call center contract with its labor union was up for renewal and the transportation agency was able to renegotiate the terms to include reservations for the Flex service. The call center contract was based on call volume, enabling AC Transit to expand its service as long as it does not exceed the negotiated amount.[42] AC Transit found that around 20 percent of the trips are dispatched through the call center. According to a customer survey conducted in 2012, 49 percent of AC Transit's riders have a household income of less than $24,000 per year.[43] However, there currently is no data to indicate whether the portion of customers utilizing the call center to dispatch rides is a function of income, digital literacy, preference, or some other influencing factor.

AC Transit and the ATU entered into a memorandum of understanding, enabling the agency to select operators for the Flex service without a bidding process for the duration of the pilot. To drive for the Flex service, operators indicate interest and are selected based on seniority by the transit agency. Only drivers who are selected to operate this service are trained on the equipment, providing cost savings over training all operators. Operators are provided financial incentives to indicate interest to drive for this service.

In November 2017, AC Transit issued a staff report to its board, recommending the permanent elimination of line 275 and the continuation of Flex services in Newark and Castro Valley.[44] By incorporating Flex permanently into its service, AC Transit will be able to place Flex routes in the regular operator bid and route training process. This is important for facilitating a network approach to service, as it would allow AC Transit to bring service on major corridors to 15-minute or better headways and Flex coverage for those routes currently at an hour and a half-hour. If AC Transit's Board approves the recommendation, implementation of the service is estimated to begin in March of 2019.

# 4. Implications and Recommendations

The experiences at KCATA, VTA, and AC Transit help to provide context for the potential institutional and contractual considerations in developing and deploying publicly operated microtransit services, in addition to providing insight into potential applications for this technology. This section details a set of key takeaways and recommendations from the experiences at each of these agencies.

> *When considering the development and deployment of publicly operated microtransit services, agencies should prioritize customers' needs over the novelty of new technology and think critically about how to design, develop, and deliver a pilot that puts the customer first.*

In the cases of KCATA and VTA, the agencies initially identified on-demand, dynamic route transportation options as a potential service option prior to determining its specific application. Through vendor selection and the project design process and deployment, each pilot eventually identified use-cases. KCATA ultimately tested the commute as a potential use-case. VTA tested first and last mile applications.

AC Transit, on the other hand, identified specific challenges up front. Within one pilot area, staff identified an under-performing bus route with an infrequent headway. The agency knew it had a clear customer base for this line, albeit low density and low demand. The second pilot area was designed to complement the existing bus line and to serve as a feeder into and out of BART stations. AC Transit designed their pilot to improve the headway on the preexisting route to 30 minutes, aiming to improve service to their customers, and to serve as a first and last mile option to the BART stations. This pilot, when compared to the KCATA and VTA pilots, has generated significant ridership and is expanding.

Due, in part, to the fact that on-demand, dynamic route technology is new and generating substantial interest, many transit agencies are experiencing political pressure to deploy this technology and demonstrate the ability to innovate. However, regardless of technology, customers are not very likely to use a service that does not meet their specific transportation needs. Agencies that start with clearly defining their transportation problem statement and that do not shy away from asking tough questions will be more successful than agencies that implement technology for its novelty.

> *Transportation agencies should consider defining performance more broadly than ridership and farebox recovery metrics, and should structure the service contract around continuously improving these metrics.*

In the cases of KCATA and VTA, ridership was low and expenses were high. Ultimately, these disproportionate costs led to discontinuation of these pilots. While, in general, public transportation is not expected to experience full cost recovery, these pilots were unable to meet even modest financial goals and justify the continuation of the service.

However, these early experiments illustrate that ridership does not always capture the full story. For example, these metrics do not necessarily capture improved mobility, increased safety, and enhanced customer experience. In order to ensure that a service is optimized to deliver on the defined project goals, agencies should consider allocating performance metrics for the public and private partners within the service contract.

Public-side performance metrics should not necessarily use fixed-route service performance and/or cost as a baseline, as this is a fundamentally different type of service. Rather, agencies should consider what they are trying to accomplish, orient performance metrics around that goal, and seek to optimize the cost of achieving the goal.

> *Transportation agencies should utilize a contracting process that empowers those most familiar with the project to make decisions outside of the standard bureaucratic processes in order to be able to fail fast and iterate quickly.*

Shortly after the launch of the VTA pilot, it became clear that the service area needed to be adjusted to meet customers' needs. Because the program was subject to standard labor protocols, staff were unable to adjust the service area quickly and instead had to go through a specified board process. Additionally, VTA's contract did not allow them to adjust staffing in response to actual need.

While transportation agency processes exist for a variety of important reasons, there may be benefit in incorporating increased flexibility in the procurement process and during the piloting phase of a microtransit project due to the number of unknowns that exist during project development.

One approach is defining a specific pilot program policy that enables increased flexibility during a specified pilot time period. Early private sector involvement, organizational separation, escalation ladders, and mechanisms to drive accelerated project decision-making should also be considered. Such tools may enhance collaborative problem solving and ensure that issue resolution keeps the integrity of the project and its specific goals in mind.

*Transportation agencies should establish their goals or define hypotheses up-front and work with potential technology vendors to design a microtransit project within those parameters.*

Within each of the pilots, the vendor selected was not able to meet the requirements of the RFPs set out by the agencies. This is in part due to the emerging nature of these types of technologies, in addition to the need for better understanding the needs and applications of the end user.

For KCATA, the software was limited to only serving commuting patterns. Through the duration of the pilot, low ridership indicated that the commute may not be the best application for this type of service and the sole sourced Bridj model did not provide the flexibility to test other potential applications. VTA's RFP called for software that could provide for first and last mile needs, both on-demand and through an advanced reservation subscription service. The company that was awarded the RFP was unable to concurrently provide both on-demand and advanced reservation options. During pilot analysis, customers indicated a desire for a service that had the flexibility for both on-demand and advanced reservation. AC Transit's software challenge was slightly different, in that the service became quickly oversubscribed. The software, however, was not designed in a way that provided alerts to AC Transit staff to indicate that this was an immediate challenge.

Transportation agencies should conduct robust vendor and design research prior to RFP development and release. For example, by taking the time to conduct a series of outreach meetings to potential vendors, agencies can better understand the capabilities of their technology solutions and set achievable standards. Agencies should also be willing to not move forward with a project if they cannot identify a vendor who can help them meet their goals. To ensure that the project is designed to provide a solution for a specific use-case that fits within the strengths of a technology vendor, agencies should use an innovative contracting approach that allows the proposing vendor to contribute to the design phase.

*Transportation agencies should prioritize local, on the ground marketing and outreach upon launch of a new microtransit service.*

Representatives from all three agencies indicated that the pilots would have benefited from more on the ground marketing and outreach. When deploying a new service that requires the use of digital tool literacy and comfort with change, agencies should ensure the public is well educated and prepared to engage with the service. Because deploying a pilot like microtransit requires cross-departmental engagement, project managers should work early on to ensure that there is clear communication around expectations, roles, and responsibilities. It is imperative to have agency-wide consensus on the amount and intensity of marketing and outreach expected for a successful pilot. On the ground marketing campaigns that specifically target potential pilot customers, such as direct

mailers to local businesses and residences, the distribution of educational materials at transit stations and on existing bus and train lines, and the deployment of customer service representatives are likely to be effective. Transportation agencies should set aside substantial budget and time to ensure that customers are both aware of the new service and understand how to use the service.

# 5. Conclusion

It is not a coincidence that these public transit agencies launched variations of a microtransit service model while transit ridership across the United States is in decline. When discussing their motivations for pursuing these pilots, representatives from all the agencies acknowledged the emergence of private new mobility services and their apparent appeal to riders as a motivating factor. On-demand, dynamic route, new mobility services have changed customer expectations around transportation and public transit agencies want to be responsive to these changes. How public transportation agencies do so continues to be executed through trial and error.

The experiences of public transportation agencies demonstrate the critical first steps of incorporating this new technology into the public portfolio. On-demand, dynamic route technology options provide a new value proposition for public transportation customers, but it is critical to remember that this technology cannot solve all of public transportation's challenges.

Public transportation agencies should be intentional and deliberate in identifying the problems they are looking to solve when testing these new technologies. While these services have the potential to solve agency challenges and expand the reach of public transportation, they cannot do so without taking into considering the full scope of service delivery.

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# Transit's Reach:
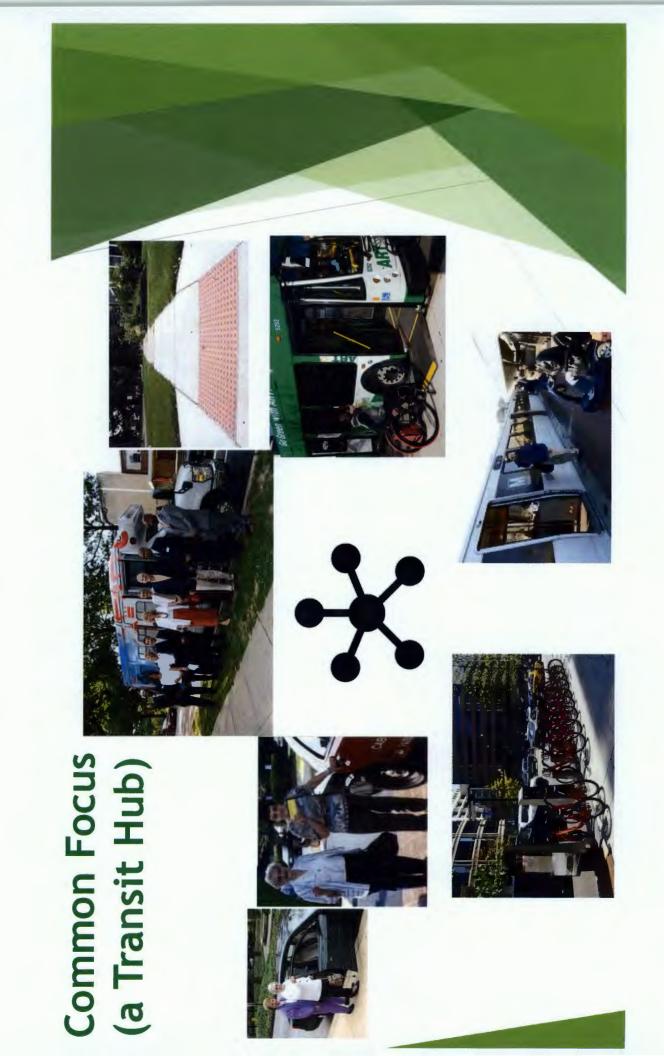
## First Mile / Last Mile and Local Circulation

# Common Aspects

▶ **Shared Rides** (to provide more rides within budget)

▶ **App-Based** (with a call-center backup capability)

▶ **Automated Ride Matching & Scheduling** (for efficient scheduling)

▶ **Accessible** (possibly with experienced accessible provider partners)

# Common Focus
# (a Transit Hub)

# Alternative Approaches 1

▶**GeoFenced** – Rides only provided within a zone, with defined boundaries

<center>-Versus-</center>

▶**Spontaneous** – Rides must originate within a zone, but can go to any destination in the metro area

-or- **Fixed Route/Fixed Stop or Hail-a-Ride** – operated with smaller buses

# Alternative Approaches 2

▶ **Curb-to-Curb** (Origin-Destination)

-Versus-

▶ **Stop-to-Stop** (Walk to/from a nearby common meeting place)

# Alternative Approaches 3

▶ **Many to One** – Rides only provided to/from a Common Destination (e.g. a Transit Hub)

▶ **Many to Many** – Rides can connect any two addresses within the zone.

▶ **Spontaneous** – Rides must originate within a zone, but can go to any destination in the metro area or just within the zone.

▶ **Many to Few** – Rides only provided to 2 or 3 destinations within the zone.

## New Marin Transit on-demand service debuts



**Tampa's HART offers suburban connections**



## SmaRT Ride: Sacramento Regional Transit's New Way to Get Around Citrus Heights, Antelope and Orangevale



**Riders can book a ride with VIA anywhere within the City of West Sacramento for $3.50, stopping near homes and destinations.**

# Contracting Model 1: Ride Pooling

▶ Contractor takes ride requests and pools rides as feasible within on-time performance targets.

▶ Examples: **UberPool** & **LyftLine**

▶ Rides may be shared with non-sponsored riders.

▶ Data generally owned by the Contractor.

▶ Reporting dependent upon the Contractor.

▶ No Cash Fares

# Contracting Model 2: Software as a Service (SaaS)

► Contractor just provides software, software support & reporting capability.

► Transit system or another contractor owns and operates the vehicles, which may take cash fares.

► Data is owned by the sponsoring jurisdiction or transit system.

► Reports are generated by the sponsoring jurisdiction or transit system.

# Software as a Service (SaaS) Providers for Demand-Response

include

▶ **DemandTrans Solutions -** http://demandtrans.com/dynamicmobility service/

▶ **TransLoc -** https://transloc.com/microtransit-ondemand-software/

▶ **Via -** https://platform.ridewithvia.com/

# Contracting Model 3: Turn-Key
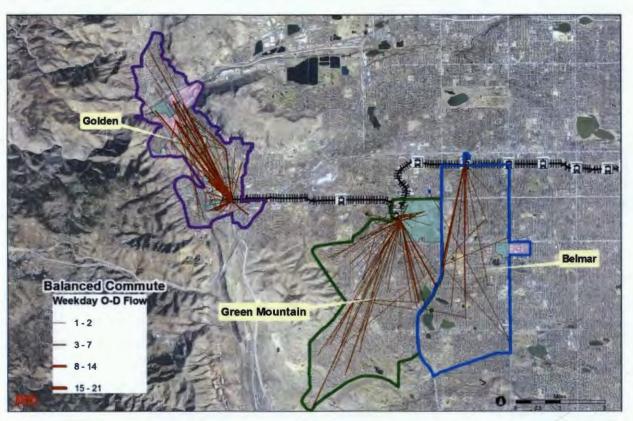
- ▶ All the features of SaaS (contracting model 2)
- ▶ SaaS contractor also provides directly or through subcontract
    - ▶ Vehicles
    - ▶ Drivers
    - ▶ Operations Management
    - ▶ Data & Reporting
- ▶ Data may be owned by the jurisdiction, if required by the contract.

# Turn-Key Examples
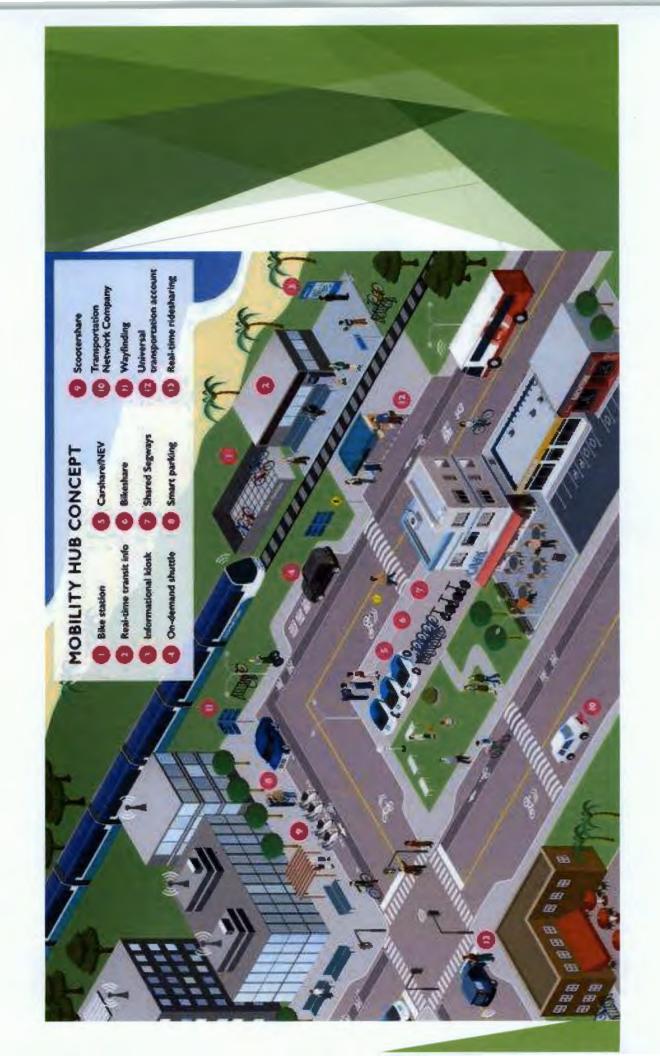
- TransLoc OnDemand, using Ford Transit vans - https://transloc.com/microtransit-ondemand-software/
  - Sacramento CA suburbs of Citrus Heights, Antelope, Orangevale and Folsom
- Via Transportation – www.ridewithvia.com using Mercedes Metris Passenger Vans
  - Arlington, TX
  - West Sacramento, CA

# Service Model 1:
# Feeder to a Transit Hub

## MOBILITY HUB CONCEPT

1. Bike station
2. Real-time transit info
3. Informational kiosk
4. On-demand shuttle
5. Carshare/NEV
6. Bikeshare
7. Shared Segways
8. Smart parking
9. Scootershare
10. Transportation Network Company
11. Wayfinding
12. Universal transportation account
13. Real-time ridesharing

# Planning Considerations

▶ **Population Density**

▶ **Employment Density**

▶ **Demographics**

▶ **Travel Patterns** (from a metro-wide household travel survey, cell phone tracking data and other sources)

▶ **Spatial Connectivity** (both the street network and internal pathways)

# Inclusion & Civil Rights 1

▶ Title VI of the 1964 Civil Rights Act: Services funded by the public must be accessible to the public !

  ▶ Services must be accessible regardless of race, color, national origin,

  ▶ This has been extended to include income and English Proficiency

  ▶ We should assume eventual extension to include those without access to technology.

# Inclusion & Civil Rights 2

▶ The Americans with Disabilities Act is also a civil rights law

   ▶ Older Americans & people with disabilities also work, shop, go to school and participate in community life.

   ▶ Partnerships with call centers and transportation vendors experienced in serving people with disabilities can meet the need.

# Key Measures of Success

► Boardings per Vehicle Hour

► Time Elapsed Between Ride Booking & Vehicle Arrival for

  ► Ambulatory riders

  ► Wheelchair or Scooter-users

► Subsidy per Ride

► # of Unduplicated Riders

► Average Frequency of Use for

  ► Ambulatory riders

  ► Wheelchair or Scooter-users

# Sustainability

► **Boardings per Vehicle Hour** – To boost the number of rides provided within budget, rides must be grouped. Allowing only a few destinations leads to more grouped rides.

► **Subsidy per Ride** – Minimization techniques include:

  ► Offering a flat fare over a time period instead of per ride.

  ► Capping the subsidy per ride over the fare required to board.

  ► Partnering with the destinations (the grocery store or hospital) to cover part of the subsidy and part of the fare.

► **# of Unduplicated Riders & Average Frequency of Use**

  ► Patronage builds political support

# Fares & Fairness

- ▶ Collecting and accounting for cash fares is cost-prohibitive, except for taxi vendors.
  - ▶ Taxi ordinances must be revised to allow shared-ride for public use.
- ▶ Integration with SmarTrip is not possible at this time.
- ▶ Drawing down on credit card accounts doesn't serve the unbanked or visitors.

# Fare Payment Trends

► One Platform for both information & fare payment

  ► Multimodal (bus, rail, bike – how about Amtrak & Greyhound?)

  ► On-Line info is now more important than print.

► Payment by:

  ► Mobile Phone

  ► QR-code paper tickets printed at stores & kiosks

  ► Designated credit card

  ► Draw-down Accounts similar to EZ Pass

## Mobility as a Service (MAAS) Principles 1

► Expand and integrate **shared-ride mobility options** to move people easily and efficiently, including:

  ► Network of local, limited-stop & express fixed route transit serving moderate to dense

    ► Affordable and Young Professional Housing

    ► Office and Commercial developments

  ► Transit Hubs for easy transferring between buses, bikeshare, carshare, demand-response, regional bus and Amtrak

  ► Geo-fenced zone demand-response connections from the curb to a transit hub and one or two nearby shopping and/or medical destinations

## Mobility as a Service (MAAS) Principles 2

▶Remove the **institutional silos** that can hinder movement between modes and providers, such as:

- ▶Single-provider Fare Payment
- ▶Single-provider information
    - ▶brochures
    - ▶websites
    - ▶apps

**YAFFE
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**Focus on Demand-Response
* ADA & Human Service
* General Public Feeders
  to Transit Hubs**

# 35 MILLION

## TRIPS IN 2017

# Bike Share in the U.S.: 2017

Bike share in the U.S. has continued its brisk growth, with **35 million trips taken in 2017,** 25% more than in 2016. This growth is attributable to increasing ridership in existing systems as well as the launch of several major new bike share systems across the country. Since 2010, 123 million trips have been taken on bike share bikes in the U.S.

2017 also saw the advent of a new bike share customer interface, commonly known as dockless bike share. Rollout has been uneven: after a series of unpermitted systems launched (and subsequently closed) in various cities across the U.S., numerous cities responded with pilot programs to permit dockless bike share operations. By the end of 2017, five major dockless bike share companies reported operating in approximately 25 cities and suburbs.

NACTO

# BIKE SHARE SYSTEMS IN THE U.S.: 2017



**MAP LEGEND**

- ● STATION-BASED
- ● DOCKLESS
- ● STATION-BASED & DOCKLESS

Source: nacto.org

## More Systems, More Cities, More Bikes, More Companies

The number of bike share companies operating in the U.S. also grew dramatically in 2017. From 2010 to 2016, most U.S. bike share equipment and services were provided by three major companies, B-Cycle, Motivate, and Social Bicycles, with a few cities using equipment and services from smaller companies such as NextBike.

As of the end of 2017, five new major dockless companies — Jump (formerly Social Bicycles), Limebike, MoBike, Ofo, and Spin — and a number of smaller companies — e.g., Pace (formerly Zagster), Donkey Republic, VBike, LennyBike, and Riide — opened systems in the U.S. A sixth new major company, BlueGoGo, which was the first to roll out dockless bike share bikes in the U.S., declared bankruptcy over the summer.
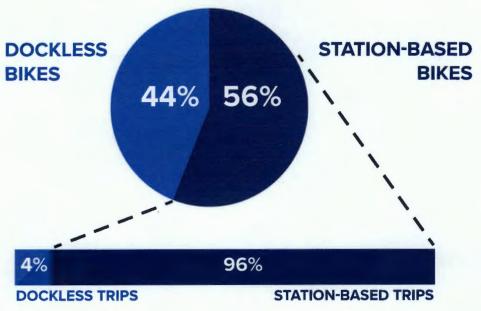
Dockless bike share bikes in Washington, D.C.

**In 2017, the number of bike share bikes in the U.S. more than doubled** – from 42,500 bikes at the end of 2016 to about 100,000 bikes by the end of 2017. The majority of the increase in bikes came from new dockless systems. During the second half of 2017, dockless bike share companies introduced around 44,000 bikes in cities across the country. Station-based systems added approximately 14,000 bikes to their fleets, bringing the 2017 total to 54,000 station-based bikes. As of the close of 2017, dockless bike share bikes accounted for about 44% of all bike share bikes in the U.S.

The large influx of dockless bike share bikes across the U.S. has not yet translated into substantial mobility gains. NACTO estimates that up to 1.4 million trips were made on dockless bike share bikes in the U.S. in 2017, making up **about 4% of trips.** NACTO's methodology for counting dockless bike share trips is provided in the Appendix.
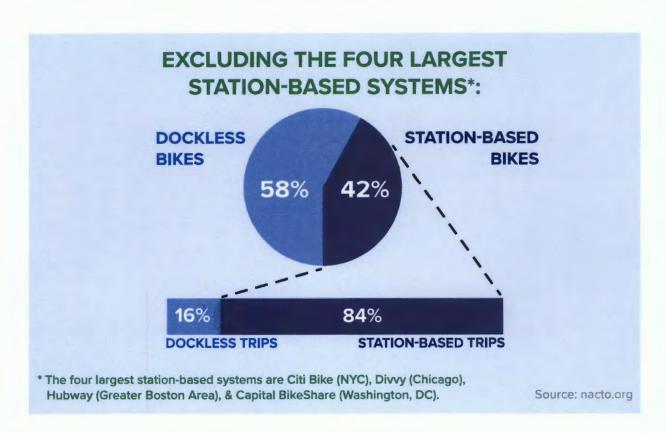
Using the intensity metric of rides per bike per day (r/b/d), **U.S. station-based systems produced an average of 1.7 r/b/d. In contrast, dockless bike share systems nationally had an average of about 0.3 r/b/d.** Analysis by the University of Washington, adjusting for a changing number of bikes over the 6 month pilot period, shows a r/b/d of 0.8 in Seattle.[1]

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[1] Interviews with Seattle Department of Transportation and University of Washington.

# PERCENT OF TOTAL BIKES AND TRIPS
## DOCKLESS V. STATION-BASED

**DOCKLESS BIKES**

**44%** **56%**

**STATION-BASED BIKES**

**4%** **96%**

**DOCKLESS TRIPS** **STATION-BASED TRIPS**

Source: nacto.org

## EXCLUDING THE FOUR LARGEST STATION-BASED SYSTEMS*:

**DOCKLESS BIKES**

**58%** **42%**

**STATION-BASED BIKES**

**16%** **84%**

**DOCKLESS TRIPS** **STATION-BASED TRIPS**

\* The four largest station-based systems are Citi Bike (NYC), Divvy (Chicago), Hubway (Greater Boston Area), & Capital BikeShare (Washington, DC).

Source: nacto.org

# Growing Ridership

2017 saw the launch of a number of new station-based systems; notably in Honolulu (Biki), Detroit (MoGo), New Orleans (Blue Bikes), and Charleston (HolySpokes). The San Francisco Bay Area system re-launched as Ford GoBike with 7,000 bikes, a ten-fold increase from the area's prior system. In addition, dockless companies piloted bikes in approximately 25 cities across the U.S. including Seattle, Washington DC, Dallas, Aurora CO, and Charlotte NC.

Four large station-based systems – Citi Bike NYC, Divvy, Capital Bikeshare, and Hubway – generated the majority (74%) of all rides taken in the United States in 2017, similar to previous years. However, bike share growth is widespread across many cities. In Philadelphia, for example, the Indego bike share system increased ridership by 84% over 2016.

## BIKE SHARE RIDERSHIP IN THE U.S. SINCE 2010



Legend:
- All Other Systems
- Divvy (Chicago)
- Citi Bike NYC
- Hubway (Greater Boston)
- Capital Bike Share (Washington DC)

Source: nacto.org

Several recently-launched systems have attracted substantial numbers of riders. Biki in Honolulu launched in July 2017, and quickly became the eighth-most heavily used bike share system in the U.S., with 365,000 rides taken to date. Detroit's MoGo system saw 112,000 trips taken in six months, including during some of the lowest November and December temperatures on record.

# More systems have subsidized low-income passes

The national increase in ridership also comes from work in cities around the country to make bike share more affordable to a wide cross-section of people. Many of these efforts are documented by the Better Bike Share Partnership. For example, in Philadelphia, work to develop and promote a $5 AccessPass, available to Pennsylvanians receiving food assistance, has resulted in an increase in low-income Philadelphians using the Indego Bike Share system. In 2017, AccessPass sales made up about 15% of all sign ups and AccessPass users took 9% of all trips.

Among cities with station-based bike share systems, **32% have an income-based discount program,** using income thresholds or living in affordable housing as criteria. This is a 33% increase over 2016 when about a quarter of all cities had income-based discount programs.

Newer systems, such as Detroit's MoGo, have followed this model. MoGo launched with a widely-publicized $5 annual AccessPass, available to Detroiters who receive state food assistance. After six months, **AccessPass sales have made up 18% of all long-term pass sales.** MoGo also offers a cash-payment membership option which is well used by AccessPass holders. Together, AccessPass and the cash-option provide fast, flexible, and convenient access to transportation for hundreds of residents.

Further north, the Citi Bike program in New York City completed its 5th year of providing $5/month annual memberships for New York City Housing Authority (NYCHA) residents and select community-based credit union members. In addition, in tandem with a partnership effort managed by the community development organization, Bed-Stuy Restoration, Citi Bike opened a new operational facility, hiring NYCHA residents as mechanics and 'Community Champions.' The number of NYCHA residents using Citi Bike nearly doubled in 2017 to 1,500 active members.[2]

2      NYCHA and Citi Bike Announce Partnership to open Citi Bike Operations Facilities at Riis Houses. (2017, August 22). Retrieved from http://www1.nyc.gov.

# How is bike share used?

Understanding who is riding and how bike share is used can be difficult. Most station-based systems collect some demographic data on annual or monthly pass holders but very little on one-time users. Conducting bike share intercept surveys is not yet widespread practice. Dockless bike share companies do not share demographic data, making it hard to get beyond anecdote.

In July 2017, the city of Seattle launched a pilot program to allow dockless bike share companies to operate in the city.  At the end of 2017, this pilot program included four dockless bike share companies and approximately 9,000 bikes. To accommodate the companies' concerns about proprietary data and address Washington's FOIA laws, independent researchers at the University of Washington were employed to gather and analyze the dockless bike share data. To date, the Seattle pilot provides some of the best available data on how dockless bike share is used.

Data from Seattle suggests that dockless bike share may be used differently from station-based bike share systems in other places around the U.S. and world.  For example, typically station-based systems generate the most trips on weekdays and use within the average day follows 9-5 commuting patterns. **In 2017, 48% of all station-based bike share trips took place during rush-hours (7-9AM or 4-6PM), and 76% of all trips took place on weekdays.[3]**

In contrast, dockless bike share in Seattle has an evening peak but no morning rush-hour peak and trips are spread out over the day with highest use seen on weekends, suggesting more recreational use.
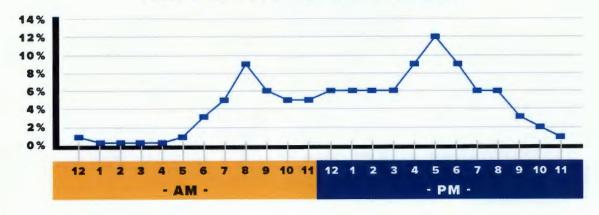
The presence of weekday and AM/PM rush hour peaks is important because it suggests that station-based systems are part of a city's overall transportation network and are used in the course of a typical commute to work or school. For instance, annual member surveys from Washington, DC and Chicago also show significant bike share to transit crossover: 65% of Capital Bike Share members and 42% of Divvy members respectively report using bike share as part of longer transit commutes.[4]

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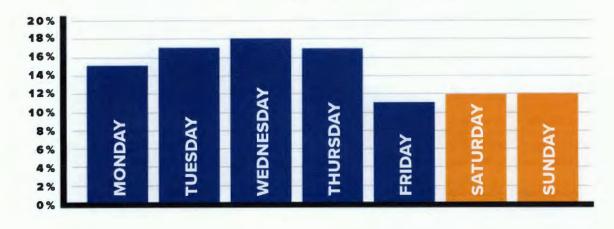3       Interviews with Seattle Department of Transportation and University of Washington.
4       How Do People Use Bike Share? (2017, May 4). Retrieved from https://www. motivateco.com

# TRIP PROFILES IN STATION-BASED SYSTEMS

## TRIPS BY HOUR OF THE DAY



## TRIPS BY DAY OF THE WEEK



## AVERAGE TRIP DURATION

**LONG-TERM PASS HOLDERS
12 MINUTES**

**CASUAL USERS
28 MINUTES**

Source: nacto.org

# Looking forward


Checking out a B-Cycle in Austin, TX

With 35 million trips in 2017 and strong year-on-year growth since 2010, bike share is gaining hold as a transportation option in cities across the U.S. Significant ridership in an ever-widening collection of cities and clear indications of cross-over use between bike share and traditional bus and rail transit indicate that bike share can provide an essential mobility option for people in U.S. cities.

The landscape around dockless bike share is less clear. In less than a year of existence, one U.S.-focused company, BlueGoGo, and a number of China-based companies have filed for bankruptcy, merged with other companies, or ceased operations.[5] The extreme degree of venture capital funding, coupled with generally low ridership, brings questions as to the overall sustainability and volatility of the dockless bike share market. Cities are proceeding cautiously, watching the results of pilot efforts, and encouraging dockless companies to share more data so that cities can better evaluate and understand how dockless bike share can further city goals of safety, equity, and sustainable mobility.

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5    Tchebotarev, E. (2017, December 16). With Hundreds of Millions of Dollars Burned, The Dockless Bike Sharing Market Is Imploding. Retrieved from https://www.forbes.com

# Appendix: what do we know and how do we know it?

### Station-Based Trip Data
As in *Bike Share in the U.S.: 2010 - 2016*, NACTO collected trip data from all publicly available station-based systems with more than 100 bikes or ten stations.

### Dockless Trip Data
Most dockless bike share companies claim their trip data as proprietary. How and what data is shared with cities varies by city and company. There are no comprehensive mechanisms in place to ensure data quality or comparability across markets. As a result, it is difficult to know how many trips have been made or who is riding dockless systems. To date, the Seattle pilot, where trip data is compiled and analyzed by independent/third party data analysts at the University of Washington, provides some of the best information about whether dockless bike share is helping to improve mobility and who is benefiting.

NACTO's estimate of up to 1.4 million dockless trips reflects much of the uncertainty about this data. Most of the dockless companies publicly provide information about total mileage traveled but not total trips. Thus, NACTO's total dockless trip estimate combines two sources:

1. Total number of trips recorded by company (if available)
2. Total miles traveled by company divided by average trip length

In developing the estimate, NACTO also assumed two possible average trip lengths to create a "high" and "low" estimate for the total number of dockless bike share trips. The "high" estimate (1.4 million trips) assumes a 1.5 mile average trip length, the average dockless trip length in Seattle as reported by the University of Washington. The "low" estimate (1.1 million trips) assumes a three mile average, on par with how casual or one-time users tend to use bike share in station-based systems.

## Capital Bikeshare

- Regional Bike Transit Service funded by Montgomery County
- Fixed docking stations.
- Trips under 30 minutes are free with membership
- Requires ongoing public investment to operate, rebalance and maintain the system.

## Dockless Bikeshare

- Pilot launched in Silver Spring and Takoma Park
- For Profit Bikeshare Companies (Limebike, Mobike, Ofo, and Spin)
- No docking stations
- Self-locking bikes
- No public funding but public support required
- App-based

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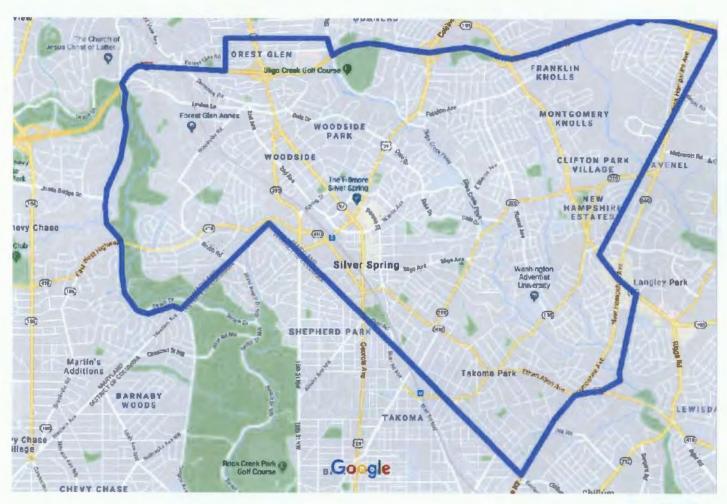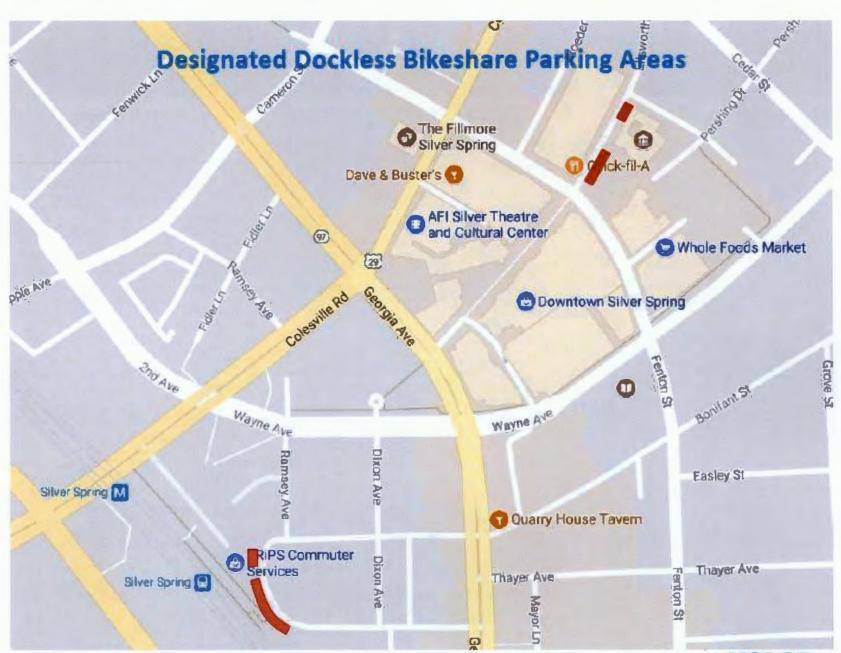
# Pilot Project

- New option for bicycle mobility and use
- Understand what management, oversight, and infrastructure is needed to deploy long-term program
- Ensure dockless bikes are parked appropriately
- Area – Silver Spring Vicinity and City of Takoma Park
- Duration – initial term of 6 months with 6 month renewal
- No cost or revenue to County

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# Pilot Area

# Designated Dockless Bikeshare Parking Areas

The Fillmore Silver Spring

Dave & Buster's

Chick-fil-A

AFI Silver Theatre and Cultural Center

Whole Foods Market

Downtown Silver Spring

Silver Spring M

Silver Spring

RiPS Commuter Services

Quarry House Tavern

Fenwick Ln · Cameron St · Cedar St · Pershing Dr · Fidler Ln · Ramsey Ave · Colesville Rd · Georgia Ave · 2nd Ave · Wayne Ave · Ramsey Ave · Dixon Ave · Fenton St · Bonifant St · Grove St · Easley St · Thayer Ave · Mayor Ln · Fenton St · Thayer Ave

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# Operators' Responsibilities

- MCDOT signed MOU with each operator
- Operator to respond to calls. Emergencies within 1 hour
- Operator is responsible for customer and public information
- Bikes to display a visible logo, contact information; website, phone numbers to report problems
- Operator to maintain comprehensive general liability insurance policy.

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# Operators' Responsibilities

- Operator provides monthly report to County
  - Bike use, number of bikes in pilot area
  - Customer enrollment
  - Travel patterns
  - Request to remove improperly parked bikes
  - Complaints
  - Accidents/injuries

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# Bike Parking

- Bikes can only be parked in public bike parking areas, designated areas, public sidewalks that do not impede pedestrian access, fire hydrants, street furniture, bus stops or where interferes with traffic

- Operator required to move improperly parked bikes

- County can remove violating bikes at company expense if company fails to do so

- Companies are required to ensure that bikes do not impede sidewalk snow removal

- County can require removal of bikes for other special or emergency condition

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# Customer Service

- Operator of dockless bike company
    - Web and phone number on each bike
    - Access from mobile app
    - Customer service phone number
    - MCDOT requested parking info on Apps
- County
    - County 311
    - MCDOT Website
    - Commuter Services – develop info materials, e-newsletter, respond promptly to complaints

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# Overview of Comments

77 comments regarding the Pilot Program

Majority complaints

Major themes include:

- The bikes are an eyesore
- Bike parking is a major issue (sidewalks, ADA ramps, bus stops, private property, Sligo Creek Park, etc.)
- Dockless bikeshare fills gaps within Capital Bikeshare
- Bikeshare operators are not responsive to moving improperly parked bikes, abandoned bikes, and bikes outside of the service area
- Consider hybrid model between dockless and docked bikeshare systems

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# Common Complaints

- Property owners/managers are responsible for maintaining the public right-of-way outside their property (snow removal, mow lawn, remove litter, etc.). How are they supposed to treat bikeshare bikes?
- Do not think the public should have to pay for this system.
- Batteries are dying in the cold weather making the bikes unusable.
- Sidewalks in neighborhood are already narrow. Parking bikes make it difficult for people to use the sidewalk.
- Dockless bikes take up rack space needed for personal bikes

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# Supportive Comments

- It makes my neighborhood more transit-friendly.

- Fills gaps that Capital Bikeshare station cannot fill.

- Its great, but maybe consider a hybrid model between dockless and docked bikeshare

- Install docks in neighborhoods and provide incentives for returning bike to stations.

- Love the program but concern people who dislike it are overpowering supportive comments.

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# Supportive Comments

- Likes seeing colorful bikes around town.
- Seeing the bike remind people of benefits of biking (environment, local economic growth, public health, and improve mobility).
- Capital Bikeshare doesn't have enough stations and its not nearly as convenient as dockless bikeshare.
- Expand and continue the dockless bikeshare program.
- Like the program but concern people are sabotaging program (witnessed people throwing bikes onto curb and yelling at LimeBike employees).

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# MCDOT Response to Community Input

- Required operators to reduce # of bikes in Pilot Area; set guideline of 3 bikes/block face
- Created flyer re proper parking of bikes
- Conducted Town Hall
- More outreach to organizations, businesses and property owners in Pilot Area to address concerns
- Responded promptly to emails, calls
- Participating in Facebook page set up by community
- Installing 30 new "U" racks for bike parking – not limited to dockless but for all bikes

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# Preliminary Analysis

- Ridership across companies increasing monthly with peak in February and decline in March
- At least 6,400 + users (combined)
- More than 85% trips totally within pilot area
- Thursday and Friday highest ridership
- Morning peak at 10 am and evening peak at 6 pm
- Operators providing fewer bikes than when initiated
- No serious accidents

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# Field Survey

- Survey Dates: 4/30/2018 – 5/21/2018
- Total Days Surveyed: 12
- Total Bikes Surveyed: 466
- 90% bikes with no missing parts
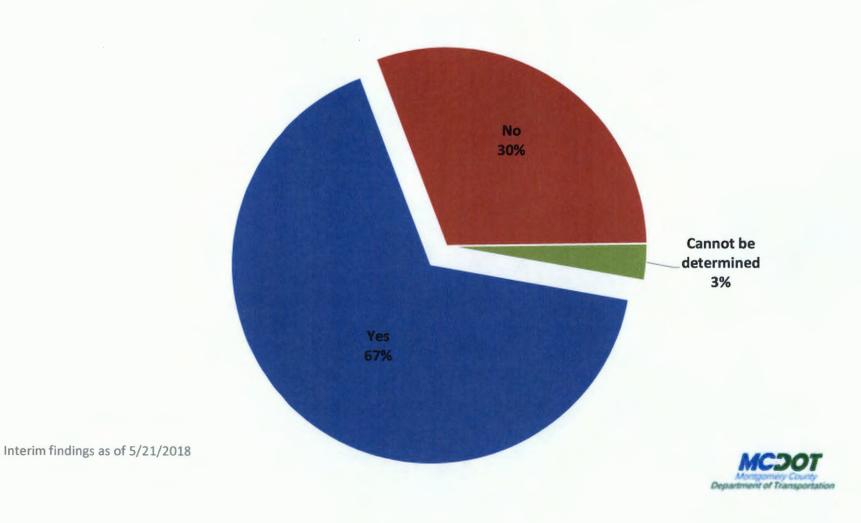- Solar panel, back light and rear reflectors areas of defects

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# Field Survey

- Bike Parking:
  - Parking Obstructions: 8%
  - Preferred Parking Area: 9.09%
  - Parked Upright: 88.10%
  - Parked at Bike Rack: 6.71%

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# Field Survey: Bike Present in App?

**No**
**30%**

**Cannot be**
**determined**
**3%**

**Yes**
**67%**

Interim findings as of 5/21/2018

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# Concluding Thoughts

- Pilot is the way to go to test program
- Cannot rely solely on companies to plan, educate, and engage community and businesses
- Need public call number and website
- Beneficial to have regional coordination
- Be prepared for immediate pushback
- Bringing new bike riders and access to underserved communities

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# Next Steps

- **Complete the Evaluation**
  - Phase 1: Collect & analyze data including reports & additional data from companies, field survey
  - Phase 2: Ambassador program + intercept surveys in Pilot Area

- **Decisions re Program Continuation/Expansion**
  - Changes in MOUs/program parameters, requirements
  - Expand service area – which areas?
  - Potential for charges to operators to cover County costs
  - Support regional coordination

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