Minnesota Council on
Transportation Access

Public/Private Partnerships in Transit: Case Studies and Analysis

Prepared for:
Minnesota Council on Transportation Access

October 2017

Prepared by:
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University of Minnesota

About the Council

The Minnesota Council on Transportation Access (MCOTA) serves as a clearinghouse to address transportation coordination topics from a statewide perspective. The Minnesota State Legislature established the group in 2010 (MN Statute 2010 174.285). The group includes member representatives from thirteen agencies. MCOTA's work focuses on increasing capacity to serve unmet transportation needs, improving quality of transit service, improving understanding and access to these services by the public, and achieving more cost-effective service delivery. In addition, fostering communication and cooperation between transportation agencies and social service organizations leads to the creation of new ideas and innovative strategies for transportation coordination and funding.

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Abstract

With the emergence of new business models for transportation services in the private, new types of partnerships between the public and private sector have also started to emerge. In this report, we focus on public/private partnerships that involve transportation network companies (TNCs), such as Uber and Lyft. We first discuss the structure of these partnerships in terms of the type of service provider, category of service, and payment arrangement. We then provide an in-depth discussion of five case studies, selected to highlight unique and distinctive features in each case. We draw lessons and takeaways from these case studies, highlighting opportunities and challenges for the future. We also discuss opportunities for the Twin Cities and the greater Minnesota region. In doing so, we provide analysis of travel behavior data and show how this analysis can be used to guide the deployment of a public/private partnership. One limitation of these case studies is that access for persons with disabilities, compliance with regulations, and protection of civil rights was not clearly articulated in these pilot programs and greater understanding of these areas is needed.

1. Introduction

There has been an explosive growth in the past five years in new modes for transportation. These new modes are leveraging in new ways digital technology to offer a variety of mobility services on-demand, ranging from the short-term rentals of cars and bikes to the peer-to-peer provisioning of transportation services. These new business models, by enhancing the user experience and minimizing inconvenience and delays, are enabling shared mobility in ways that traditional transit has failed. The most successful of these new business models is arguably that of transportation network companies (TNCs), such as Uber and Lyft[1,2] (together these two companies offered over 71 million trips per month across the US in 2016[3], compared to 472 million trips per month for public transit[4]).

Most TNCs are built around digital online platforms that match drivers (willing to offer rides in their own vehicles) with riders. These platforms decide on prices to charge customers and wages to pay drivers. They also decide on the amount of commission (fraction of revenue) they keep. These platforms typically have the flexibility to adjust prices and wages based on current levels of driver supply and customer demand. In general, fares on TNCs have been competitive with fares offered by traditional taxi services. More significantly, they are becoming competitive with traditional transit modes in some markets. This is particularly the case for TNC services that involve carpooling such as UberPool and LyftLine (the ridesharing service Via offers a flat fee of $5 for all rides within certain parts of Manhattan).

For roadway transit modes, the US totaled 5.668 billion unlinked trips in 2014 with $32.442 billion in capital and operating expenses, averaging $5.72 per trip[4]. Fares averaged $1.17 per unlinked trip, leaving $4.55 per unlinked trip to fund through other means.

Several transit agencies across the US have started recently to explore opportunities for partnership with TNCs. These agreements are instances of so-called public/private partnerships, or P3s[6,7,8]. There are of course partnerships that involve third party service providers other than TNCs, such as bike sharing systems, car sharing systems that involve the short-term rental of cars, such as Zipcar, and private shuttle and bus services, among many others). In this report, we provide an overview of the types of partnerships between transit agencies and TNCs that have been established recently. We discuss in detail five case studies. These case studies have been selected to highlight unique and distinctive features of the corresponding partnerships. We draw lessons and takeaways from these

case studies, highlighting opportunities and challenges for the future. We also discuss opportunities for the Twin Cities and the greater Minnesota region. In doing so, we provide analysis of travel behavior data and show how this analysis can be used to guide the deployment of a public/private partnership

Research found that in 2016, 23% of adults in the US did not own a smartphone. However, this number is decreasing, as 65% of Americans did not own a smartphone in 2011 [10]. In addition to potential inability to meet legal regulations for accessibility, leaving these barriers unaddressed would keep P3s from being accessible to a substantial portion of the population. These issues have been addressed to varying extents by existing P3s, as will be discussed later.

2. Types of P3 Partnerships

Existing partnerships with TNCs, especially as they pertain to the case studies we consider, can be roughly categorized along the following dimensions: (1) type of transportation fulfilled, (2) type of payment, and (3) type of TNC service provider.

2.1 Types of Transportation Need

Partnerships have targeted various transportation need but most fall into the following categories: first mile/last mile transportation, general transit, and paratransit. Some partnership target specific segments of the population such as seniors or low-income communities or specific regions such as rural areas.

First Mile/Last Mile Transportation

The "first mile/last mile" gap exists for public transit users who can travel most of the way to their destinations by public transit, but may have to walk, bike or drive to get to (first mile) or from (last mile) transit pick up ad drop off transit points. In such cases, these journeys to and from the transit stations can become barriers from users or major sources of inconvenience (e.g., a significant increase in commuting time). The first/last mile gap has been addressed historically through investments in park and ride lots, the deployment of shuttles and feeder buses, and the support of bicycling and bikesharing[11].

Recently, some cities some cities have partnered with the private sector to provide transportation for trips to and from transit stations. These systems typically operate for only part of the day, such as while the transit system itself is running or only during commuting hours. Pilot programs typically select a few key transit stations and zones around transit stations that are then made eligible for pickups and drop offs through the partnership. This approach has been called a "virtual garage" by the city of Summit, New Jersey, which runs one such pilot. When applied to commuter train stations instead of bus stops or light rails, this partnership may reduce the need for park and ride lot space by allowing commuters to leave cars at home[12]. Examples of pilots have been run by the city of Centennial in Colorado, the South Eastern Pennsylvania Transit Authority, the Miami-Dade County in Florida, and the city of Pinellas Park in Florida[12–17].

General Transit

Some partnerships involve the full or partial outsourcing of transit to a third party. In the case of partial outsourcing, service through the third party is offered to users whose trips either originate or end in certain specified geographic areas. Alternatively, it may involve the elimination of certain bus (or other transit) routes and replacing them with access to services offered through the TNC.

Typically regions with low density and routes with low ridership are candidates for such outsourcing.[18] Pilots of this type of partnership have been conducted in Altamonte Springs, FL, Dublin, CA, and through Liberty Mobility Now, Inc. [8,19–22] These cases are discussed in this report. In Pinellas Park, Florida, the public transit agency cancelled service to its East Lake area due to low ridership (only 75 people per day) and replaced the canceled bus route with a service though a TNC[17].

Paratransit

While paratransit is currently available in many cities, it can be costly to operate for transit agencies and inconvenient to use for customers. Traditional paratransit often involves the investment by a transit agency in ADA in a fleet of ADA-compliant vehicles and the hiring of dedicated drivers. It may alternatively involve contracting out with a third party service provider who owns the vehicles and hires the drivers. Users request trips ahead of time, sometimes as much as a day in advance. Transportation is offered through a carpool model, where the same vehicle makes multiple stops to pick up and drop off customers. A common complaint from users is the lack of an on-demand feature that enable user to take a trip as the need arises and the length of the trips because of the carpool feature.

A number of transit agencies have started pilots of partnerships with TNC to offer paratransit service on an on-demand basis (i.e., without the need for advance booking). The Massachusetts Bay Transportation Authority has conducted a pilot for general paratransit while the city of Gainesville, Florida has performed pilots for senior transit[23–27]. Both cases are discussed in this report.

Other Opportunities

There are partnerships that have targeted other types of needs. For example, Pinellas County in Florida launched a program called TD Late Night, which provides low income residents of the county 23 free rides per month between the hours of 9 pm and 6 am[28].

Partnerships have also been established to address temporary peaks in demand. For example, in July 2016, the city of San Diego in California hosted both the Major League Baseball All-Star game and the annual San Diego Comic Convention. To encourage attendees to bring the cars to the event venues, the city offered a one-time $5 voucher for use on UberPool to and from designated transit pointss[29].

Washington DC is considering the possibility of using TNCs to augment the city's emergency services. 911 call centers would identify the severity of a caller's medical needs. If the caller needed an emergency room, the call center would dispatch an ambulance. If not, the caller would be picked up by Uber and brought to a doctor's office or an urgent care clinic instead of an emergency room. This would reduce strain on the emergency services system and free up emergency vehicles to respond to higher severity calls[30].

2.2 Types of Payment Structures

The simplest payment structure involves the transit agency paying for the entire trip. This is the case for example in Centennial, Colorado. Other structures involve placing a cap on the amount of subsidy the user receives. For example, in Pinellas Park, the city covers the first $5 of any trip. They may alternatively involve the transit agency paying a percentage of the trip fare or a percentage of the trip fare up to a certain amount. For example, Altamonte Springs, Florida pays for 20% of the

trip cost anywhere within city limits while Dublin, California pays for 50% of the trip, but not more than $5. Yet other payment structures involve the user paying a fixed fee and the transit agency paying the rest (in some cases up to a maximum). The fixed fee is typically chosen to correspond to the fee paid under existing public transit. Some cities have tailored the payments based on the income of the user. This is the case in Gainesville, Florida. These various payment structures are summarized in Figure 1.

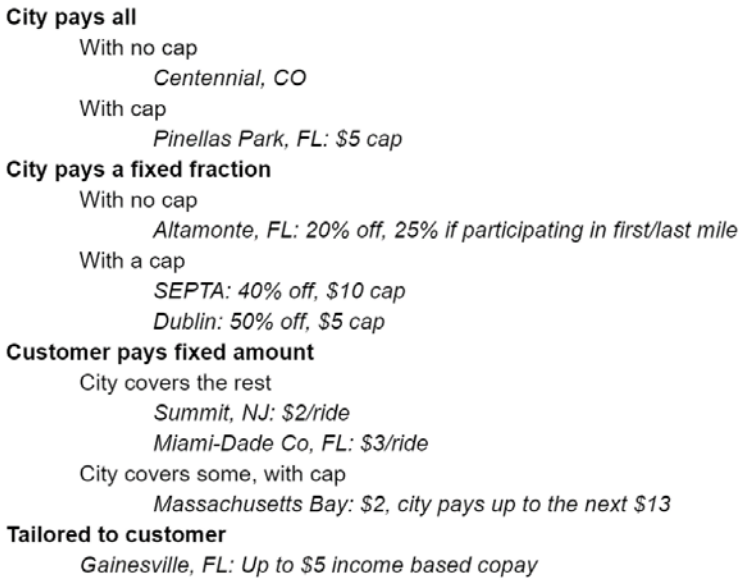

Figure 1 Payment structures among a sample of public/private partnerships

2.3 Types of Service Providers

Most P3s that involve TNCs rely on either Uber or Lyft, the two leading such service providers in the US. Access to the service in both cases requires downloading the corresponding using a smart phone. The user indicates their desired pickup and drop-off location and in some cases selects the type of vehicle. Some of the partnership restrict require that a users selects the lowest cost vehicle or a shared vehicle option (UberPool in the case of Uber and Lyft Line in the case if Lift). Users are typically shown at the start of the trip either an actual or an estimated fare. Fares are computed using proprietary algorithms (these algorithms are usually not shared with the transit agency) but are known to consist of a fixed fee, a fee that varies with ride duration, and a fee that varies with ride distance. These fees are adjusted in some cases to reflect supply and demand, with a price multiplier applied to peak demand or low supply periodss[31,32]. Drivers are subjected to a check of their driving record and criminal history before they may start with the company[33].

Some partnerships have involved service providers other than Uber. A notable example is Liberty Mobility Now, which provides an Uber-like service but also directs users to other transit options. Liberty Mobility Now takes a community-based approach and attempts to engage through its "community circles," all potential transportation users and providers. Liberty is targeting primarily rural areas with limited public transit infrastructure.

3. Case Studies

The following case studies represent a sample of P3s. Each case study has a distinctive feature: the type of service provided, the consumer need targeted, or the payment mechanism used, among others. Figure 2 provides a high-level summary of the characteristics of the case studies considered. All information presented about the case studies is based on first-hand interviews with relevant representatives of these programs.

Case Study	P3 type	Area	Partner	Ride Type	Payment
Centennial, CO	First/last mile	Suburb	Lyft	Carpool	City covers all
MBTA (Boston, MA)	Paratransit	Urban	Uber, Lyft	Single rider trips	Customer pays first $2, MBTA pays next $13
Gainesville, FL	Senior transit	Suburb	Uber	Single rider trips	Income-based copay
LAVTA (Dublin, CA)	General transit	Suburb	Uber, Lyft, Desoto Cab	Carpool	LAVTA pays for 50 percent of ride, up to $5
Liberty Mobility Now	General transit	Rural	N/A	Single rider trips	N/A

Case Study	Pilot Size	Rides per Week	Avg. Cost to Public Agency per Ride	Avg. Cost to Customer per Ride	Cost of Alternative per Ride	Cost per ride relative to alternative
Centennial, CO	124	55	$4.75	$0	$21	22.62%
MBTA (Boston, MA)	400	**	$9	$2	$31	29.03%
Gainesville, FL	*	69.58	$10	$0-1	n/a	n/a
LAVTA (Dublin, CA)	Unconstrained	n/a	n/a	n/a	n/a	n/a
Liberty Mobility Now	n/a	16.67	$16.72	n/a	n/a	n/a

*available to two retirement communities, exact enrollment not provided

**currently over 1000 per week since pilot has been expanded, but numbers were not provided for the pilot period

Figure 2. P3 Characteristics for the case studies considered. Gray boxes indicate that the information was not available.

3.1 Centennial, Colorado: First/Last Mile

On February 17, 2017 the city of Centennial, Colorado ended a six-month pilot of its "Go Centennial" project, a first mile/last mile partnership with Lyft Line, Lyft's car-pooling service. Centennial, a city of approximately 107,000 residents, is located in the south metro Denver area [35]. The pilot consisted of shuttling users to and from one specific light rail station within a four-square mile service area. The city of Centennial covered the full cost to users.

This case study is based on interviews with Melanie Morgan, Innovation Team Data Analyst for the city of Centennial, who has been working on the Go Centennial project. Additional information can be found on the project's website at www.go.centennial.gov.

Origins of Go Centennial

Go Centennial was created as an alternative to the call-n-ride service, a previously existing first mile/last mile system. Under the call-n-ride system, Centennial owns and operates 14-passenger vans, which riders must book at least two hours in advance. Residents of Centennial had expressed frustration with this system. In feedback the city collected, residents mentioned that they were unable to book trips during rush hour because shuttles were full. Moreover, the city estimated that each ride was costing it an average of $21. Ultimately, Go Centennial attempted to determine whether the city could make the first/last mile system more responsive to the user while also reducing its own costs.

Implementing Go Centennial

In planning for Go Centennial, the city considered many types of user interfaces. Initially, Centennial considered a private smartphone application, but reasoned that riders are not always travelling within Centennial. Instead, officials decided to work through Denver's "Go Denver" app, a transportation app that allows users to check all possible modes to get from one location to another within Denver. By using the Go Denver interface, Centennial hoped to reach a broader audience.

The choice of interface ultimately determined the company with whom Centennial would partner. Lyft and Uber had both been planning to integrate with Go Denver, but Uber pulled out shortly before the app's launch, leaving Lyft as the only ridesharing option on the app. Lyft was convenient for multiple reasons. In order to allocate public funds to the project, Centennial had to use a paratransit-friendly service. Centennial found that taxi companies with wheelchair accessible vehicles were unwilling to drive to the suburbs due to high demand in Denver. However, Lyft already had wheelchair accessible vehicles as an option via Lyft Access. Additionally, for both environmental and cost reasons, Centennial preferred a carpooling-type service, which was available in the form of Lyft Line. Even if officials had wanted to use Uber, the equivalent UberPool was only available in downtown Denver at the time and did not include the suburbs.

The user payment structure was a more straightforward decision, and primarily determined by the previous call-n-ride system. The preexisting system charges $2.60 per ride, but includes free transfers to and from the light rail. In order to make Go Centennial competitive, Centennial made the program entirely free, but without a transfer pass for public transit.

Pilot Results

In order to evaluate the pilot, Centennial decided to use a combination of hard numbers, such as cost per ride and ridership counts, and more qualitative data using user surveys. Overall, the pilot

was a viewed by the city as a success. Lyft Line rides averaged about $4.75 to the city of Centennial compared to the $21 under the existing dial-n-ride service. However, the service did not see as many users as expected, and averaged 11 riders per day while the original call-n-ride service saw 50 riders per day. The relatively limited ridership may be due to insufficient awareness on the part of user of the availability of the service. The city is currently investigating reasons and potential remedies.

Figure 3 below shows ridership totals over the course of the pilot. Additionally, Centennial also found that most users booked rides through a smartphone app, either the native Lyft app or the Go Denver app[36]. The call-in "Concierge" service and the "Access" paratransit service, which were also available to users, were rarely used. Figure 4 summarizes these findings.

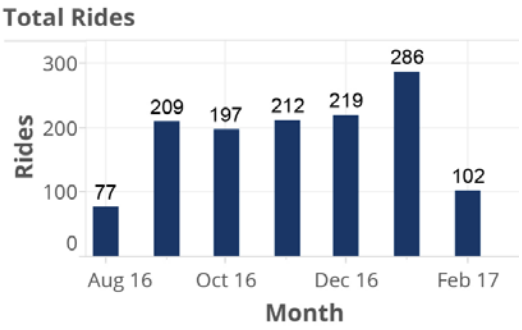

Figure 3. Taken obtained from the Go Centennial February 2017 Monthly Report, this chart shows an overall increase in ridership over the six-month pilot period. Note that the pilot did not run through the entire months of August and February, which may explain the lower ridership in those months.

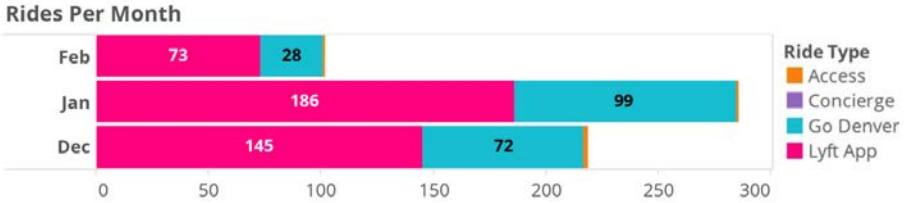

Figure 4. Taken from the Go Centennial February 2017 Monthly Report, this chart shows the various methods, and corresponding frequencies, used to request a ride

Surveys were more difficult to interpret. Centennial found that many survey responses were from people who had not actually used the Go Centennial service, which affected the usefulness of the results. Staff ultimately emailed Go Centennial users and went directly to the light rail station to administer surveys. The responses from people who had used the Go Centennial service were generally positive. The negative feedback was primarily due to confusion over how to use the app. Several users accidentally used the regular Lyft service instead of Lyft Line, which made them ineligible for reimbursement. These issues were addressed by city staff who walked the users through the process of using Lyft Line and then reimbursed the account for the mistaken trips.

3.2 Massachusetts Bay Transportation Authority: Paratransit

The Massachusetts Bay Transportation Authority (MBTA) is the fifth largest transit authority in the US, providing over 400 million rides per year [4]. Including only the fixed-route service area, and not commuter rail, the MBTA serves 65 towns and cities in the Massachusetts Bay area, surrounding Boston[37].

The MBTA is partnering with Uber and Lyft to provide on-demand paratransit to the Massachusetts Bay area. A pilot began in September 2016 and is planned to run for one year. Currently there are 45,000 users eligible for this paratransit service with approximately 20,000 having taken at least one a ride. However, the number of regular users is closer to 700. As part of the pilot, MBTA offers a subsidy for all paratransit trips within the defined service area through both Uber and Lyft, with users paying the first $2 of the trip fare and MBTA covering the balance up to $13.

To solicit feedback on the program, MBTA has dedicated a phone line for customers to call in. They are also conducting a monthly survey, directly calling users, as well as compiling information received from Uber and Lyft.

This case study is based largely upon an interview with Ben Schutzman, Director of Transportation Innovation at the MBTA. Additional information can be found on the pilot project website.

Origins of the program

Before the on-demand paratransit pilot, the MBTA ran a paratransit system called The Ride. The Ride has 3 different service providers for three zones of the Massachusetts Bay. Rides must be scheduled at least one day in advance by calling the specific service provider for the pick-up location. A paratransit compatible vehicle would then pick the customer up and delivers them to their location. During the trip, the vehicle is likely to make additional stops to pick up or drop off other customers along the way. The Ride was viewed by customers as being less than convenient because of the need to call a day ahead and because of the length of the trip (due to the ride sharing feature). For some customers, it was also viewed as an unreliable means of transportation for time sensitive trips such as commuting to work or making it a doctor's appointment on time. Motivated by these concerns and to the rising cost of operating the service, the MBTA decided to explore options for an on-demand service. They put out a request for proposals (RFP) from third party service providers, with targets for lower costs and better service. Both Uber and Lyft responded, offering to provide paratransit on demand.

Implementing the program

Initially, Uber proposed not to cover the entire ride service area. This was primarily an attempt to ensure that a sufficient supply of vehicles is available to cover the area they were servicing. However, within the first two weeks, customers complained that Uber's partial coverage was confusing and that it was unclear where they should start and end trips. After receiving this feedback, the MBTA talked to Uber, and Uber agreed to cover the entire ride service area within. Ben Schutzman mentioned that Uber and Lyft's openness to making adjustments was an important factor to the success of the program. In particular, he highlighted the willingness of both companies to continuously test and improve the system.

Feedback for the program from users has been largely positive. Most negative feedback relates to customers wanting more rides. Initially, the MBTA put a cap on the number of rides at 20 rides/month per user. However, the cap has now been modified and is based on a user's ride history. Since changing the ride cap, complaints about these limits have reduced significantly, although the issue somewhat persists. According to Ben Schutzman, MBTA must perform a balancing act between providing as many rides as possible to users while ensuring the program leads to net savings to justify continuing with the partnership.

In addition to these issues, the MBTA has fielded other complaints about more minor, typically process-related, issues. Some users have had a change in their eligibility for paratransit, which led to

confusion regarding their eligibility for rides; this, however, is not ultimately due to the P3. Some users had trouble signing up; others missed the sign-up emails from Uber or Lyft. Ben Schutzman suggests that the early adopters from the pilot may have been more tech savvy, which would explain the amount of sign up issues once the pilot expanded.

Outcome of the program

This program started as a pilot with 400 users, conducted between October 2016 and February 2017. This was expanded in March 2017 to the entire population of eligible users. The MBTA carried an assessment upon the completion of 10,000 rides on Uber and Lyft. The results are summarized in Figure 5 [38]. As we can see, on average an Uber/Lyft ride costs the MBTA about $9, compared to an average of $31 on The Ride. The introduction of the Uber/Lyft option has allowed an expansion of service in terms of total number of rides provided by approximately 28% while reducing total cost by 6%.

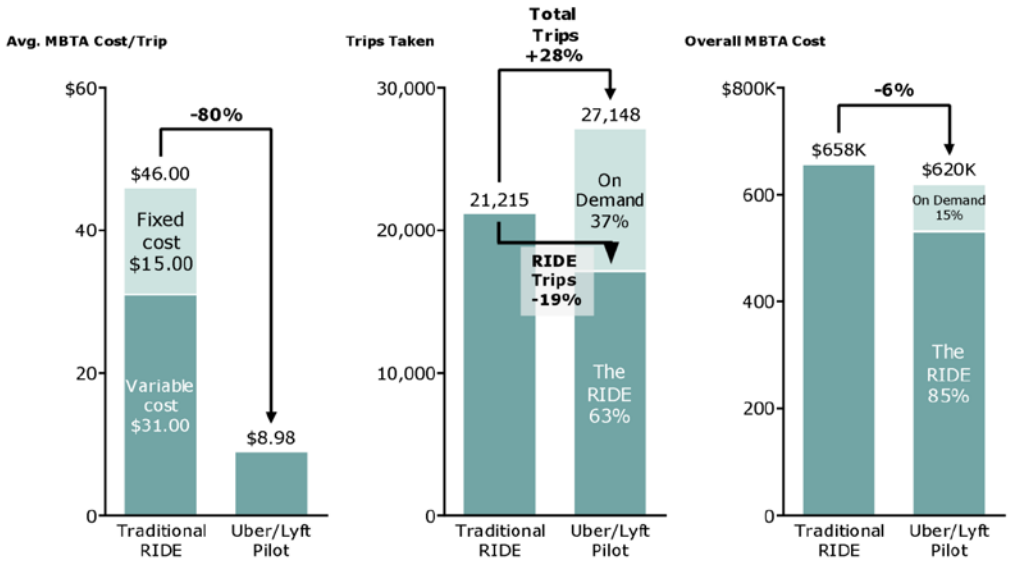

Figure 5. These graphs, taken from the MBTA paratransit pilot 10,000 trip event assessment, show how the pilot has enabled the MBTA to provide more rides for a lower cost.

The Uber/Lyft option has allowed customers to request rides on an on-demand basis, doing away with the need to place a request a day in advance, required for The Ride. Moreover, the MBTA found that individual trips through the Uber and Lyft partnership averaged 25 minutes, compared to 59-minute for The Ride trips (mostly because of the ridesharing feature under the Ride).

A metric that has been by MBTA to assess its transit programs is the so-called net promoter score. To calculate the NPS, customers are polled on how likely they are to recommend a service on a scale of 1-10, with those giving a score 1-6 considered *detractors*, 7-8 considered neutral, and 9-10 considered promoters. The net promoter score is the difference between the percentage of promoters and the percentage of detractors. The current net promoter score for the on-demand partnership service is 79%, which is significantly than the transit industry average of 12% and the MBTA's fixed route transit score of 1%.

In addition to NPS, Ben Schutzman mentioned that total cost is an important metric. However, this metric has important subtleties. In particular, the expansion of service because of the convenience and ease if use of an on-demand system could increase the total cost even though the cost per ride is

significantly lower. Hence MBTA would like to continue to monitor both service expansion and cost per ride and ensure that the expansion of the service occurs if the cost per ride is also reduced.

3.3 Gainesville, Florida: Senior Transit

In Gainesville, Florida, the Freedom in Motion program partners with Uber to provide discounted rides for all seniors in Gainesville. Gainesville has about 130,000 residents, making it the largest city in Alachua County. Gainesville is home to the state's oldest and largest university, the University of Florida[39].

The program started out as a six-month pilot program for two assisted living facilities. The program was subsequently expanded to all seniors living within city limits. Unlike other partnerships around the country, the Gainesville program involves a co-pay that is income-based with a cap of $5 per ride. Most users pay between $0 and $1 out of pocket per ride. Currently, Freedom in Motion has two employees: Jeff Lee, handles the technical details of the program while Kevin Ramirez assists users with signing up for the program and with navigating the application.

Much of the information provided below is based upon an interview with Kevin Ramirez, Manager for Senior Recreation Center and Volunteer Services.

Origins of Freedom in Motion

Prior to the Freedom in Motion Program, Gainesville had no available transportation service for needy seniors. The city did have a senior care agency, ElderCare of Alachua County, which provided services such as adult day care for Alzheimer's patients and Meals on Wheels. Eldercare saw a need for seniors that the department cared for and who could not drive or did not want the financial burden of owning car. Eldercare also noticed that many seniors avoided driving at night, which limited their ability to maintain an active social life. To address these issues, Gainesville approached Uber, the only private ridesharing service available in Gainesville at the time.

Implementing the System

Uber for Business provided a simple framework for Gainesville to implement a senior transit system. Once the city partnered with Uber, enrolling users consisted of sending the user an email that directed them to a sign-up page and directions to download the Uber app. The income-based subsidy system that determines how much a user pays was already in place for the city's Meals on Wheels program, and was adopted for the Freedom in Motion program.

According to Kevin Ramirez, the biggest challenge the system faced has been in getting users comfortable with using the technology. Initial enrollment was slower than expected due to issues with technology. Ramirez has found that many seniors struggle even with the simple task of pulling up the email to enroll in the program. Many have little experience using apps and some did not have a smart phone. On an average day, Ramirez says that he enrolls and trains three new users. He mentioned that some senior come to his office with their smartphone still in its packaging, and need setup and training for the phone as well. In some cases, he had to drive to a user's home to help them set up their account, since they may not have means of travel to come to his office.

Results of the Pilot

The initial pilot for Freedom in Motion lasted six months, and was only available to elderly residents of two specific neighborhoods. The pilot began on September 15, 2016. In the six months between October 2016 and March 2017, Freedom in Motion provided 1,809 rides, or about 70 rides per

week. These rides averaged 4.9 miles per trip, and cost the city an average of $10 per ride. The customer typically paid $0-1 per ride, but higher income users paid more. By January 21, 2017, the pilot had been judged successful enough to be renewed for an additional six months, as well as expanded to all senior residents of Gainesville.

The Freedom in Motion program received many testimonies from many users how the program had impacted their lives. One woman had moved to Gainesville to be closer to her daughter. However, her driver's license had been revoked and she became reliant on her daughter for rides to the grocery store, the hair dresser, and all other necessities. Her daughter already had a full-time job and three children, so transportation became a burden. When this woman came to Kevin Ramirez to enroll in Freedom in Motion, she had just bought her first smartphone for the program and had yet to take her phone out of the box. One month later, she came back to Ramirez's office and told him that Freedom in Motion allows her to get everywhere she needs without having to rely on her daughter. She also became quite proficient with the app. Ramirez mentioned that she showed him feature of the app that he did not know about.

In another instance, a whole family flew to Gainesville to set up their grandmother with the program when she got her license revoked. Freedom in Motion allowed her to accept not being able to drive with dignity. Months later, she returned to Ramirez's office and said that she was more than happy to give up her license. She preferred Uber, since it allowed her not only to have door to door service but also gave her somebody to talk to on the ride. Another user had recently lost mobility in her thigh, and all she wanted was to take her dog to the dog park a few miles away. Now, she uses Freedom in Motion for a daily trip to the dog park.

3.4 Dublin, California: General Transit

Dublin, California, a San Francisco suburb which Livermore Amador Valley Transit Authority (LAVTA) official Christy Wegener describes as "low density, high income," is currently experimenting with a general transit P3 pilot. LAVTA, one of 26 public transit companies in the Bay Area, implemented a P3 pilot in January 2017 which will run through June 2017. LAVTA chose to partner with three companies, Uber, Lyft, and Desoto Cab. For any carpooling trip (through Uber Pool, Lyft Line, or Desoto Share) that starts and ends inside city limits, LAVTA will subsidize 50% of the ride cost up to $5. Through Desoto, LAVTA provides a call-in request system, allows for cash payment, and offers paratransit services. Users do not have to enroll in the program, as GoDublin relies on coupon code technology available to all riders within city limits.

This case study is based on an interview with Christy Wegener, Director of Planning and Operations for LAVTA. Additional information can be found on the GoDublin website at www.wheelsbus.com/godublin/.

Origins of GoDublin

LAVTA decided to pursue a P3 after assessing each individual line within the LAVTA transit system. Some lines were found to carry an average of 5-6 passengers per hour, with each ride costing up to $20. With a fare of only $2 per ride, fare revenue was falling far short from supporting these routes. LAVTA investigated various alternatives for servicing these low-demand routes, including agency-run solutions such as mini buses but ultimately decided to experiment with a TNC partnership. Uber and Lyft were chosen due to their popularity with riders.

Ultimately, LAVTA removed one bus line and put a second route under probationary monitoring and as a candidate for possible removal in the future.

Implementation of GoDublin

The main challenge in implementing GoDublin has been coordinating between the three private companies. Each company has a different level of technical sophistication and of investment in working with LAVTA directly. For instance, Uber uses Geosense (a geo-fencing technology) to limit the use of GoDublin within the Dublin's city limits. However, Lyft relies on a less precise technology, and has therefore provided GoDublin rides outside of Dublin's city limits.

However, according to Christy Wegener, Lyft has been the more amenable partner with respect to communicating with LAVTA and sharing data. When contacted, Lyft is the partner "more likely to pick up the phone," she said. Lyft is also the only private transit company to provide LAVTA with data so far. Desoto Cab has been taking more time to compile statistics since of limited internal IT capabilities. Uber has decided that they will not share data on use until they send LAVTA their first invoice once they have provided riders with $5,000 worth of discounts for GoDublin.

In addition to challenges of managing the relationship with three different private partners, LAVTA has experienced challenges in obtaining feedback from users. Since users do not need to explicitly enroll in GoDublin, LAVTA does not have direct access to users' contact information. To solicit user reviews, LAVTA must request that their partners send out a survey on LAVTA's behalf. However, Uber and Lyft do not necessarily want to push surveys out to their users. The lack of a formal enrollment system has also kept LAVTA from knowing how many users are taking advantage of the GoDublin program.

This lack of information makes it hard to assess the program in other ways. For example, LAVTA cannot currently be sure that Desoto sends out a wheelchair accessible vehicle within 20 minutes, as the GoDublin program promises.

Wegener mentioned that LAVTA, to gain more visibility into the programs, may resort to using secret shopping techniques, where the agency pays users to take and assess rides.

Outcomes of GoDublin

Assessing the success of the program so far has been a challenge due to the lack of information from private partners and LAVTA's inability to contact users directly.

Based on the invoices they have received, Christy Wegener suspects that demand is not currently high enough for ride matching (more than one rider sharing a vehicle) to occur in more than 25% of GoDublin rides. However, this may grow over time.

LAVTA is also interested in assessing to which the GoDublin program affects ridership for the remaining public transit lines available (e.g., is the program taking away users from public transit or generating new demand from a segment of the population that would have otherwise used other means of transportation). The available data so far has been inconclusive. If GoDublin does affect transit ridership, it may prompt LAVTA to rethink their transit structure. With autonomous shuttles already running just six miles north of the LAVTA service area, LAVTA is aware of the changing transit landscape. Wegner mentioned that it LAVTA is open to relying partially or entirely on TNCs for low density areas.

3.5 Liberty Mobility Now: Rural Transit

Liberty Mobility Now is a TNC with a different model than Uber and Lyft. Liberty serves as the private end of public/private partnerships, focusing primarily on rural customers. In addition to a ridesharing service, Liberty also provides services to connect customers with existing transit infrastructure. Liberty finds that this method, which is more community oriented, works well for rural areas. With relatively few existing transit services and low population density, coordination in a rural area is less complex than in urban areas.

Information about Liberty Mobility Now is largely based on an interview conducted with Liberty CEO, Valerie Lefler. Additional information about Liberty Mobility Now can be found at www.libertymobilitynow.com.

To facilitate coordination with existing transit options, Liberty organizes "community circles," or gatherings of community leaders whose groups may either provide or require rides. Often, these groups do not interact on their own, which can lead to confusion. Members of community circles may include representatives from taxi companies, transit agencies, veterans' services, developmental disability services, agencies on aging, and ESL educators, among others. These circles meet monthly, with months alternating between in person and online meetings. At community circle meetings, these groups discuss what services are offered, what needs are present, and how to make progress in meeting those needs. Liberty uses community circles as an example of being focused more on community building than standard transit companies. Valerie Lefler says that with community circles, it is possible to start addressing transit problems bottom by engaging the users and the providers instead of the usual top down and bureaucracy-driven approach.

In addition to community circles, Liberty frequently acts as a broker or a platform, directing potential customers toward existing services when available. When a customer calls in needing a ride, Liberty does not immediately send their own vehicle. Instead, they may recommend a bus that is running at that time, or a subsidy that could be available to the customer for travel expenses. They may even seek to work with the transit authority and add a transit line if there are enough requests from a specific area.

However, Liberty does have their own drivers who can fill gaps unaddressed by existing transit in an area. These cars are driven by community members, not unlike drivers for a TNC, with fares being fully paid by passengers. In areas where Liberty operates trips cost an average of $16.

Liberty also provides a "mobility manager," who connects with groups for community circles and recruits drivers (Liberty requires fingerprinting, background checks and drug tests for all its drivers).

Liberty has found that, focusing on community building, is easier (and also more effective) in rural areas than in urban areas. Liberty has been promoting its services through methods such as buying lunch, donating to United Way, and hosting scholarship competitions at schools. According to Valerie Lefler, this has helped in strengthening their community-based approach.

Origins of Liberty

Liberty started in Nebraska, where there are 93 counties, 38 of which do not have any public transit at all. Liberty found that for many counties, building effective public transit was infeasible due to low ridership and high levels of regulation. Lefler reports that she has seen transit agencies in rural areas trying to expand, but getting bogged down by bureaucracy, and that it can take a full year to add one bus to a system.

While doing research, Lefler also found that existing transit entities rarely know of other available transit options. Liberty talked to 35 rural transit program managers across the country, and found that only about one third of them knew how transit worked beyond their own organization. Most could not answer questions about how transit worked for those customers who are using veterans' services, disability services, or Medicaid, for example.

In one extreme case, a woman was paying $177 for a two-mile trip to the hospital every time she had an appointment. Since the local taxi service had stopped serving the hospital, her only option was to take an ambulance. In many rural areas, bus service is nonexistent or limited by service time or area. Liberty found that transit managers often have multiple roles or are stretched thin due to constraints within city budgets. In one illustrative example, Lefler describes how a transit manager had once broken down on the phone while describing the effects of cancelled bus service for the day. The transit manager had to inform one person they were not going to have a ride to chemotherapy, another person was not able to make a cardiologist appointment for which they had been waiting several weeks, and one woman had to miss her granddaughter's birthday party. To Lefler, it was clear that these people's neighbors would be willing to help in each situation, but there was no method in place to do so.

Implementing Liberty

Liberty's main hurdle has been navigating regulations regarding private transit, which tended to vary from state to state. In particular, finding a common setup to insure drivers has been difficult. In some states, Liberty operates as a transportation network company, in others they operate as a non-profit organization with a large group of volunteer drivers (drivers can still be compensated for the cost of the rides). By operating as a nonprofit, drivers can keep their own insurance. It affords driver other forms of flexibility, such as bringing another person (such as a spouse) with them in the car.

Progress on Pilots

As of the interview date with Lefler in March 2017, the Ohio pilot had been running for 3 weeks. There had not been any marketing efforts yet. During those three weeks Liberty provided 50 rides. By mid-April, Liberty anticipated opening a call center, at which point they plan to expand advertising and push for more usage. Lefler mentioned that they were currently focused on recruiting drivers and building up the driver database.

Lefler states that in mid-2015, Liberty was "an idea in a conference room," but demand has grown quickly. Liberty implemented its first pilot program in February 2017 in Ohio, and is about to start in Nebraska in April. In addition to Ohio and Nebraska, they expect to be in Texas, Colorado, Virginia, South Dakota, Missouri, Wales, and Australia by the end of 2017 Liberty is also in discussion with CTAA expo in Detroit and the National Regional Transit Convention in Denver. Liberty is also exploring other opportunities to offer transportation services, such as first/last mile, ADA paratransit, and complimentary transportation for social workers.

4. Opportunities for the Twin Cities and the Greater Minnesota Region

We highlight below opportunities for partnership with TNCs for the Twin Cities area and for the greater Minnesota region.

Paratransit – Metro Mobility, a paratransit service of Metro Transit, operates in the Twin Cities area. The service uses three different independent contractors for different zones. Rides must be booked

at least one day in advance. The service promises that the customer will be picked up within 30 minutes of their scheduled pickup time or the ride is free. However, Metro Mobility emphasizes that "a five-mile ride that may take only 10 to 15 minutes in a personal automobile may take up to 50 minutes on regular-route transit and on Metro Mobility"[42]. As with the MBTA paratransit system, these limitations could potentially be addressed by partnering with a TNC to either supplement the current system or completely substitute it. Analysis would need to be carried out to assess to what extent outsourcing the service to one or more TNCs could result in savings and improvement in quality of service. An important factor is the continued availability (if not the expansion) of the service to all the existing service areas.

Transit for Seniors – Seniors in the Twin Cities area qualify for reduced fares, but do not have a dedicated transportation program other than paratransit. A partnership with a TNC may be able to provide service for needy seniors at lower cost and in a more responsive fashion, freeing up capacity on paratransit vehicles (e.g., not all seniors need access to an ADA-compliant vehicle and not all seniors may need assistance getting in and of out of a vehicle by a trained driver).

First mile/last mile transportation – Other than providing for park-and-ride parking lots, there is not currently a system that targets the first/last mile challenges for commuters. In the Appendix, we provide analysis that highlights where these challenges are particularly acute. A partnership with a TNC targeted at those who live sufficiently far from a transit pick up point could increase transit use, reduce the need for park and ride lots, and shorten overall commute time.

General Transit – In Appendix A, we provide analysis of bus routes in the Twin Cities areas and identify those with particularly low ridership and high cost per rider. These routes may be candidates for outsourcing though a partnership with TNC.

Transit for Low-Income Communities – Reliable transportation is often cited as a factor for improving the access of low-income communities to jobs, schools, child daycare, healthcare, and other social services. A partnership with a TNC that targets specific low-income neighborhoods or individuals could significantly broaden the range of economic opportunities for these communities.

Rural Transit – Rural transit is currently limited. The business model of TNCs (i.e., a system that relies on peer-to-peer transportation) may potentially offer a solution. As demonstrated by Liberty Mobility Now, this could leverage volunteer drivers to provide services for seniors and the disabled under the umbrella of a non-profit organization.

Healthcare Services – A partnership with a TNC could target trips to and from healthcare facilities. Through such a partnership, access could be provided to seniors, disabled individuals, and individuals with low income. Such a service could for example target after hours urgent care, where traditional transit may not be available or adequate. It could also be deployed selectively to encourage vaccination or prenatal care.

5. Some Lessons Learned and Challenges

The following are some general takeaways from the case studies. The case studies highlight the wide range of opportunities for transit agencies to partner with TNCs. These opportunities include:

Extending the Reach of Transit – P3s can help in addressing the vexing problem of first and last mile problem. For this to work well, a high degree of collaboration and integration between the transit agency and the private TNCs is needed. In particular, the experience for the user needs to be seamless (e.g., a user can use the same app to book and pay for the public transit and TNC portions of the trip).

An Alternative to Traditional Transit – In low density areas and areas where rider ship is low or intermittent, P3s can offer a more economical alternative to traditional transit. P3s can also enable public transit in communities that do not have the resources to own and maintain their own fleet of vehicles and hire dedicated drivers. P3s also allows smaller communities to shift the financial and operational risks of providing transit to a third party.

On-demand Transportation for Seniors and the Disabled – Partnering with a TNC can allow a transit agency to leverage the on-demand features and capabilities of a TNC to offer on-demand services to segments of the population, such as older adults and individuals with disabilities, and to do so more cost effectively.

The case studies highlighted challenges as well. These include:

Investments in Marketing and Outreach – The success of P3 programs hinges on the sufficient participation of users. This requires an investment early on in a marketing effort that explains the eligibility of the programs, along with the costs and benefits to the users. Depending on the target population, an investment in outreach and training may be needed. For senior populations, there may be a need for assistance with signing up for the program and using the associated technology.

Experimentation – Because these business models are new and best practices are yet to emerge, transit authorizes would need to be willing to experiment with various modalities, pricing, service region design, and contractual arrangements with the TNCs, among others. A one-size fits all is unlikely to work and a degree of customization of the service for the needs and requirements of the community being served may needed. This also provides an opportunity to offer a more personalized service and for price differentiation.

Quality of Service Monitoring and Enforcement – As the provisioning of the service is outsourced to a third party, the transit agency cedes control over the day-to-day operation of the service. With this comes a lack of visibility into the real-time performance of the system. Depending on the contractual arrangements with the third-party provider, a transit agency may also not have full access to important data regarding usage, the geospatial distribution of usage, the demographics of users. More importantly, it may not be able to monitor service quality (e.g., waits experienced by consumers or percentage of time consumers were not able to obtain a ride).

Technology Barriers – Most TNCs rely on a digital platform that is typically accessed via a smartphone. This could limit the service to segments of the population with smartphone, access to the intern, and some fluency in the technology. These limitations could be mitigated by providing a call-in option or by allowing users access to the app at some fixed location (e.g., kiosks at hotspots which could also serve as pickup points).

Access for the disabled and for seniors – While some of the partnerships considered have been able to provide vehicles that are ADA-compliant and drivers who are qualified to assist passengers with disabilities, this remains a challenge for many TNC's who rely on occasional drivers who bring along their own private cars. The two major TNC providers have recently recognized the needs of the disabled population and have begun services tailored to the disabled in several major markets.

Other Barriers – Most TNCs require a credit card for registration and payment. This could limit access, particularly in low-income communities. Providing for other payment option (e.g., the option to prepay for the service with cash) would be important to ensure equity.

Long Term Risks – Although TNCs are growing rapidly, their business model is still evolving. By fully outsourcing transit to a TNC, a transit agency may expose itself to significant risk (e.g., a TNC may decide not to renew a partnership or to pull out entirely from a region). A transit agency that has divested from its own physical assets and workforce may lose leverage against third party providers (lessons learned from how outsourcing has affected other industries, such as manufacturing, could be useful).

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Appendix A – Travel Behavior Analysis and Opportunities for P3s

Transit service in the Twin Cities region is provided by multiple agencies, where Metro Transit is by far the largest of them. According to Metro Transit reports, the system's average weekday ridership was nearly 267,000 trips in 2016. Among these, nearly 70,000 were served by LRT lines, 4,500 by the BRT line, 2,500 by the commuter rail, and the remaining were served by the bus routes. Hence, many transit trips can be long distance starting from or ending at the suburbs. In the following, we study the travel behavior of transit users as well as transit operating cost per riders, to assess the potentials for P3s. The primary data sources are from the Travel Behavior Inventory, namely the 2010 Household Travel Survey and the 2010 Transit On-Board Survey.

Travel Behavior Analysis

The first data set that was analyzed is the 2010 Household Travel Survey. This contained a 2% sample of trips taken in the Metropolitan Area, expanded to estimate all the trips on an average weekday. As visualized in Figure 6, the primary mode of the vast majority of trips taken is individual vehicles. This indicates that transit only made up a small fraction of the trips in 2010. The 2010 Transit OnBoard Survey data provides a larger sample of transit users as well as more information about their trips. Figure 7 shows how riders accessed transit and the share of each access modes. The data reveals that about 20% of transit riders use a mode other than walking to access their boarding stops or stations. Moreover, at least 14% used a motorized vehicle, indicating a great potential for TNCs to serve these trips as first mile access. Figure 8 and 9 show the length of access trips by car and bicycle. While bicycle access trips are mostly limited to 2 miles, some relatively long car access trips raise the question on whether these trips are better served by TNCs in a P3 framework.

In order to gain a better understanding of the spatial features of the data, GIS maps were created. The calculated data was added to an existing shape file from Minnesota Geospatial Commons containing the Transportation Analysis Zones (TAZ).

A color scheme is used to highlight those TAZs with the highest observed access distance. Figures 10 and 11 display the average distance traveled from Origin to Boarding by driving and biking respectively. Appropriate classifications according to the observed values, were created.

From Figures 10 and 11, a few conclusions can be drawn. First, there is not nearly enough data to accurately predict or measure demand for all of the metro areas 3000+ TAZs. As shown from the biking maps, in particular, there seems to be scattered dots of color toward the center of the map surrounded by TAZs with no data. However, there seems to be enough data to paint a general picture of metro residents' travel patterns by car. Specifically, the majority of transit users in the city have short distances to their transit stops. Most TAZs in the heart of the metro are colored dark green, meaning they have the least amount of distance to travel. Specifically, nearly all drivers going over three miles to transit are in the outskirts of the metro. This helps highlight the real possibility for ridesharing to greatly benefit more rural communities. Specifically, for those who work in the cities but live in the exurbs, ridesharing could help prevent them from having to drive five or more miles just to get to a stop, and then have to continue using transit to get to their destinations.

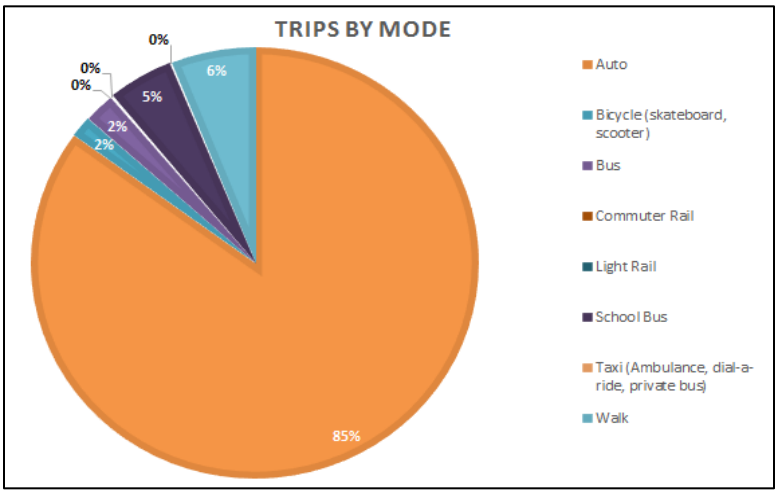

Figure 6. Share of each transportation mode

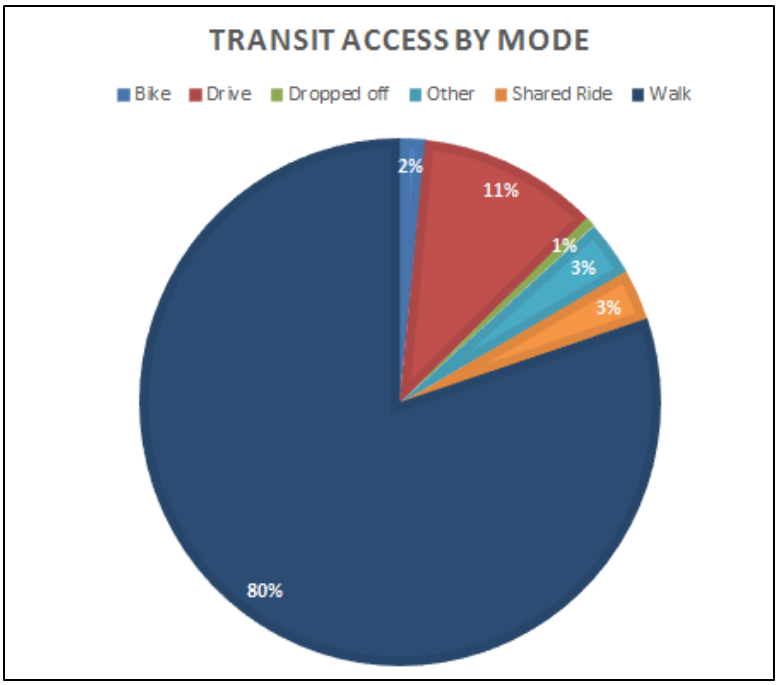

Figure 7. Share of each access mode for transit trips

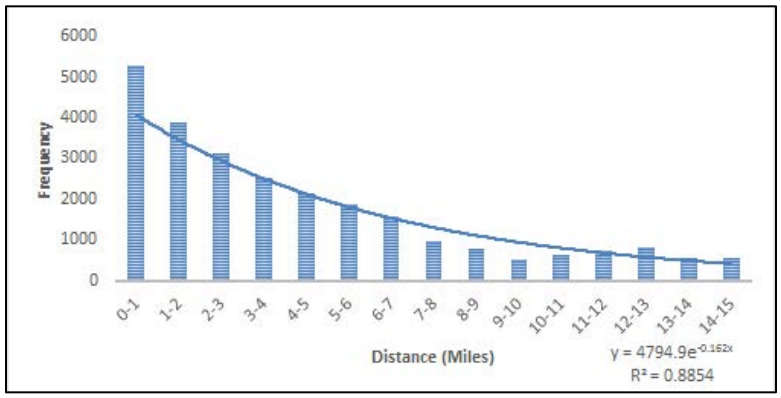

Figure 8. Driving distance for transit access trips

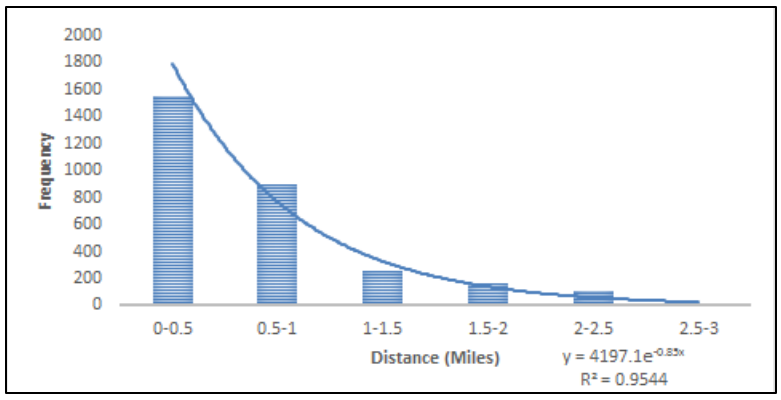

Figure 9. Biking distance for transit access trips

These maps are clearly not without outliers in the data, but the general trend, show what is to be expected with distances traveled (in miles) to transit. However, these distances represent straight line paths from start to end, so actual driving distances may be a little or significantly greater, only highlighting the long commutes of certain transit customers. Moreover, what is not shown on the maps is how many people use transit (according to this survey) from each TAZ. In many cases, the people living far away are one of only a few or no others from that zone, whereas in the cities, the values are averaged from dozens of customers that were interviewed. This can make it seem, according to the visualization, as though the customers driving from far away are just as plentiful as those in the city. Advocating for ridesharing in these areas assuming that all TAZs contain the same number of potential passengers would be an economic miscalculation, so that must also be considered.

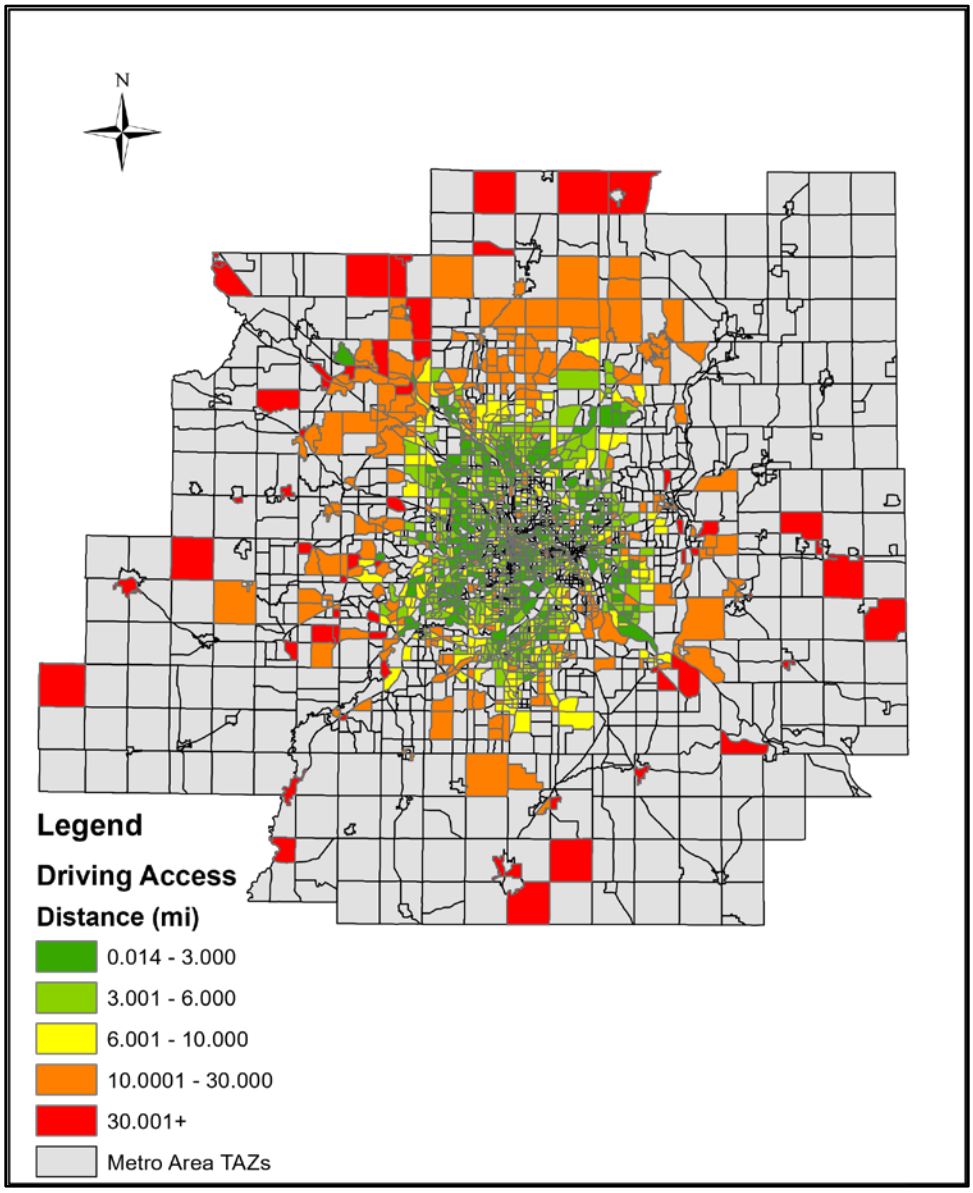

Figure 10. Driving access distance from each TAZ

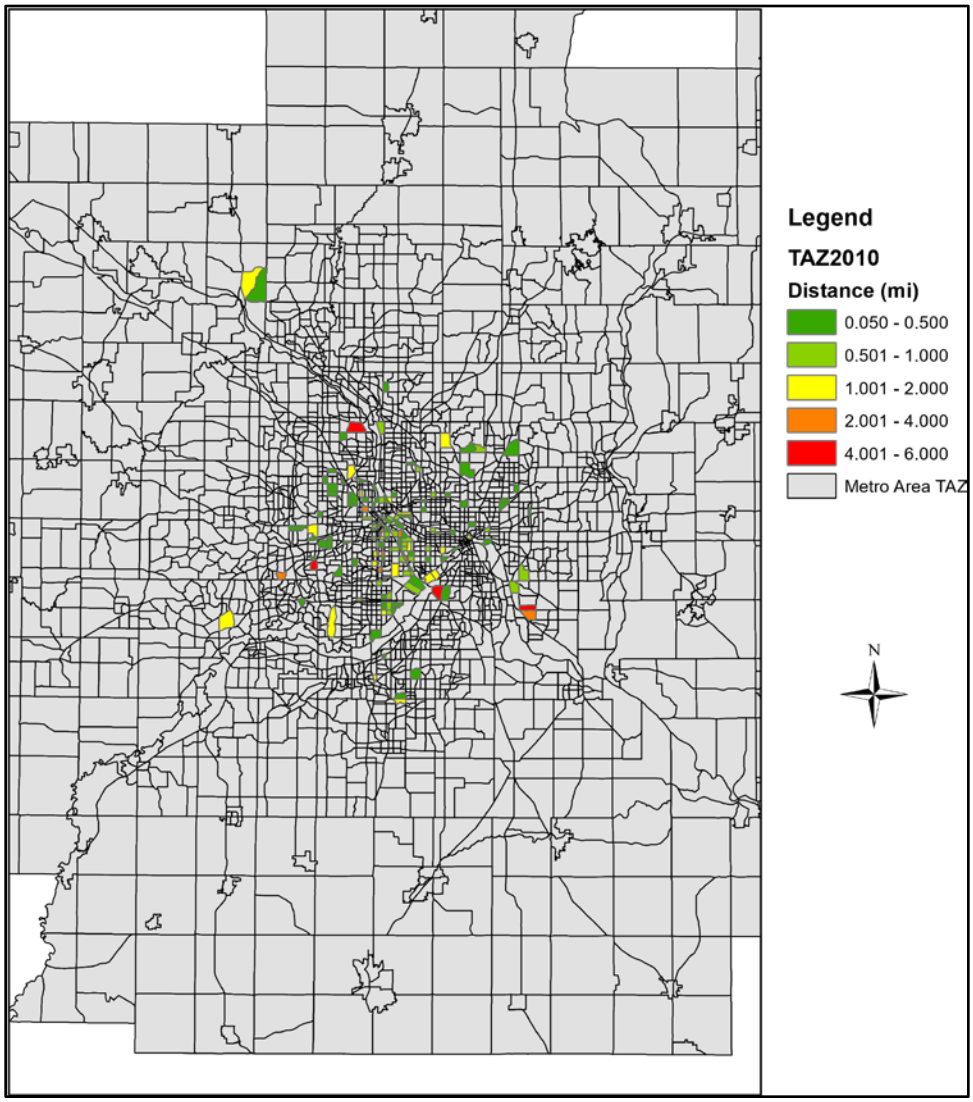

Figure 11. Biking access distance from each TAZ

Transit Operating Cost Analysis

The operating cost of the 2015 Metro Transit network was also determined. Using operating costs provided by Metro Transit, the Weekday, Saturday, and Sunday daily cost per rider was calculated. The annual cost per route was divided by the number of service days of each route by type of day. The results are summarized in Figures 12-14.

The legend given in the first map applies to all three figures. As shown in the legend, the routes were color-coded according to their costs per rider per day. The intervals ranged from $2.95 (minimum)-$4, $4-5, $5-6, $6-7 and above $7. The maps were created by adding the cost data to an existing transit route shapefile from the Minnesota Geospatial Commons. Only the routes operated by Metro Transit were evaluated and mapped. The fare on all local bus routes in the Metro Transit network for rush hours is $2.25 and $1.75 for non-rush hours. For express buses, the cost is $3.00 for rush hours and $2.25 for non-rush hours. The GIS maps show those routes which are the

costliest to operate, as a function of their ridership, with longer routes and less used routes costing more.

The costliest of the routes is route 565 with a daily cost of $44.95 per rider, running only 46 days a year and was eliminated as of March 7, 2016. Route 415, costing $19.13 per rider and running on weekdays connecting the Mall of America to Mendota Heights, was the second highest daily cost. Route 46 with a cost of $16.28 per rider, runs on Sundays from downtown Minneapolis to Lakeville. Route 67 from downtown Minneapolis to St. Paul also runs on Sundays and costs $16.01 per rider. The remaining routes costing above $10 per rider per day include; route 7, route 16, route 25, route 31, route 46, route 65, route 272, route 353, route 515, route 588, route 664, and route 674.

Generally, the longer, radial routes connecting nearby suburbs or attractions with the downtown areas are the costliest per day, a trend seen in all three maps, but particularly evident in the first. The direct connectors, running between two large trip generators (such as the Mall of America or downtown Minneapolis and St. Paul) are typically also high-cost routes. Using this data, an evaluation of the benefit of continuing service on these costliest routes can be conducted. Moreover, the analysis can be extended to incorporate time-of-day in the operating cost calculation, such that late-night routes with lower cost effectiveness can be determined.

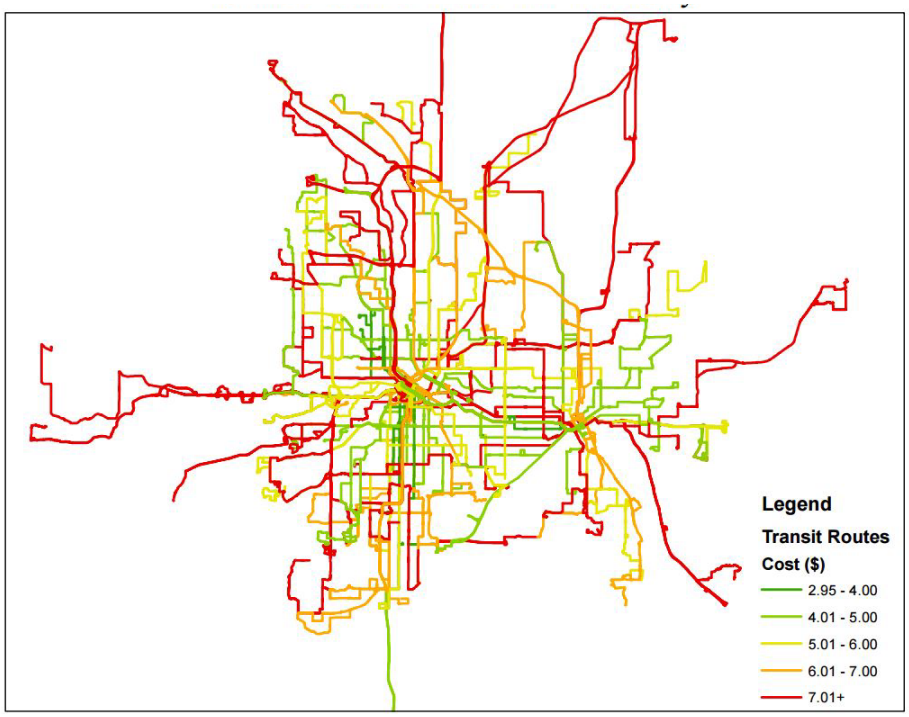

Figure 12. Cost per rider by route - weekday

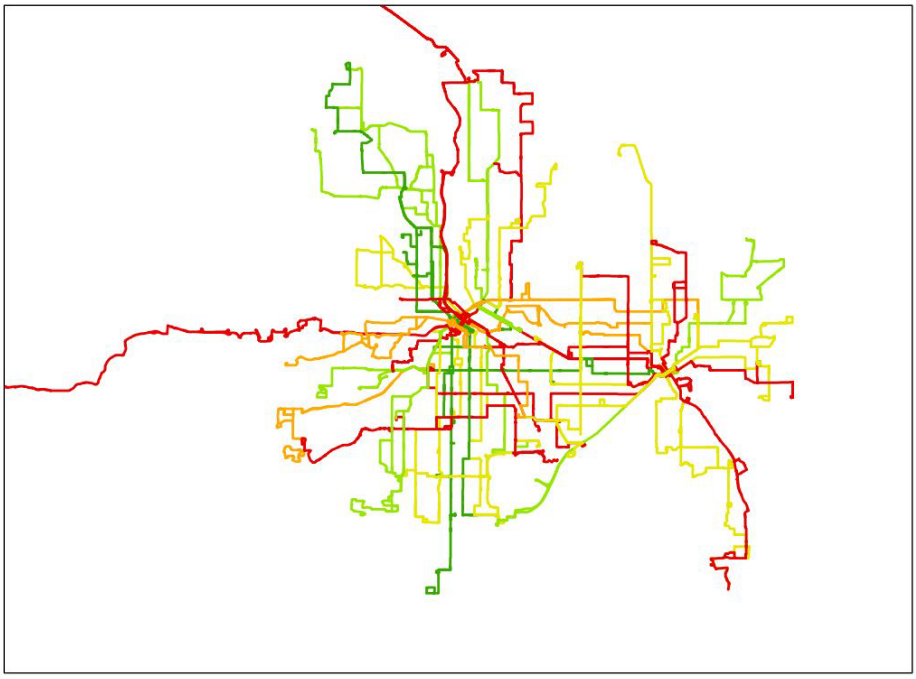

Figure 13. Cost per rider by route - Saturday

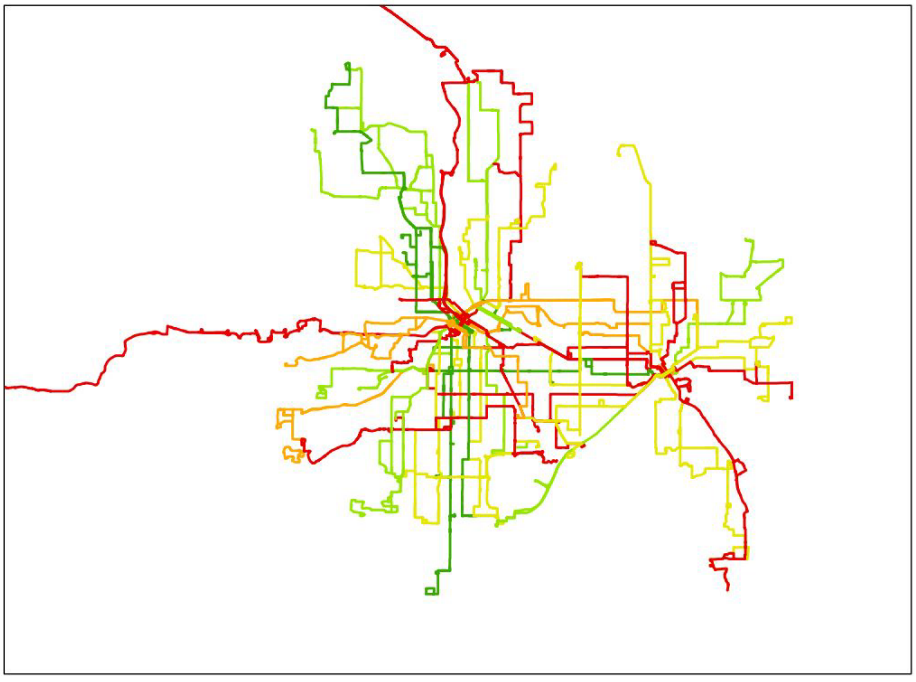

Figure 14. Cost per rider by route - Sunday