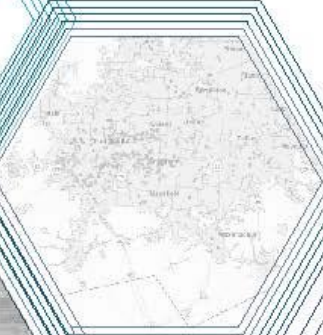




# Transit in Flex: Examining Service Fragmentation of New App-Based, On-Demand Transit Services

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FINAL REPORT

**TRANSIT IN FLEX:  
EXAMINING SERVICE FRAGMENTATION  
OF APP-BASED, ON-DEMAND PUBLIC  
TRANSIT SERVICES**

**FINAL PROJECT REPORT**

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Sponsorship  
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In cooperation with US Department of Transportation-Research and Innovative  
Technology Administration (RITA)

### **Acknowledgment**

This work was supported by a grant from the Center for Transportation Equity, Decisions and Dollars (CTEDD) funded by U.S. Department of Transportation Research and Innovative Technology Administration (OST-R) and housed at The University of Texas at Arlington. We graciously thank Amruta Sakalker, Thomas Scott and Taylor Benjamin for their research assistance, without which this project could not have been done.

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| <b>Technical Report Documentation Page</b>  |                                    |  |
|---|------------------------------------|--|
| <b>1. Report No.</b> CTEDD 018-10   | <b>2. Government Accession No.</b> | <b>3. Recipient's Catalog No.</b>                |
| <b>4. Title and Subtitle</b><br>Transit in Flex: Examining Service Fragmentation of New App-Based, On-Demand Transit Services   |                                    | <b>5. Report Date</b>                            |
|   |                                    | <b>6. Performing Organization Code</b>           |
| <b>7. Author(s)</b> David Weinreich, Thomas Skuzinski, Shima Hamidi, S. Matthew Reeves  |                                    | <b>8. Performing Organization Report No.</b>     |
| <b>9. Performing Organization Name and Address</b><br>Center for Transportation, Equity, Decisions and Dollars (CTEDD)<br>USDOT University Transportation Center<br>The University of Texas at Arlington<br>601 W. Nedderman Dr. Suite 103<br>Arlington TX 76019-0108 United States |                                    | <b>10. Work Unit No. (TRAIS)</b>                 |
|   |                                    | <b>11. Contract or Grant No.</b><br>CTEDD 018-10 |
| <b>12. Sponsoring Organization Name and Address</b><br>United States of America<br>Department of Transportation<br>Research and Innovative Technology Administration  |                                    | <b>13. Type of Report and Period Covered</b>     |
|   |                                    | <b>14. Sponsoring Agency Code</b>                |
| <b>15. Supplementary Notes</b><br>Report uploaded at <a href="http://www.ctedd.uta.edu">www.ctedd.uta.edu</a>   |                                    |  |
| <b>16. Abstract</b>   |                                    |  |

The transportation industry may be going through its largest technological revolution in a century, with new forms of on-demand transportation capitalizing on innovations like the GPS chips to develop app-based, on-demand transportation, connecting user and driver, known alternatively as ridesourcing, ride-hailing, Transportation Network Companies (TNCs). As TNCs spring up along with other app-based, on-demand service models like ridesplitting, microtransit and E-Hail, among others, a growing number of cities are considering whether they could shed the high cost and unprofitability of running fixed route transit services through conversion to app-based, on-demand systems. Fixed route public transit has traditionally been hampered by political fragmentation, manifested in numerous geographical service gaps created by a failure of local transit agencies to plan for cross-jurisdictional services. Fragmentation can create equity concerns for residents of transit deserts, unable to access key services across the city or county line. For example, the Detroit man James Robertson spent several hours commuting to work because his job was located in a city that did not join the transit system, and his route crossed two counties—each with its own bus system. This required an untimed transfer, and a long walk (Laitner, 2015). Similarly, the Dallas Fort Worth metro region suffers from large service gaps, with Arlington and Grand Prairie both sitting outside the region’s large transit systems.

This study examines how the problem could change, or perhaps be overcome, by the onset of app-based, on-demand transportation technology. Since jurisdictional fragmentation is a problem rooted in excessive local government autonomy (Weinreich, Skuzinski, Hamidi, 2018 working paper), conceivably, this could be overcome by private services, when funded by private sources, and regulated by states and regional governments, rather than locally.

As local governments consider harnessing app-based, on-demand technology to operate their public transit systems, often in partnership with private companies, it remains to be seen whether these services will be designed in such a way that they can overcome the jurisdictional fragmentation seen in previous fixed route services (Rivasplata, et al., 2012; Miller et al, 2005). Furthermore, as local governments consider ways to incorporate on-demand transit services into their existing transit systems, they will need to know how governance structures could be designed in order to avoid cross-jurisdictional fragmentation. This study conducts surveys and interviews of the cities and transit agencies across the state of Texas that have already implemented TNC services, or plan to do so. This study examines the reasons for fragmentation connected to government and funding policy. This project identifies local governments that are considering app-based, on-demand services as either a replacement or a compliment to their fixed route services. Researchers interview public officials about what they have/have not done to ensure the new services overcome jurisdictional fragmentation and cross-jurisdictional lines, and what they think can be done to make cross-jurisdictional public transportation more robust. This study provides a strong understanding of the governance structure underlying the development of such services, which may be leading to equity challenges.

This study offers a first examination of the choices local elected officials are making that will shape their transit systems for decades to come. The Texas planning environment, with its high interest in using on-demand technology as a cost-saving alternative to fixed route transit service, offers a strong test case. This study surveys public officials across a range of medium to large local governments and the transit agencies that serve them, revealing which ones are in the process of “uberizing” their transit systems; what steps they have/have not taken to overcome fragmentation from the past; and what policy solutions regional leaders think could be implemented to provide services more favorable to cross-jurisdictional trips. This study concludes by identifying opportunities for better coordination across services and for federal and state policy makers to incentivize coordination at the local level. The authors find that transit agency service boundaries and municipal jurisdictional boundaries had a large and negative impact on service integration across jurisdictional lines. Yet much of the funding for the myriad pilot services comes from the same sources—state and federal funds, or MPO/COG support. This study recommends stronger requirements by federal and state governments, and by MPOs, to require service integration as a condition for receiving grant funds.

|  |  |   |                         |
|--|--|---|-------------------------|
| <b>17. Key Words</b><br>TNC, App-Based, On-Demand, Integration, Fragmentation, Cross-Jurisdictional Services |  | <b>18. Distribution Statement</b><br>No restrictions. |                         |
| <b>19. Security Classification (of this report)</b><br>Unclassified.   | <b>20. Security Classification (of this page)</b><br>Unclassified. | <b>21. No. of Pages</b><br>111                        | <b>22. Price</b><br>N/A |

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## **Introduction**

Municipalities and transit agencies across the country are fast innovating to develop a new mode of public transit, based on the same technology that has facilitated the advent of Transportation Network Companies (TNCs) like Uber and Lyft.—app-based, on-demand transportation services that connect user and driver, and Texas has been a national leader in this regard. Due to the nascent nature of these services, they are also known by a series of names, which can be confusing and problematic to developing a robust analysis. These terms depend on the state, region or setting, and we define them more precisely in the Background Literature and **Table 2.1** These include names like ridesourcing, and ride-hailing, in addition to other similar app-based, on-demand models like ridesplitting, microtransit and E-Hail, while policy makers have often used terms like ridesharing, TNCs, and Mobility On Demand (MOD), among others. We often refer to them as app-based, on-demand services here, both for simplicity and the descriptiveness of the terms, though sometimes we refer to them as MODs, when quoting policy makers, or as TNCs, which we designate as public TNCs or private TNCs, depending on whether they are managed as a public transit service or are provided by a private contractor.

Fixed route public transit has traditionally been hampered by a number of factors, including its inability to adjust routes to meet changing needs, and the high density and volume needed near its routes in order to be successful. Recent C-TEDD research identified an additional challenge—the political fragmentation, manifested in numerous geographical service gaps, where public transit agencies and local governments have failed to coordinate services across jurisdictional boundaries (Weinreich, Suzinski, Hamidi, 2018). Fragmentation leads to equity concerns, where large populations must commute to/from destinations that are unserved by public transit, or along routes that require significant transfers from one agency’s services to another. While this is a strong concern for fixed route services, it is still unclear whether TNCs serving as public transit are able to offer more integrated services to the rider. For example, TNCs may be able to bridge jurisdictional divides using private contractors, who could provide a single, integrated service for separate governments, making the experience seamless to the rider, and allowing TNCs to connect origins and destinations without concern for long-established jurisdictional boundaries.

However it is also possible is that public transit TNCs may exacerbate existing problems with fragmentation. In many cases, public transit TNCs are intended as a first/last mile solution to compliment existing public transit services. Yet, if public transit TNCs do not adequately integrate with existing fixed routes or with TNCs of neighboring transit systems, it will be difficult to provide that first/last mile connection. Previous literature has already identified a number of elements of fixed route services that do not integrate well across many transit systems, including physical infrastructure like stations and signage; scheduling; fare payment systems, machines, payment cards, transfer discounts; information and data sharing; and special event/emergency planning (Rivasplata, Iseki, & Smith, 2012) (Miller, Englisher, Kaplan, & Halvorsen, 2005). To date, there has not yet been a similar study of integration challenges in public transit TNCs, which are a new but fast-growing transportation mode. This report applies

the typology of integration challenges developed for fixed route systems to public transit TNCs, and identifies the existence of additional categories unique to this new mode. This study also establishes the challenges agencies face in integrating TNCs used as public transit, examining the extent to which such services have been adopted in the State of Texas, whether such services are intended to compliment or replace fixed route public transit, and the measures (if any) taken to date to overcome jurisdictional boundaries.

In theory, government fragmentation could be overcome by the use of private contractors or entirely private services, unbound by traditional government barriers (Gavin, 2017, pp 337). As local governments consider offering such services in partnership with private companies, this examines the extent to which they have used private participation to overcome this challenge. This study examines a growing technology, and may be the first to examine adoption of publicly-funded ride sharing services across an entire state. This study conducts an exploratory survey of policy makers across the entire State of Texas to learn the extent to which they are introducing app-based, on-demand public transit services, whether they are intending such services to compliment or replace existing fixed route services, and the extent to which they are planning services that cross jurisdictional boundaries. The study then selects cases of implemented or planned app-based, on-demand public transit services for deeper case study analysis, including interviews, analysis of minutes, reports, budgets and other key documents.

This study offers an initial examination of the choices local elected officials are making that will shape their transit systems for decades to come. Focusing on the Texas planning environment, this study looks at a large state with a high interest in using app-based, on-demand technology as a cost-saving alternative to fixed route transit service, sampling the opportunities and challenges to developing public app-based services across the state's 10 largest metro areas. This study surveys public officials in cities and transit agencies that are implementing app-based, on-demand services as public transit, revealing which ones are in the process of "uberizing" their transit systems; whether such services are intended to compliment or replace existing fixed route systems; how city and state ordinances, as well as MPOs, are shaping the process of adoption; and most importantly, what steps they have taken (if any) to integrate such services with each other, and with existing fixed route systems. In many cases, this studies findings are reinforced by collection of documents, and interviews with key public officials. Finally, this study concludes by recommending policy changes for adoption of future public transit TNCs, as well as policies that could be adopted in TNC funding programs at the state or federal level to ensure better integration of TNC services. (We examine integration both: 1) between TNC/app-based, on-demand services acting as public transit; or 2) between TNC/app-based, on-demand services and traditional fixed route services).

## **Background Literature**

### **Jurisdictional Fragmentation and Service Gaps**

Literature on fixed route services has discussed the potential for geographic governance limitations (Goldman, 2007, pp 9-16) to lead to service gaps that prevent transit dependents from accessing schools, jobs and medical services, among other necessities. More recent works have analyzed the political processes needed to overcome such hurdles (Weinreich, 2017; Weinreich, 2016), and develop multi-jurisdictional services, using five case studies where multi-county tax/toll referenda were used as a funding source. Due to the recent emergence of the technology, the literature has yet to examine how the extent to which app-based, on-demand services can overcome the impact of jurisdictional fragmentation, which has been a challenge for traditional fixed route services. The result is likely to be different for private services, which are common providers of ride hailing services, since they are not subject to jurisdictional divisions to the same degree. Known examples of public-private-partnership (P3), app-based, on-demand and services like Via, in Arlington, TX, which are private, but supported by the City of Arlington and the Federal Transit Administration.

Existing literature has yet to examine cross-jurisdictional policies for developing app-based, on-demand services. Some articles have noted the significant equity problems presented by the services (Rogers, 2015). Some researchers have discussed the policy limitations to a regional app-based, on-demand regulatory regime (Gavin, 2017). This literature notes that some states like Pennsylvania have traditionally regulated taxis at the local level, but have also allowed for regional regulations in major urban areas. By contrast, California and Texas have favored municipal taxi regulation. Even so, California has considered applying state-level regulations to Uber and other transportation network companies (often referred to as TNCs).

There is very little research on the emerging phenomenon of replacing fixed route public transit services with app-based, on-demand services, or using on-demand services to funnel riders to existing transit as a first/last mile solution. This trend may be in its nascent stages, leaving most of the debate to the media. This has included articles in Slate, Bloomberg, and local newspapers noting that Uberpool, Lyftline and microtransit services are cherry picking the best, most profitable transit routes (Grabar, 2016; Brustein, 2016).

Some authors have noted app-based, on-demand services' ability to overcome jurisdictional gaps in the existing transit system (Gavin, 2017), but have not elaborated on how this might happen. In particular, it is unclear how app-based, on-demand services may be developed by various levels of government, and what the outcome of this process would look like, though cases like Arlington's new Via service, designed to replace a fixed route, indicate that this is a possibility that requires analysis.

The scope of this project is rooted in the app-based, on-demand service categories laid out by (Jin et al., 2018), as well as geographical categories from (Errico et al., 2013; Koffman,

2004). **Table 2.1** uses these categories to classify the other ride sharing concepts identified in the literature:

**Table 2.1 Typology of TNCs from the Literature**

| Type  | Criteria  | Examples                                | Sources   |
|---|---|---|---|
| Ridesourcing/Ride-Hailing/Transportation Network Companies/TNC <sup>1</sup> s | App-based service that connects community riders who drive private cars for customers | UberX, Lyft                             | (Rayle et al., 2016; Clewlow et al., 2017; Jin et al., 2018)                        |
| E-Hail  | Taxi service equipped for apps  | Taxi                                    | (Jin et al., 2018)  |
| Shared Ride-Hailing/Ridesplitting   | Combines passengers with a similar route, splits their fare                           | UberPOOL, LyftLine                      | (Rayle et al., 2016; ; Clewlow et al., 2017; Jin et al., 2018)                      |
| Microtransit/Shared Minibus   | Private commuting services similar to fixed route, with rides reserved by app         | Chariot, Bridj                          | (Barbar & Burtch, 2017; Rayle et al., 2016; Clewlow et al., 2017; Jin et al., 2018) |
| Demand Responsive Connectors  | Connects passengers with rail station   | Via, Arlington, TX, DART, Capital Metro | (Errico et al., 2013; Koffman, 2004)  |
| Zone routes   | Trips around town, within a specific zone   | Via, Arlington, TX                      | (Errico et al., 2013; Koffman, 2004)  |

Rayle et al (2016) and Clewlow & Mishra (2017) provide strong definitions for the various service types, particularly Transportation Network Companies/ridesourcing/ridehailing, which are app-based services that connect the user to the provider, and distinct from ridesharing services, which are co-ops, for which users pay a membership fee to drive themselves (e.g. Zipcar). Additionally, services like ridesplitting are app-based, but allow riders to share their ride (e.g. Uberpool or LyftLine), while microtransit are privately-run fixed or semi-fixed route services (e.g. Bridj, or Chariot).

<sup>1</sup> Note that “Ridesharing” is often confused, but stands for carpooling/vanpooling, in which the driver is heading to the same destination as the passengers (Jin et al., 2018; Rayle et al, 2015).

Finally, some authors have conceptualized (Errico et al, 2013; Koffman, 2004) about the geographical service area. For example, according to their paradigm, Zone Routes serve ride requests within a particular area. This would be distinct from demi-fixed routes, which might describe microtransit services, and can deviate from the assigned route to pick up a passenger nearby. This paradigm includes Demand Responsive Connectors, used to make first/last mile connections to transit (Errico et al, 2013; Koffman, 2004). (See Appendix **Figure 2.1** for a catalogue of semi-flexible spatial service designs).

While other authors have identified distinctions among these concepts, in this study, we include all concepts, when used as public transit service (see below). However none of the previous work on app-based, on-demand services has analyzed the governance and finance system supporting such services, when used as public transit—partly because the use of these concepts for public transit service has only emerged in the last several years. In this study, we make qualitative connections between how transit systems are governed and how riders experience traveling between them on demand-responsive service. Previous research has found significant differences across regions and states in the way fixed route transit services are governed (Weinreich et al., 2018), and has identified ways these governance features can impact transit operations, by creating governance fragmentation (Weinreich, 2017). Multiple providers can create a number of difficulties for fixed route public transit systems, which our study and our study intends to analyze whether and how they apply to app-based, on-demand public transit systems. Challenges to integration can come from incompatible fare structures across transit agencies/providers, increased travel time, diseconomies in facilities and routes, and poor disaster preparedness. Governance fragmentation has also been identified as a reason for the existence of these challenges (e.g., Iseki & Taylor, 2008; Rivasplata et al., 2012).

We draw our concept of fragmentation from that described in a previous study on transit governance (Weinreich et al., 2018). This study discusses fragmentation as a splintering of regions into multiple governing units, and the “*division of planning and policy implementation among multiple units of government in a given area.*” We define governing units as including general-purpose local governments, including municipalities, counties, and county subdivisions. We also include transit agencies and transit districts, and in some cases, transit services are nested as a division of a general-purpose local government. The opposite of fragmentation would be regionalization of transit services, meaning transit has been consolidated to serve riders of more than one municipality or county. This can occur to varying degrees depending on the number of local governments that have integrated services. Rivasplata (2012) provides a useful typology of theoretical perspectives from which to examine integration of transit agencies, using systems engineering, public management, institutional and microeconomic lenses (2012: 57). Their study (and others) focus on the public management lens, though ours and Weinreich et al. (2018) are some of the few to use an institutional perspective.

Rivasplata et al. (2012), using the management perspective, cited several reasons why transit agencies might have difficulty coordinating from one agency to another. For example, several of their survey respondents identified institutional barriers to coordinating, like the lack of a strong MPO or Regional Transit Authority to coordinate (2012: 64-65). Funding structures were even more problematic. Funding at lower levels of government would make it difficult to

integrate services across jurisdictions, Others have cited inflexible funding arrangements as a major barrier to better service integration from one transit agency to another (Miller, 2004). Transit decision making further complicates the redistribution of power, authority and control across agencies. Additional factors making integration difficult include satisfaction with the status quo, inertia/resistance to change, lack of a common vision across independent agencies, and lack of an environment encouraging fundamental change (Miller & Lam, 2003). Essentially, integration is a product of both formal rules, like separation of services across multiple local governments, as well as norms, like willingness to work together or the existence of a strong, unified vision (Miller & Lam, 2003). These studies suggest ways that formal finance and governance institutions may improve coordination. Yet their conclusions focus, rather, on technology to bridge cross-agency divides, using smart cards and improved information sharing (Miller et al., 2005). Technology may tell us about how agencies are dealing with their institutional environment, though it is not the complete story. Institutions also tell us a great deal about how and why transit agencies are failing to cooperate, and more research needs to be done on it from the perspective of different transportation modes. This is the first study we know of to do such research on public transit TNCs. This can aid policy makers in identifying ways to create better integration of services using funding policies, and governance structures.

## **Research Questions**

This project seeks to understand:

- 1) *The extent to which cities have chosen to compliment or replace their fixed route services with app-based, on-demand transit systems.*
- 2) *Regional accessibility and the extent to which government-planned, app-based, on-demand transit serve outside their jurisdictional boundaries. What have app-based, on-demand providers done to overcome jurisdictional fragmentation up until now, and what can they do?*

## **Methodology**

This study uses qualitative methods to analyze the level of fragmentation present in app-based, on-demand services that cities and local transit agencies are proposing to replace or compliment fixed route transit lines. This study includes services initiated by medium and large size cities, counties or local/regional transit agencies. Public support can mean financial, leadership in planning, or otherwise, by a local government, perhaps with a Request For Proposals for a private company to provide service for the city/transit agency. However *entirely* private services are outside the scope of this study. Furthermore, the *scope* of this study excludes non-app-based services. Otherwise, we included any service that was app-based and on-demand, including paratransit, or other specialized services. Furthermore, we included all categories of TNC service design from Table 2.1, as long as they were proposed by municipalities or transit agencies as public-supported, or publicly initiated, and to serve in some way as a substitute or compliment to the types of needs public transit would otherwise provide.

The state of Texas was selected for analysis, due to the large number of cities within the same state legal geography, under the same set of rules governing implementation of app-based, on-demand services. This will allow comparison across services, and across cities with different levels of legacy transit services. Furthermore, Texas was selected over other large states due to the high level of interest in converting fixed-route services to app-based, on-demand, making Texas a trendsetter in this regard, and of high interest to other states that might want to implement similar services.

The research team began by examining archives and newspapers for Texas' app-based, on-demand policies, and regulations that may have impacted these services' relationship with public transit. The team then conducted *exploratory surveys of key informants* of medium and large size cities in Texas, covering city and county governments that had over 50,000 people in the most recent American Community Survey, as well as transit agencies for their jurisdiction. Development of the list mainly followed a list of transit agencies, many of them municipal governments, already developed for a previous project on transit governance (Weinreich et al., 2018). From this list, transit providers and municipalities were selected from across the state's 10 metropolitan statistical areas that have over 400,000 residents, (excluding Rural Transit Districts, or RTDs).<sup>2</sup>

Surveys provided an exploratory understanding of the extent to which local governments and transit agencies are considering app-based, on-demand services as a replacement for or compliment to public transit, as well as the extent to which they have been developing services that cross jurisdictional boundaries.

For each government, the team collected email information for key decision makers, using contact information from the Local Barriers to Regional Transportation project, as a

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<sup>2</sup> The 10 MSAs would include Dallas-Fort Worth, Houston-Woodlands-Sugarland, San Antonio- New Braunfels, Austin- Round Rock, El Paso, McAllen-Edinburg-Mission, Corpus Christi, Killeen-Temple, Brownsville-Harlingen, and Beaumont-Port Arthur.

starting point, sending at least one survey to every government in the sample frame. The aim here was to achieve maximum coverage of transit agencies and local governments that provide transit in the selected regions, relying on alternate respondents if the initial contact does not reply. Surveys were sent to transit agency and municipal staff. [In some cases, transit services were provided by an independent transit agency, while in others, services were provided by a city or other municipality].

Pre-testing surveys ensured the question order and language did not bias the survey results. Additionally, surveys were designed to minimize the effect of question order. Questionnaires were developed and pre-tested on members of the research team before sending by email to each local government in the study. Questions were included to assess the level of knowledge of the survey respondent. Surveys provided information on local level of interest in replacing transit with app-based, on-demand services, status of implementation of on-demand services, and plans (or lack thereof) for ensuring services cross municipal boundaries. Additional information was collected for use in Part 2, on local governments' plans for addressing equity issues identified in the literature<sup>3</sup>. If plans for serving outside municipal boundaries were absent, this would indicate the potential for service fragmentation similar to that which already exists for public transit, and being investigated by the C-TEDD transit governance study (Weinreich et al., 2018).

Surveys were designed to reveal and distinguish between municipalities/transit agencies that were *considering* a switch from fixed route public transit to app-based, on-demand services, and those that had *already done so*.

To answer the **first research question**, the research team used survey information to develop a typology of services being proposed to serve as public transit. This builds on the existing TNC-focused categories in the literature (**Table 2.1**), which are reflective of the private transport TNC environment now existing. However the typology built here focuses, instead, on services being planned or initiated by local governments to serve a public transit role. These can include public private partnerships or all-public projects, but not services that are entirely private. Examples of data gleaned from the survey for this typology reflect basic information on the number of cities considering a conversion from fixed route to app-based, on-demand service; whether these services are being proposed for implementation in the near future, or have already been implemented; and whether such services are intended to be confined to jurisdictional boundaries, or are planned to serve neighboring jurisdictions.

To answer the **second research question**, the research team built on the work that has been produced, to date, from the (Weinreich et al., 2018), analyzing the degree to which local autonomy carries over from public transportation policy to app-based, on-demand services.

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<sup>3</sup> Part 2 will define equity as cost, ADA access, access to smart phones or bank accounts, and service for seniors and people with disabilities. Questions will ask about policy makers' efforts to include solutions for these problems into their plans, like kiosks for people without smart phones to call app-based, on-demand services, or the use of pre-paid debit cards for the unbanked.



## Conducting the Survey

This study began with knowledge of two then-known cases of public governments or transit agencies proposing or implementing the use of app-based, on-demand technology for transit uses in Texas, one being in Arlington, and the other in an underserved part of the Dallas Area Rapid Transit (DART) system. As the surveys revealed the existence of additional cases across the state, the research team collected data on all known cases, as there were not enough cases to merit use of a typology-based case selection tool.

*In each case, the research team examined whether services were confined to local jurisdictional boundaries.* Services that have already been implemented relied on service boundaries from the existing service. Information was gathered through meeting minutes and other archives to indicate what, if anything, was planned to overcome this problem. If the service was confined to municipal boundaries, the team interviewed public officials from agencies that were in a position to overcome local jurisdictional divisions. For example, they interviewed board members or staff from MPOs, toll road authorities, councils of government, or other relevant multi-jurisdictional body about what they believed their agency could do in the future to provide less fragmented service. What would be the challenges of getting involved? What would be the politics? And what would they do to make it work?

Interviewees were selected by consulting archival documents and newspapers. Any additional interviewees were selected through a snowball sampling method, asking interviewees to suggest others who are working with them to develop and promote app-based, on-demand transit in their area. Interviews were checked against survey information, information from the CTEDD Local Governance study, and meeting minutes where app-based, on-demand services had been discussed.

The research team collected data from the municipalities in the ten largest MSAs in Texas in 2017. We chose metropolitan regions in the state of Texas for four reasons. First, Texas is leading the introduction of public TNC service concepts, using app-based, on-demand services in place of fixed route transit. Second, state law shapes the policies that can be initiated and implemented through local ordinances, working within a single state at this early exploratory stage to control for state level influences. Third, we needed a state with a high number of large metropolitan areas, in which demand from residents for the consideration and adoption of new technologies in public services might be higher. We wanted to collect data from a state in which local governments have a relatively high degree of autonomy when compared to their peers in other states, making them more likely to be active adopters of new policies. Texas has all these qualities (US Bureau of the Census, 2018; Wolman et al., 2008). Finally, given our location in Texas, the state presented an advantage for survey response and completion rate, potential for identifying and contacting interviewees, and efficiency of follow-up interviews, if needed.

The survey population included elected officials, and select administrative staff—such as municipal managers or transit directors—who we expected to be familiar with proposed or adopted transit policies. One of the drawbacks of this broad type of canvassing of a public

organization is that multiple actors receive the survey at once, and internal communication could result in only one respondent self-selecting from this group. While this can artificially deflate the response rate, our goal was to receive responses from as many local governments from those in our study area as possible.

The survey questionnaire had seventeen items, but skip and display logic meant that no single respondent answered more than twelve items. Excluding outliers who left the survey instrument open more than one hour, completion on average took only seven minutes. We excluded open-ended questions to avoid excessive completion times. The questionnaire instrument was pre-tested for functionality by researchers, while we assessed the conceptual validity of each survey item by submitting it to select local government actors outside the study area. The goals of this questionnaire were 1) to learn about the consideration and adoption of on-demand transit systems among municipalities and 2) to learn about the general characteristics of such programs. This would help provide a baseline of understanding for the policy landscape in which app-based, on-demand systems existed. We administered the questionnaire online in June 2018 via Qualtrics; the general distribution and response characteristics are in **Table 3.1** below.

**Table 3.1. Survey Distribution and Response Characteristics**

|                           | <b>Number</b> | <b>Rate (%)</b> |
|---------------------------|---------------|-----------------|
| Population                | 2,997         |                 |
| Starts                    | 418           | 13.9            |
| <b>Responses</b>          | <b>353</b>    | <b>11.8</b>     |
| <i>Non-consent</i>        | 6             | 1.7             |
| <i>No item completion</i> | 14            | 4.0             |
| <b>Completions</b>        | <b>333</b>    | <b>94.3</b>     |
|                           |               |                 |

Of the 90 respondents who indicated they were from local governments with on-demand transit systems, only 23 indicated that “smart phone” was one of the ways riders could request service. Another 55 respondents, of the 333 who completed the survey, indicated they did not have such a program at the time of response, but had previously considered one. The research team designed two follow-up questionnaires for these two groups of individuals, which we administered in July 2018.

## **Survey Results**

In total, 61 municipalities, including both city and county governments, responded in our first round of surveys that they had either implemented a public app-based, on-demand service

already, or had proposed implementing one in the future. After the first round of surveys, it became clear that more information was needed on the service interface, as well as follow up questions on coordination with existing transit, funding streams, and support by other government agencies like MPOs. We sent this survey with specialized questions in two groups, one with 18 questions for those respondents that had previously answered that their agency/city/county/MPO had implemented an app-based, on-demand service (n=35), and one with 16 questions for those respondents that had said their agency had formally proposed such a service (n=31). The surveys indicated that a total of nine Texas municipalities had implemented a service using an app-based customer interface; 30 had proposed one; while 11 had conflicting responses from different respondents from the same municipality (A total of 50), as of July, 2018, when we sent the surveys.

The cities that had considered or already implemented an app-based, on-demand service were mainly suburban. Of this group, only five can be considered core cities (Beaumont, Brownsville, Dallas, El Paso and Fort Worth), and all of these except El Paso had merely proposed an app-based, on-demand service, while El Paso was the only core city that had implemented one by the date of response. (Additionally, Dallas and Austin can core cities, and while they had not implemented one by the survey closure, they had by the time we interviewed them for the qualitative analysis section below). The surveys further indicated that the other 45 cities were from suburban and exurban parts of Texas' ten largest Metropolitan Statistical Areas. A considerable number of these cities were clustered in the Dallas-Fort Worth area, with smaller clusters located around Austin, Houston, and in the Brownsville-Harlingen metropolitan area of South Texas<sup>4</sup>. *The concentration of responses in suburban and exurban areas from Texas' major regions indicates the new technology and service model is more appealing to areas with lower density and lacking a robust fixed route transit system, though additional research will be needed to understand the full range of reasons for the technology's appeal to suburban cities.*

### **Contracted TNCs are Being Used to Expand Existing Services, Not Replace Them**

Survey respondents reported using TNC services in their communities primarily as a means of supplementing and expanding upon existing paratransit services, as opposed to utilizing TNCs as a replacement for public transit or paratransit services. During the survey, respondents were given the opportunity to discuss the specifics of their programs, and several discussed existing paratransit services that operate in concert with TNC offerings to transport elderly, disabled, and Medicare/Medicaid riders on qualifying trips. In addition, several suburban and exurban respondents made explicit mention of using TNCs to improve connectivity to

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<sup>4</sup> There were four in Austin-Round Rock MSA, two in Beaumont-Port Arthur, four in Brownsville-Harlingen, 19 in Dallas-Fort Worth, 1 in El Paso, 11 in Houston-The Woodlands, two in Killeen-Temple, two in McAllen-Edinburg, and five in San Antonio-New Braunfels.

regional transit networks as a ‘last-mile’ connector service. The specific degree to which a contracted service with a private TNC can expand a region’s existing transportation services varies from place to place, but this remains an indication that many communities engaging the services of a private TNC are doing so with the ultimate goal of expanding existing government-run services, rather than contract them as a full-service replacement for public transit.

Indeed, when asked to rate the degree to which respondents expected riders to use the service to replace existing public transportation services (on a sliding scale from 0-6), only nine respondents, representing nine different municipalities, rated it 3 or less, meaning they thought the public would use it to replace other public transit; six of these were using the service for disabled or medical transport only, with the exceptions—i.e. municipalities where they thought riders were using the service to replace public transit—being Arlington, Rockwall and Rowlett, all in the DFW region.<sup>5</sup>

In the initial survey, most cities were expecting to use their services to supplement, rather than replace public transit. Of the 24 respondents, representing 23 municipalities, who rated their service a 4 or more, 20 of these gave it a 5 or 6, meaning they expected riders to use the service to supplement other public transit (n=37). In the first (replacement) group, only 36% of respondents said the service was for medical transit, seniors, or persons with disabilities, while 66% of the first group expected the service to be limited to medical transit, seniors or persons with disabilities. This suggests two types of services, with services designed to operate as a replacement to public transit focusing on persons with disabilities and seniors, and service supplementing public transit being less restrictive. Additionally, the 50% (n=14) of respondents who said their riders were more likely to use the service to replace transit (answering 4 or less) also said their area had fixed route public transit, while only 45% of respondents said their riders were more likely to fill gaps in the transit system, with those respondents from cities with fixed route services (n=24) indicating a slightly greater propensity to use TNCs to replace existing services.

## **Operation Across Multiple Local Government Boundaries**

Given how many of the respondents’ programs operate in suburban environments – often a patchwork of individual municipal governments – a willingness to operate across multiple city and transit agency boundaries is required to provide adequate coverage and accessibility to the population. Out of cities that responded to our follow-up survey question on whether their (implemented) app-based, on-demand service crossed outside their municipal boundaries (n=22), 15 said the service went outside their boundaries (68%), while five said it only served areas

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<sup>5</sup> It should be noted that some cities with more than one respondent had scores that varied up to three points. However the responses represent a range, and provide useful information about the intentions of the policy makers responsible for planning them.

inside their boundaries (and two responded “other” or “not sure”). An important question of this study is how local governments planning public TNCs are overcoming jurisdictional boundaries. Respondents provided information about methods used to develop their services (including both cities that had implemented or planned to implement such services).

In the initial survey, we found a strong role for cross-jurisdictional governments like MPOs and the state in planning TNC services, with the strongest being the MPO, and other local governments coming in second, followed by state support (**Table 4.1**). We found an even stronger role for multi-jurisdictional financial support, with 61.5% of respondents saying they received financial support from the state, and 40.7% receiving support from an MPO, while 57% received support from “other,” with many of these specifying they received federal support (further discussion below). Additionally, many cities that had proposed developing such a service had mostly discussed using a multi-governmental governance model, or through a multi-government/multi-agency agreement, rather than managing it by a single city, county or transit agency.

**Table 4.1 Primary Sources of Support for Public App-Based, On-Demand Services\***

| Technical Support |                    |       | Financial Support |                   |       |       |
|-------------------|--------------------|-------|-------------------|-------------------|-------|-------|
| MPO               | Another Local Gv't | State | MPO               | Special Authority | State | Other |
| 33%               | 28%                | 26%   | 40%               | 35%               | 61%   | 57%   |
| n=30              | n=25               | n=23  | n=27              | n=22              | n=26  | n=14  |

\*Respondents could rate the importance of sources of support from 0-10. This table reflects the percentage of respondents selecting a 9 or 10 for each category.

## Methods of Multi-jurisdictional Cooperation

While cities’ general *willingness* to cooperate suggests the possibility of strong integration of services, their tepid response to specific forms of cooperation like fares indicates a need for more proactive measures by higher level governments like counties, MPOs and states to ensure strong integration both between TNCs and across modes, from TNCs to fixed route services. MPOs and regional governments are uniquely suited to promoting regional integration and multi-jurisdictional transportation services, and their role as funders, technical advisors, and facilitators of innovative services appears important to cities developing new public TNCs.

This role seems essential because municipalities appear more interested in the *concept* of multi-jurisdictional service than the reality. In our follow up survey, over 80% of respondents said their service had crossed jurisdictional boundaries, or planned to, though in one case we identified (Arlington, TX), the service just barely crosses the boundary into another city, connecting riders, by transfer, to a commuter rail line. This suggests that perhaps the response to

‘whether’ the on-demand service crosses boundaries is less helpful than the response to a question in the follow-up survey on what measures had been taken to facilitate coordination with other nearby transit systems. *From this question, we found that shared equipment and facilities were the most common methods of cooperation that respondents were interested in, while they were least interested in reduced fares or universal fare card proposals.* To further clarify these issues, we made this the focus of our interviews with city officials in the second section.

## **Cities Seeking to Use TNCs for Public Transit Modeled Their Policies on Non-Texas Cities**

Those survey respondents who were either currently operating a contracted TNC service or considering one in the near future were asked to rank the sources of information and policy guidance they used to craft their specific policies regarding TNC-city relations. As with the previous rankings of technical/financial support from external sources, respondents ranked the state government quite poorly. In addition, respondents ranked their MPOs, the federal government, and other Texas cities as providing rather limited input on the crafting of TNC-city policies. By far the most influential source of policy data, according to these respondents, were cities located outside of Texas. None listed any specific cities they used for inspiration or guidance, but the authors found the distinction between Texas cities (not influential) and non-Texas cities (very influential) noteworthy. In addition, respondents ranked the “other” category as highly as non-Texas cities, suggesting these communities are seeking information and policy guidance from nontraditional, perhaps nongovernmental, sources as well as distant American cities.

## **Codes Governing the Implementation of Public TNCs**

Our analysis of the 51 Texas cities that had either implemented or proposed introducing a public TNC service found very few local regulations governing or limiting public or shared ride TNCs. Indeed, only a few cities even regulated private TNCs like Uber or Lyft. Only three cities, El Paso, Dallas and Beaumont had ordinances that could be applicable to the functioning of such services as public transit. Out of these three, Dallas is the only one that mentions ease of access for such services at the airport, but does not impose any additional specific regulations TNCs need to follow at the city level. The other two cities, El Paso and Beaumont, provide more specific regulations, which we discuss below.

*Since this is a relatively new way of providing transportation, the overriding finding was that very few cities have regulated them so far, with many city-level regulations simply merged with existing regulations for taxis and other for-hire vehicle services. In cities that did regulate TNCs separately, they used differing terminology to discuss the same concept, which is not surprising considering the same lack of consensus in the academic literature and among state*

regulators. To identify the applicable codes in spite of the lack of semantic consensus, we scanned ordinances for all 51 cities using a menu of keywords, including “transportation network company” (TNC), “on-demand,” “digital network,” “app-based,” “on-line enabled,” “prearranged,” “ride-sharing,” “rideshare,” “Uber” and “Lyft.”

## **Cities with Public App-Based, On-Demand TNC Services**

When app-based, on-demand services are private, a number of laws regulating discrimination and pricing are necessary. This may be the case with public-private partnerships as well. However only a few cities we examined have even these basic regulations. Very few cities have accessibility and non-discrimination regulations for vehicles for hire. Nor do they require wheelchair accessibility for such vehicles. For example, Hurst, Pharr, Plano and Mission do not have any codes regulating accessibility or requiring non-discrimination of service.

Only one city, El Paso, has regulations for app-based, on-demand transportation systems (City of El Paso Municipal Code § 6.04.320), mainly applying to private providers. The code regarding fare information, surge pricing, methods of identifying TNC vehicles and electronic receipts covers many of the controversial issues with private TNCs, but is not as relevant to services provided by a city or county. Regulations cover things like how a price can be set and how it can change according to needs and available drivers in the area, provided this has been clearly stated in the app. Additionally, the City of El Paso exempts government-owned vehicles from such regulations (City of El Paso Municipal Code § 6.04.030), though it is unclear whether public-private partnership services would be subject to city regulations.

## **State & Federal Regulations**

State code defines key terms like “digital network”, “digitally prearranged ride,” and “Transportation Network Company” (Texas Occupations Code, § 1. Subtitle C, Title 14, Occupation Code, Chapter 2402). State regulations also allow shared rides between multiple passengers (on the passengers’ approval) but a passenger cannot carpool and share the expense off the digital network (Texas Occupations Code, § 1. Subtitle C, Title 14, Occupation Code, Chapter 2402.102). Texas regulations require TNC companies to acquire a permit from the state to operate a TNC (Texas Occupations Code, § 2402.015).

Public transportation systems have traditionally had a fixed fare rate. But, the fares codes of the state regulations do not have any rules in favor or against surge pricing methods used currently by private TNCs (Texas Occupations Code, § 2402.103).

Nationally and in the state of Texas, public transportation providing vehicles are of different capacities. They can range from four people to more than 30 people. If a TNC system is

used for public transportation, Texas codes limit the capacity to eight people, inclusive of the driver (Texas Occupations Code, § 2402.111). This could make it challenging to use TNCs as public transit, should the demand continue to grow over time, requiring the purchase of more vehicles, and payment to more drivers, for capacity to keep up with demand. This suggests a demand threshold, above which TNC services are not as cost effective as fixed route services.

Finally, there is the issue of access for persons with disabilities. Wheelchair access is mandatory in all current public transportation systems nationally. But the company can direct the rider to other wheelchair accessible services, and it is not mandatory for the company to have wheelchair accessible services (Texas Occupations Code, § 2402.112e).

### **The Section 5310 Program as a Major Source of Funding for Flexible Transportation**

There is a strong role for federal assistance in helping municipalities provide cross-jurisdictional service. Indeed, as **Table 4.1** indicates, most cities already look to the federal government for financial support for public TNCs. The specific federal program providing grants for paratransit and other flexible-service transportation programs (which can include TNCs operating under government contract) is known as the Section 5310 program, and it arguably provides a stable and visible source of financial support for communities seeking to offer flexible services to vulnerable portions of their citizenry. To better address the mobility needs of older adults and people with disabilities not effectively served by fixed-route transit, the federal government in 1975 established this program (Federal Transit Administration, 2017) to distribute dedicated federal dollars on a population-formula basis to state governments, MPOs, and local transit agencies. The original purpose of these grants was to cover capital costs for both public and nonprofit agencies providing door-to-door transportation for older adults and persons with disabilities (Koffman et al., 2004). In 2012, federal legislation expanded the program to cover operating expenses as well (Federal Transit Administration, 2014). Additional language was added to allow recipients to contract with private-sector firms. As explained in FTA directives to grant applicants (2017), recipients of funding are permitted to distribute the money based on local needs, and is often used for travel training, volunteer driver programs, signage at transit stops, and paratransit service. This program remains the dominant source of funding for traditional paratransit service, as well as innovative public-private partnerships with TNCs and qualifying nonprofit agencies. It is also a key driver in regional transportation planning and interagency cooperation, allowing the distributing agencies (chiefly MPOs, but also state governments) to play a central role in promoting innovative partnerships and regional transportation integration.



## Survey Conclusions

All TNC service types faces one challenge in common—the need to ensure that public TNCs serve more than just their single community. This is an issue that may not be a problem for private services, but for public ones, there is an incentive for cities to keep the service within their own boundaries, so as to avoid spending tax dollars on a neighboring community. Most respondents to our survey said they did not want this to happen. However when asked what steps they were interested in taking to cooperate with other transit services, the answers were limited to the easiest measures, like sharing facilities, rather than harder ones like offering discounts for rider transfers.

More work is needed by higher levels of government to avoid excessive fragmentation of public TNCs, as has already happened to many regions' fixed route public transit systems. Many cities said they were already looking to MPOs, state and federal governments for funding, though they were relying more on MPOs for technical assistance.

While the Texas Department of Transportation (TxDOT) has implemented statewide regulations of TNCs in the form of liability-insurance requirements (Moran, 2016), there remains limited technical guidance from TxDOT on how municipalities should regulate, manage, or engage in contracted partnerships with TNCs. In this environment, cities are left to work out their own regulatory and normative structures for interacting with TNCs. Finally, while respondents ranked state guidance as limited, their views on technical assistance from MPOs and their local government were not much more positive. Taken together, this indicates a general desire to learn more about operations, funding and regulations, but a lack of available information. This may represent an opportunity for higher levels of government.

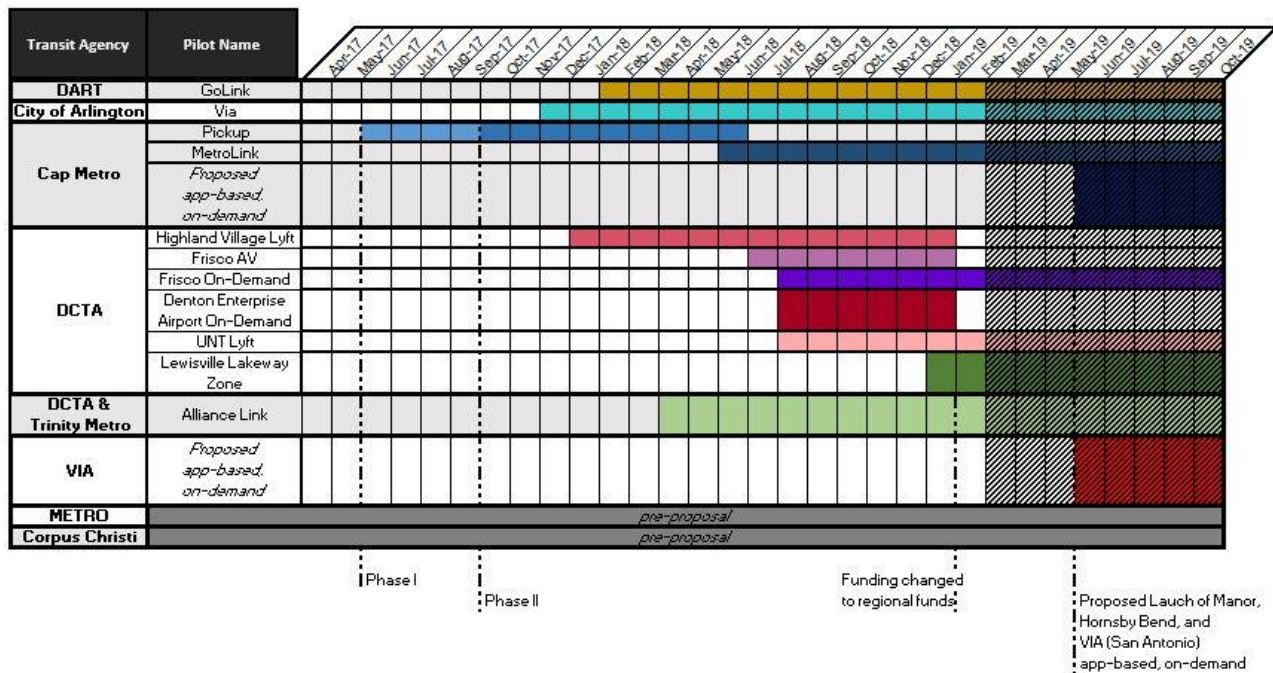
Surveys also indicate the federal government can make stronger use of its 5310 program to support public transit TNCs, and assist in integrating paratransit services and rural (non app-based) on-demand transit. In the section below, we further examine the public TNC proposals that are being implemented across the state of Texas, using interviews and analysis of documents to provide a picture of the services being implemented, policy makers' motivations and intentions in providing that service, and how/why that service is fragmented or integrated with other transit and TNC services in the region.

## **Review of TX App-Based, On-Demand Services & Case Selection**

We did not find enough services in place, or large enough differences between services to make a typology useful in selecting services, as had originally been intended. We did find service distinctions across cases (see **Table 6.1**). We also found many services used for a general population, along with several like in Denton and Capital Metro, where they were intended to provide a new interface for paratransit. However these distinctions did not prove to be helpful in selecting services due to the low number (n=9). Due to the low number of municipalities found to be implementing or proposing public app-based, on-demand TNCs in Texas, we selected *all* cases that met the selection criteria for further investigation through interviews. Criteria included the use of an app, and on-demand. We did not select based on the use of the service, or the target population allowed to ride it, so we included paratransit and rural transit services, when relevant. We also included both operators already providing public TNC services, and those proposing to do so. From the survey responses, seven transit agencies were selected, four of which had existing app-based, on-demand pilots, one in the late stages of planning the pilot, and two that were still in their pre-proposal stage. Interviews took place between November 2018 and January 2019. Please see **Figure 5.1** for a comprehensive list of the transit agencies, pilots and when they launched (or planned to launch) app-based, on-demand services supported by a government agency (e.g. city, county, transit agency).

In some cases, we did not include regions that the surveys indicated were either proposing or had already implemented app-based, on-demand services. Survey respondents from the city of El Paso indicated they were operating an app-based, on-demand service; however, upon further investigation, this turned out to be a simple webpage for paratransit-eligible riders to book their trips, but not a phone-based app (personal communication, Julio C. Perez, September 17, 2018). Additionally, Brownsville or Beaumont's transit agencies and metropolitan planning organizations did not respond to email requests for information, so were not included in the qualitative portion of this report.

Figure 5.1 Timeline of Implementation Across Cases



Methodology

Information was collected through websites, released reports, board minutes, personal communication, and interviews. The information collected for each agency is summarized regarding their coordination and integration practices as understood from the various sources.

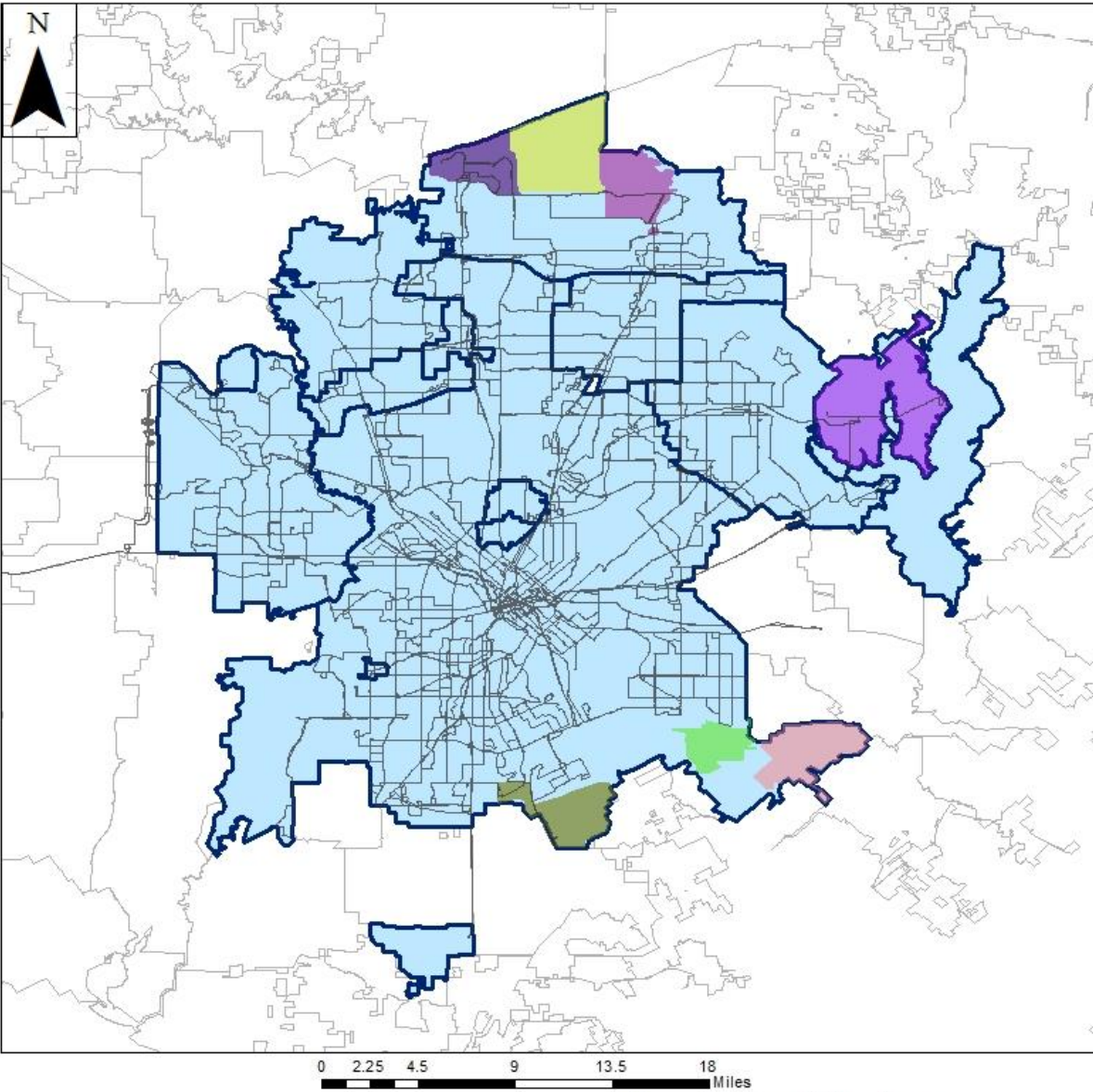
## **Dallas Area Rapid Transit (Dallas, TX)**

Dallas Area Rapid Transit's (DART) 700 sq. miles incorporates thirteen member cities that contribute funding through a one-cent sales tax (Dallas Area Rapid Transit, 2018) (Dallas Area Rapid Transit, n.d.). As shown in

Table 5.1: Summary of DART App-Based, On-Demand **Services** of the Appendix, DART’s thirteen service cities all have some form of fixed route service, either rail or bus, and out of the thirteen cities, three currently have app-based, on-demand services: Dallas, Plano, and Rowlett (Dallas Area Rapid Transit, n.d.). DART also offers a mobile application called GoPass, which can be used to view route maps, schedules, and purchase tickets (Dallas Area Rapid Transit, n.d.). It is currently not used in the on-demand pilot services.

DART began an app-based, on-demand pilot service to provide first and last mile solutions to its fixed route users and work “...to increase the options available, to bridge the distance and make riding transit a viable choice for more people” (Dallas Area Rapid Transit, 2018). During our interview, Todd Plesko, Vice President of Planning and Development at DART explained the basis for the program, stating the intention as connecting riders to existing fixed transit (Plesko, Interview, 2018). The goal was to provide “equitable MOD solutions that are accessible to unbanked, disabled, low income, smartphone challenged customers and typically non-transit customers” (Dallas Area Rapid Transit, 2018). He added, “Could we attract people that don’t typically use transit to use this as a way to get to a rail station or travel within the zone?”—which Plesko referred to as a key objective of the pilot (Plesko, Interview, 2018). To develop this service, specific locations were selected to provide pertinent data. For a map of pilot service locations, see **Map 1**.

Map 1: Dallas Area Rapid Transit App-Based, On-Demand Pilots



**Legend**

- DART Transit Routes
- GoLink Rylie
- GoLink Kleberg
- GoLink Rowlett
- GoLink Inland Port
- GoLink North Central Plano
- GoLink Legacy West Zone
- GoLink Far North Plano
- DART Service Area
- Texas City Boundaries
- MPO Boundaries

Map creator: Steven Matthew Reeves  
(February, 2019)

Source:  
 MPO Boundaries (2019), City\* Boundaries (2018),  
 and Highways (2019) from TxDOT.  
 Service Areas from CTEDD (2018)  
 DART Routes (Dec. 2018) from TransitFeed  
 Zones\*\* georeferenced from provided Maps

gis-txdot.opendata.arcgis.com  
transitfeeds.com

\* Includes most recent city boundaries, no annexations  
 \*\* Should not be considered exact

Todd Plesko also indicated that when implementing zones in Legacy, Rylie and Kleberg, it was to replace fixed transit (Plesko, Interview, 2018). In doing so, DART aimed to “lower the cost and expand the reach of public transportation.” DART has since identified that the app-based, on-demand program is a good way for “replacement of ineffective, cost fixed route in low density areas” (Dallas Area Rapid Transit, 2017).

The app-based, on-demand program currently provides services to seven zones – Legacy West, North Central Plano, Far North Plano, Inland Port, Rowlett, Rylie, and Kleberg (Dallas Area Rapid Transit, n.d.). DART’s current seven app-based, on-demand pilot zones operate through one program entitled GoLink (Dallas Area Rapid Transit, n.d.). The app-based, on-demand program only exists within DART’s jurisdiction and no zone crosses municipal boundaries (Dallas Area Rapid Transit, n.d.). The GoLink program uses DART-branded, accessible minibuses, operated by MV Transportation Inc., to move a rider curb-to-curb within the zone or as a first and last mile solution to access the station, either within or adjacent to the app-based, on-demand service zone, connecting to DART’s previously existing transit service. The exception to this behavior exists for the Rylie and Kleberg service zones, where a bus will wait at Buckner Station (a rail and bus station adjacent to the two zones) and depart at :05 and :35 minutes past the hour (Dallas Area Rapid Transit, n.d.). As the GoLink website says, the service areas were chosen to provide riders with the options to “take it to work, run errands or connect to other DART services” (Dallas Area Rapid Transit, n.d.).

To schedule a ride, passengers need to download an app called TapRide, which is available on Android and iOS devices. The application requires the user to, upon initial opening, to choose the service they are looking for. In this case, it is called GoLink/DART in the available services list. Once the service is selected, the app switches to the GoLink branding and asks users to create a GoLink account or login. Once logged into the application, riders are able to select their pickup and drop off locations within the available zones, which are highlighted within the application. Additional in-app notices are available to prohibit users from selecting locations outside of the zones, or schedule a ride between zones. Please view **Figure 5.2** in the appendix to see an in-app screenshot.

During the November 5<sup>th</sup> 2018 North Central Texas Council of Governments’ (NCTCOG) Mobility On Demand Working Group Meeting, Todd Plesko provided a status update for the current pilot project. While DART is still compiling its review of the pilot services so far, Plesko offered that 95% of the riders that DART currently is documenting are traveling to or from a transit facilities, and that DART is considering increasing the number of zones (Plesko, Interview, 2018). He also mentioned that micro transit ridership has increased every single month since DART started the pilot (Plesko, Interview, 2018). However, the ridership data presented at the November 26<sup>th</sup> Mobility Solutions, Infrastructure & Sustainability committee indicates a small decrease in ridership in February and October of 2018, but then resumes growing each month afterward (Dallas Area Rapid Transit, 2018). Noteworthy increases in ridership were seen in Rowlett, where it has increased by 150% from the beginning and in North Central Plano where it rose approximately 50% (Plesko, Interview, 2018). Right now, the pilots are a source to collect data and understand the affordability and efficiency of service.

The affordability of the app-based, on-demand program was identified by Plesko as DART’s major challenge (Plesko, DART MOD Sandbox Project Update, 2018). He noted that the subsidy per rider of a fixed route service operating in Plano was \$35. but the implementation

of GoLink mobility-on-demand service to this same area brought the cost down to around \$12 (Plesko, DART MOD Sandbox Project Update, 2018), though in DART's view, they would consider it "affordable" at \$5 (Plesko, DART MOD Sandbox Project Update, 2018). DART feels that this is achievable if there is a regional approach to using app-based, on-demand services like private TNC partnerships.

In fact, DART is currently finalizing a contract with Uber in order to address the affordability. Approved at their August 28<sup>th</sup> 2018 Board Meeting, DART authorized a contract with Uber Technologies, Inc. to supplement GoLink (Dallas Area Rapid Transit, 2018). Concern for contracting the TNC was expressed in the Operations, Safety & Security Committee meeting held on August 14<sup>th</sup> 2018 and the Committee of the Whole meeting held August 28<sup>th</sup> 2018, and primarily revolved around the use of money and liability for DART (Dallas Area Rapid Transit, 2018). Since Uber will supplement the existing MV Transportation Inc. accessible vehicles, no concerns were raised related to issues of inaccessibility or inequity. Once the contract is finalized, and the updated, and the GoPass application is released, users will have the option of selecting either DART's minivan or using Uber within the zone to service their trip. As Plesko described it, "Let's say they are in Inland Port, they will see the vehicle we provide down there and Uber" on the GoPass app (Plesko, Interview, 2018). Unfortunately, we are unable to verify the program's success at this point in time, since it has yet to be finalized and implemented.

An important motivation for DART to implement the app-based, on-demand service at the time it did was the Federal Transit Administration's MOD Sandbox Program. The Sandbox Program, created from 49 U.S.C. Section 5312, awarded funds to 11 recipients nationwide. The program included multiple goals surrounding the innovation and efficiency of transit (Federal Transit Administration, 2018). "Eligible Activities" included "all activities leading to the demonstration of the innovative app-based, on-demand and transit integration concept, such as planning and developing business models, obtaining equipment and service, acquiring/developing software and hardware interfaces to implement the project, and operating the demonstration" (Federal Transit Administration, 2018). As part of the FTA Sandbox program, DART met with the other 11 recipients to discuss their complications. At the time of interview, DART had met with the other recipients around six times to discuss ongoing challenges of implementation, and maintaining their program within budget and on time (Plesko, Interview, 2018).

In DART's original project proposal to the FTA for Sandbox funds, they discussed the motivation for the new app-based, on-demand service in their service area. DART wrote at the time that the program would be initiated to "...overcome the challenges that DART documented in four separate pilot tests to improve service and connectivity and provide efficiencies and cost effectiveness within DART's operations" (Federal Transit Administration, 2016). While DART was already working on improving their GoPass ticketing application, the \$1,204,000 from the Sandbox Program was intended to help DART integrate ride-sharing services into GoPass (Federal Transit Administration, 2016), and modify the it into a regional mobile application "...to offer transit riders choices to choose first and last mile options in order of price, travel time and wait time for arrival of the service and actually pay for the service within the application" (Federal Transit Administration, 2016). As Plesko recalls, "we started GoPass before FTA. We then thought `gosh, if we can make this app do a lot more...` so that was the genesis of the Sandbox application" (Plesko, Interview, 2018). "FTA funds were used only for the technology. No FTA's, zero not one penny, are going into the operation" of the pilot projects (Plesko,



Interview, 2018). However, “in order to get the money, you had to commit to a one year pilot test of the technology” (Plesko, Interview, 2018).

As mentioned before, the GoPass application is not currently used with the app-based, on-demand pilots. The updated GoPass integrated with app-based, on-demand service will not be released until the end of January 2019. Uber will be the first third party service presented on the app. At the point of the release, people will have to have an Uber App as well as the GoPass app if they would like to schedule the ride with Uber instead of DART’s vehicle and driver (Plesko, Interview, 2018). The application will show both options on GoPass, with the wait time, but users will have to click a link that opens the native Uber app to finalize the ride (Plesko, Interview, 2018). This fragmentation between public and private services in P3 operations is due to the motivations of the economy, more than government institutions. As Plesko puts it, “Both Lyft and Uber really, really want you to only use their app. They don’t want you using somebody else’s app” (Plesko, Interview, 2018). Even so, DART has plans to fully integrate third party app-based, on-demand services and requests within the GoPass application (Plesko, Interview, 2018).

DART recognizes coordination as a necessity to best service riders that may cross jurisdictional boundaries or service areas. It was, after all, DART’s initiation that led to the MOD working group hosted by the North Central Texas Council of Governments (Xu, 2019). During which, Plesko spoke in favor of a regional approach to app-based, on-demand solutions and has mentioned the effective utilization of DART’s GoPass application in order to provide the greatest return on investment (Plesko, DART MOD Sandbox Project Update, 2018).

DART has considered the need to coordinate with neighboring transit agencies through its app, but this appears to be a one-sided relationship, requiring neighboring transit agencies to pay in order to join the GoPass app. When asked about regional coordination, Plesko responded that DART “...would like to expand into parts of the Inland port that are outside of the City of Dallas,” however DART’s general policy is if the service is provided outside of DART’s service area “somebody else has to pay for it besides DART” (Plesko, Interview, 2018).

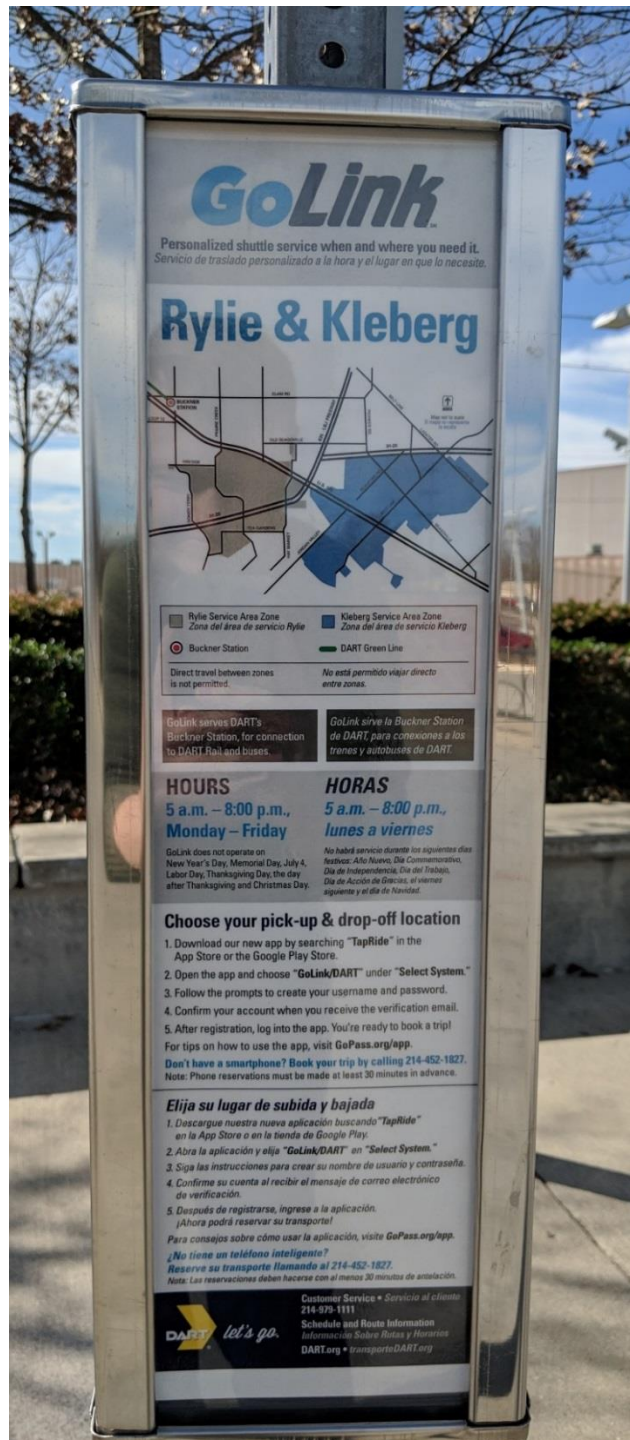
The GoPass application is already used by separate transit agencies such as Denton County Transportation Authority and Trinity Metro. When asked about sharing the updated GoPass application and integrated app-based, on-demand service solutions, Plesko said, “So we will offer Trinity Metro, the rural transit providers, and DCTA the ability to use that app, but they have to pay the additional cost” (Plesko, Interview, 2018). The cost is highly dependent on the technology providers SpareLabs and Unwire, which own and license the mobile application software for trip planning and payment (Plesko, Interview, 2018). Therefore the app can serve the region, “...as long as they pay their fair share” (Plesko, Interview, 2018).

In the case of the Inland Port area (a warehouse and shipping district just outside the DART service district), DART obtained funding from the COG/MPO and private companies that would benefit from this service expansion. Documents indicate that DART reached out to NCTCOG in 2018, an inter-office memorandum that requested “funding to create and operate a Transportation Management Association for the Dallas Inland Port Transportation Management Association” (Plesko, Interoffice Memorandum to NCTCOG Director of Transportation, 2018). This Transportation Management Association would also include private funds from the large employers in Inland Port. DART has previously worked with Amazon, which operates a warehouse in Inland Port, to receive 50% of the total cost (not to exceed \$20,000) to extend the

GoLink service to operate Saturday and Sunday, 5:00 AM-8:00 AM, and 5:00 PM-8:00 PM, within the Inland Port zone (Dallas Area Rapid Transit, 2018). This began October 1<sup>st</sup> 2018, and will last for one year (Dallas Area Rapid Transit, 2018).

It is also clear that DART has considered the need for integration of physical infrastructure. Plesko discussed the integration of the app-based, on-demand services with DART's existing fixed route services, explaining the existing of physical signs that will identify dedicated bus bays and general directions to request a ride (Plesko, Interview, 2018). Buckner Station was specifically highlighted for integration because the zones Rylie and Kleberg have unique additional walk-up service (Dallas Area Rapid Transit, n.d.). The walk-up service, available at :05 and :35 past the hour, creates an additional layer for integrating infrastructure and schedule, as the bus will be available for a prolonged period of time, and leave at a fixed time (Dallas Area Rapid Transit, n.d.). The Rylie and Kleberg app-based, on-demand vehicles have two distinctly separate bus bays with signs and information posted about the application download and use. Please see **Figures 5.3 and 5.4**, as well as appendix items **Figures 5.5 and 5.6** for images of the signage and general station map.

**Figure 5.3: Image of GoLink pilot signage present at Buckner Station Dallas, Texas (Reeves, Collection of Images from Buckner Station, 2019)**



**Figure 5.4: Image of GoLink pilot signage present at Buckner Station Dallas, Texas (Reeves, Collection of Images from Buckner Station, 2019)**



Buckner Station is also the last stop of the Green Line light-rail transit route, and connects a significant number of bus routes. Given it is the last station for the Green Line and GoLink's fixed departure times, it is equally important to highlight how the schedules interact. During the Rylie and Kleberg zone's 5 A.M. to 8 P.M. schedule, the fixed departure usually aligns within 15 minutes of the train's arrival. (See

Table 5.2: Schedule of DART's Green Line arrival to Buckner Station compared to GoLink's departure every :05 and :35 minutes past the hour (Dallas Area Rapid Transit, 2018) in the appendix for times). The train's departure is not considered, as the GoLink service can bring riders to the station at any time during the service hours.

Regarding integration with the general service schedule, this applies mainly during business hours, with the pilot zone only operating from Monday through Friday, 5:00 A.M.-8:00 P.M., with the exception of Rowlett having an additional 30 minutes, and ending service at 8:30 P.M.; additionally, the Inland Port zone operates during the weekends (Dallas Area Rapid Transit, n.d.). This does not consistently align with DART's existing weekend service for each zone or those late evening rides past 8:00 P.M. When asked, Plesko said, "what we did not want to get into putting paid vehicles out," meaning the concern is for operating cost as "demand does drop down a lot at night and so you'd end up paying a driver, you know, to sit out there for hours" (Plesko, Interview, 2018). However, DART is currently hopeful that the partnership with shared ride P3 TNC service would bring down the cost so they could expand the hours in the zones to match existing transit schedules (Plesko, Interview, 2018).

DART's fare structure has also been designed to integrate app-based, on-demand service with fixed route. Single day passes for \$6 (\$3 for reduced fares) can be purchased on the GoLink buses and are valid for [the] GoLink service plus DART buses and trains (Dallas Area Rapid Transit, n.d.). Furthermore, monthly, annual and regional passes will also be honored by GoLink, as well as midday and AM/PM passes, though they must be valid at time of boarding (Dallas Area Rapid Transit, n.d.). Simple fare integration means a single pass purchase can last through the duration of the journey and on all of DART's service. As Plesko says, "If you buy it on one product it's good on all of them" and "you don't have to pay again" (Plesko, Interview, 2018).

Payment integration will become more challenging as DART begins its partnership with Uber. In the initial launch of the partnership, Uber rides will be scheduled and paid for through the Uber application. Users who choose this option will have to pay \$3 per ride if they're not going to or from a transit facility, which is half of DART's day pass price (Plesko, Interview, 2018). This will still be a lower price than standard UberPool, subsidized by DART. In later iterations of the GoPass application, with Uber and other potential third party service providers fully integrated, DART will be able to validate existing transit fare purchased through the app so the app could say, 'you can't use Uber unless you have transit fare, or you can't use either service unless you have transit fare' (Plesko, Interview, 2018).

Though one intent of this program is to provide services in the first and last mile fixed route gaps, there is a lack of rider-oriented information integration. The users are currently required to use two different apps to schedule one trip. The main GoPass app currently does not reflect the availability of app-based, on-demand services provided by DART, and first time users might not know that these services are available. Once DART releases the updated GoPass

application, information about app-based, on-demand and fixed-route services will exist side by side. While this will be more helpful to the rider, DART, on the other hand, will begin missing crucial service data.

During the next phase of the GoPass app, where Uber will still need to be scheduled within Uber's native application, DART will not receive data on the rides provided. While DART will know the origin and destination and wait time from the trip planner, once the request gets sent to Uber, DART loses sight of the vehicle. DART won't know if the rider got where they are going (Plesko, Interview, 2018). All the information will be stored by Uber and they'll send DART a monthly bill listing the trip and miles (Plesko, Interview, 2018). Essentially, Uber will give DART a heat map providing the wait time and the duration of the trip (Plesko, Interview, 2018). However, once DART can utilize UberPool APIs<sup>6</sup> to integrate Uber ride requests within the GoPass application, they will be able to retain more ridership information.

At this time, it appears DART's focus is on lowering operational costs and building upon their GoPass application to integrate information and app-based, on-demand ride requests. With that said, the pilots were not haphazardly put together, but rather, chosen specifically to service the relative areas by efficiently utilizing DART's existing infrastructure and coinciding with existing fixed route transit. Those forms include available signs to identify permissible GoLink locations with accessible information on how to utilize the service. Additionally, DART can rely on its previously existing fare payment policies to integrate passes such that a single pass will work on all services. DART also displays propensity to coordinate with local employment stakeholders for alternative methods of funding and a willingness to provide tools and information for regional success, assuming that DART's app-based, on-demand service continues to expand past pilot testing and technology development.

## Methodology

Interviewees were chosen by proximity to the project. Todd Plesko was identified for interview as he presented during the NCTCOG Mobility on-demand Working Group on behalf of DART. Jing Xu was chosen as a Senior Transportation Planner at NCTCOG and administrator of the Mobility on-demand Working Group.

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<sup>6</sup> API – abbreviation of application programming interface, a set of functions and procedures allowing the creation of applications that access the features or data of an operating system, application, or other service

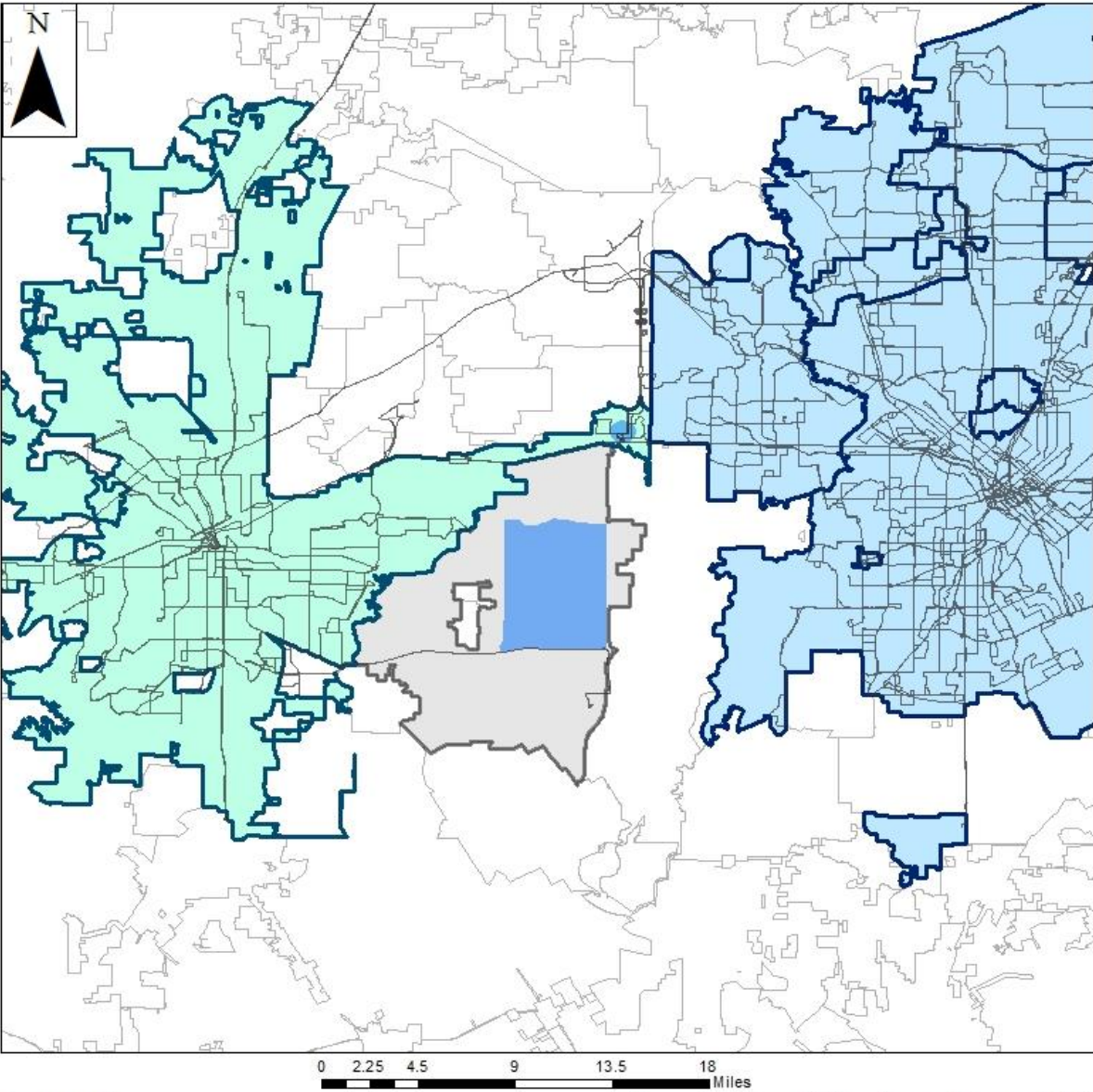
## The City of Arlington (Arlington, TX)

The City of Arlington is not a member of any of the long-established transit agencies in the DFW metro region, as the city elected not to join or devote local sales tax dollars to these systems. Consequently, none of the DART or Fort Worth Transportation Authority (FWTA) routes enter Arlington's jurisdictional boundaries, leaving Arlington as the largest city in the metro region without any fixed route transit service. On-demand service was seen as a potential remedy to this situation, and indeed, Arlington Via (app-based, on-demand public transit service) and Arlington Drive.ai (autonomous vehicle service in the city's Entertainment District) are now the only public transit service available to Arlington residents. Mayor Jeff Williams has been a key proponent of these programs' implementation, and we interviewed him for this study. Mayor Jeff Williams considers these projects as an opportunity to invest in new technology (Williams, 2019). In our interview, he expressed a desire for the world to know that "Arlington [is] the first city in America to run an autonomous vehicle for a public shuttle" and know the city is investing in "research on technology based rideshare" (Williams, 2019).

In December 2017, the city partnered with private company Via Transportation Inc. (Via) to provide a mobility-on-demand pilot to particular zones within the city's jurisdiction (City of Arlington, 2017). With the pilot, riders are able to hail an on-demand service through Via Inc.'s mobile application, and ride point-to-point to anywhere within the designated zone and CentrePort Station. The CentrePort TRE station is the only destination outside the municipal jurisdiction. Rides cost a flat fair of \$3.

The city of Arlington used target destinations to decide the zones for the program, though the zone was also decided based on the concentration of activity, and because the selected zone ensured public transit access to 160,000 residents and 90,000 jobs (Mitchell, 2018). Target destinations included Park Mall and Arlington Highlands near I-20 in the south of Arlington; University of Arlington, Downtown Arlington and Entertainment District in the central parts of the city; and CentrePort TRE station on the far north end, just over the border in Fort Worth. These destinations were identified for the pilot project to give Arlington residents access to the region (Mitchell, 2018). CentrePort Station connects to the Trinity Rail Express (TRE), a commuter rail line jointly owned by Dallas Rapid Area Transit and Trinity Metro, which provides the closest regional transit access to both Dallas and Fort Worth. However the exact boundaries of the zone were not explicitly mentioned in the signed contract between the City and Via (City of Arlington, 2018, p. 15), leaving this decision to Via as part of its operation of the service. Noteworthy areas left out of the service zone include River Legacy Park and the residential apartment complexes in North Arlington, where many UT Arlington students live, Lake Arlington to the west, and Cooper Street Plaza Mall. There is also very little service to major destinations outside the city boundaries (other than CentrePort Station), like the City of Fort Worth, DFW Airport, or the Megabus Station in Grand Prairie. For a map of the pilot service location, see **Map 2**.

Map 2: City of Arlington App-Based, On-Demand Pilot



**Legend**

- DART Transit Routes
- FWTA Transit Routes
- Arlington's Via Zone including CentrePort Station
- DART Service Area
- FWTA Service Area
- City of Arlington Boundary
- Texas City Boundaries
- MPO Boundaries

Map creator: Steven Matthew Reeves (February, 2019)

Source:

MPO Boundaries (2019), City\* Boundaries (2018), and Highways (2019) from TxDOT.  
 Service Areas from CTEDD (2018)  
 DART Routes (Dec. 2018) and FWTA  
 Transit Routes (2019) from TransitFeed  
 Zones\*\* georeferenced from provided Maps

gis-txdot.opendata.arcgis.com  
 transitfeeds.com

\* Includes most recent city boundaries, no annexations  
 \*\* Should not be considered exact



The contract for the pilot program is signed between City of Arlington and Via Transportation Inc. and the city has taken the sole responsibility for meeting the FTA requirement regarding Via's performance under the contract (City of Arlington, 2017). Additionally, Via Inc. has hired an FTA expert to ensure that the services are compliant with FTA regulations. They must also create an action plan report, which was last submitted in December 2018 to approve the next term of the contract with Via and the City (City of Arlington, 2017). However, as this program is considered a "turnkey project<sup>7</sup>," the City of Arlington cannot ask Via to modify their operations if they are not meeting with the FTA requirements. The City of Arlington submitted an Independent Cost Estimate / Price Analysis to the FTA as it was required for the extension of the Via contract into its second year (Arlington, 2018). Though the submitted document mentions service area increase, and increase of total hours of operation, as the adjustments in their second year proposal, it does not mention any consideration of coordination with neighboring cities or transit agencies.

### **Sharing of Funds**

The Arlington Via program is funded using \$230,000 in local city funds, and \$730,000 in FTA Section 5307 funds (Federal Transit Administration, 2018, p. 2). Arlington uses Transportation Development Credits, amounting to \$100,000, to lessen the local matching contribution for this project. As the city is a direct recipient of the FTA funding, like the section 5307 funds, the city coordinates with FTA directly (Xu, 2019).

As per the city's contract with Via, an estimated amount of \$922,500 (including \$322,500 in city funds) was used for its one-year pilot project, though the Mayor told us in interview that they are currently spending two million dollars a year (2019). To utilize local funds, the city passed Resolution No. 17-134 authorizing the execution of sub-recipient contracts with various local human service organizations, allowing them to use the Community Development Block grant funds of \$322,500 for the pilot project and sending out competitive RFPs for private contractors for the project (City of Arlington, 2017). These funds are budgeted in the Community Development and Planning Special Services Service Account No. 460201-61002-410318 (City of Arlington, 2017). The city estimates that the financial impact of the program will keep diminishing on an annual basis, reducing to \$0 by 2020 (City of Arlington, 2017).

However, even at the pilot stage, the program is fighting for funding to expand the project. Speaking with the mayor and a strategic planner of the City of Arlington, Lyndsay Mitchell, they told us they are now concentrating on increasing their revenue streams (Williams, 2019) (Mitchell, 2018). In particular, the city wants to limit non-contiguous destinations like CentrePort station as it expands in the future, as such points add significant stress to the system and "throws off efficiency in the way we operate quite a bit" (Mitchell, 2018).

For Arlington Drive AV, the autonomous vehicle pilot, funding is, in part, collected as Congestion Mitigation and Air Quality Improvement program (CMAQ) funds. These funds are

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<sup>7</sup> Turnkey contract as mentioned in Exhibit III-1 under Percent of Contract Allowed for Capital Assistance without Further Justification. Turnkey contracts are considered to include cases where the contractor provides the vehicles, maintenance, and transit service (Federal Transit Administration, 2016).

provided by the Federal Highway Administration and are used to support part of the Arlington Drive AV project. The North Central Texas Council of Governments, in its role as the region's MPO, assigns these funds to various projects around the region.

Even though much of the funding is federally sourced, the Via Pilot offers little coordination with regional or federal agencies, nor is it required to. For example, the FTA grant does not require coordination with neighboring cities or transit agencies. FTA grant's location description mentions that the "Via program operates within planned zones in the city of Arlington," but no more than that, and has no other requirements for coordination beyond Arlington's boundaries (Federal Transit Administration, 2018, p. 4). The same grant is utilized for Handitran program (ADA service for qualifying residents of Arlington) and FTA specifies that the service is "provided in the city limits of Arlington, Texas plus 1.5 miles from the city limits" (Federal Transit Administration, 2018, p. 4), indicating an opportunity where FTA could insert itself in future programs to facilitate better regional coordination of services, through program guidelines.

In the absence of required or incentivized coordination, Arlington often acted on its own. For example, according to Arlington's Strategic Planner, when discussing coordination with destinations outside their municipality, the City of Arlington did not think to coordinate with any other jurisdictions when providing Via service to CentrePort Station. The city believes that they "didn't have to coordinate with anybody on that because there is no rule saying that you can't drive a vehicle into CentrePort" (Mitchell, 2018). In our interview with DART Vice President Todd Plesko, we asked his view about Arlington's decision. He told us, "Arlington knows better" and "they just have to talk to Trinity Metro" (Plesko, Interview, 2018). Talking about future expansion plans, Arlington's Strategic Planner said they believe that if they decide to expand the service to other destinations outside their municipal boundaries, they would not need to obtain additional permissions from those cities or transit agencies (Mitchell, 2018). "We would let them know as a courtesy, but we would not have to contractually, unless we are asking them to provide a share of the funding" (Mitchell, 2018).

We also asked Arlington's Strategic Planner about their interest in expansion beyond the city's boundaries, to which she said they "...would absolutely consider anybody who is on our border and would like to coordinate" but said a neighboring city would have to select Via separately through a parallel procurement process (Mitchell, 2018), and it is unclear how the services would coordinate unless this was organized by Via, rather than the cities. Nor do the contracts between the City of Arlington and Via discuss anything regarding coordination with Trinity Metro or DART, or cooperation over service to CentrePort Station.

We also asked Arlington's Strategic Planner about service signage. As discussed earlier, Via was created considering target destinations as important locations for service; however, none of the locations within the zone, including key stops within the Entertainment District, University of Arlington, or the Parks Mall, has any signage or advertisement regarding the Via program, where to wait, or how to download the app. When asked if they thought such signage would help riders locate destinations and improve the outreach of the program, the city's Strategic Planner emphasized that such signs would make it difficult for the program to be a

Zone Route program—with no fixed routes or stops, saying “No I don’t think we need any signs because by using the app you hail the ride, you understand where you are going to be picked up, [and] there is no one particular stop” (Mitchell, 2018). Even for first time users, the city does not believe there would be an inconvenience, as they can “...look it [VIA program] up online or have that app, and open it.” Yet some stops are used frequently, and might benefit from signage. CentrePort Station, though it is a fixed transfer point with the regional rail system and with buses going to DFW airport, does not have any signage indicating the existence of Via as a possible travel choice for riders getting off at the station and traveling to destinations within the City of Arlington. The city believes that “...the app communicates with you where you should be picked up at the CentrePort Station” (Mitchell, 2018). In that case, riders would already need to have the app downloaded on their phones for this communication. Nor is it clear to riders where to wait, as other transit services like the bus to DFW airport have fixed places to park, but Via can pull up anywhere in the drop-off zone.

Interviewees from the Dallas Area Rapid Transit (DART) and the City of Arlington indicated contrasting opinions about signage at Via stops. DART representatives told us they believe Arlington’s Via “really needs a sign” and by not putting up enough signage, the city of Arlington “doesn’t want [Via] to be used” at CentrePort Station (Plesko, Interview, 2018). On the other hand, the Mayor of Arlington said in a personal interview that he believes signage was not installed at CentrePort Station because “...I don’t think they [Trinity Metro, owner of the station] will let us” (Williams, 2019). Internal coordination with locations within the city’s jurisdiction is also missing as there is no signage at any locations within the city limits, like the University of Texas at Arlington, because, “the university has not adopted this [program] [though] we hope they will” (Williams, 2019). We tried several attempts to contact Trinity Metro (FWTA), to confirm this, but they have not responded.

The lack of physical and informational integration seems to stem from the current situation, with Via operating at or near capacity, and the city’s lack of interest in subsidizing more riders. Through our interviews, Arlington policy makers suggested communicating Via’s existence could induce more residents and visitors to take the system. Increasing ridership is not the city’s priority as they “...are not hurting for ridership” (Mitchell, 2018). “The system is fairly stressed right now” and “we don’t need to undertake any additional marketing or communication efforts at the moment because the system is carrying just about as much passengers as it can without marketing” (Mitchell, 2018). In a similar vein, the Mayor said, “...It is still a pilot program, our ridership when we expanded... It has outrun us... It is popular” (Williams, 2019). Even in this pilot stage, the city is struggling to find revenue sources to expand the program. This demonstrates a lack of long term commitment to ensuring the program reaches the maximum local population, as one would expect of a normal public transit systems.

Though this service is meant to cater to all people in the service zone, the current capacity of the system and the actual need in the service zone are not efficiently designed to make it available to all. The current service zone covers 160,000 Arlington residents. Based on ridership data, Via is providing 600 rides on average weekdays (Mitchell, 2018). As each vehicle can carry a maximum of six riders, that means Via can carry a total of 3,600 rides, which is only

2.25% of residents living in the service zone, the maximum capacity under the pilot program (Williams, 2019; Mitchell, 2018). A much larger capital investment in vehicles and operating costs will be required to expand further. The Mayor believes one reason for its popularity was “... our citizens were very impressed by the Mercedes Benz picking them up. Hey this is a nice ride and our economically disadvantaged felt special” (Williams, 2019).

Arlington’s service is also not integrating strongly with other transit apps, such as Google Maps, Waze, or Apple maps, which are common map-based apps people use for looking at possible modes of travel, but do not mention the Via service at all, even under the public transit option. In our interview, though the Arlington Mayor mentioned that his city was working with Waze to show the current traffic conditions in the city with better information regarding indication of closed and under construction road conditions, he did not mention using Waze to advertise and provide information about Via (Williams, 2019). Currently the only way for users to know about Via service when traveling within the city, or traveling on a trip to/from Arlington to another part of the region, is to search for Arlington’s Via service online, though riders are unlikely to be able to find the program this way unless they know to look. This makes the program inaccessible or invisible to a large population, including both local residents and visitors. The Arlington Mayor justifies this situation by stating that this is a pilot project, and better outreach will be planned for a future phase, once they have more funding.

Even when riders do learn of the system, it is difficult for Arlington to ensure strong coordination between riders and events, using data sharing and integration across data sources. For example, the city is not in the position to share data with Via, which, if used properly, could help the service have enough vans ready to service big events like sporting events at the stadiums or graduations on the UT, Arlington campus. Data sharing could also help ensure that van service is proportionate to historic ridership, for example, at a particular time of day when ridership peaks. The City of Arlington and Via co-own all customer data collected from the service. Via would need to make the data available to the city, in order to allow greater coordination in planning (City of Arlington, 2017). However, the city would not be able to change the number of vehicles available if they see that the demand exceeds the number of vehicles on the road. The city’s Strategic Planner noted, “This is a turnkey contract and Via makes all decisions regarding operations,” and “we receive the info, we see it real-time what is happening. But operationally they make all the decisions, how to serve ridership...” (Mitchell, 2018). Though the city has access to data, they do not have any power to make changes to the operations.

### **Cross-Service Integration**

Arlington’s Via service lacks schedule integration with other regional transit services, reducing accessibility to regional riders connecting to the service at CentrePort Station. The current hours of operation for Arlington’s Via are between 6:00 AM to 9:00 PM on weekdays and 9:00 AM to 9:00 PM on Saturdays (City of Arlington, 2017). No service is available on Sundays. By contrast, the Trinity Railway Express has trains coming into CentrePort Station up until 1:50 AM on weekdays and 1:20 AM on Saturdays, and the train service starts at 5:19 AM on weekday mornings, and 6:19 AM on weekends (Trinity Railway Express, n.d.). This indicates

that for more than 5 hours of the day, riders getting off at CentrePort Station do not have access to any Via service to go into City of Arlington. Currently the city is not focusing on expanding service hours as their "...first objective is to get better geographic coverage before adjusting operating hours," but "that's a challenge because of funding" (Mitchell, 2018). The Mayor sees some flexibility in this regard as they expand the system. When asked about this challenge, he replied that they "...can make some minor adjustments to the hours" and that the service "really [has] to work on [the] hours based on those (fixed route) schedules" but would also, similar to the Strategic Planner's opinion, like to concentrate "on increasing our revenue stream" (Williams, 2019).

Additionally, Via service is not available during large special events like the games at Cowboys Stadium or graduations at the University, which often happen after 9:00 PM or on weekends. There is no consensus about the motivation for this among the city representatives we interviewed, and the information available on the city website does say they sometimes offer extended hours for such events, and asks riders to "check the app for ride availability to and from events ending after 9 PM in the Entertainment District" (City of Arlington, 2017). This is echoed by the Mayor's statement that "We extend times sometimes during special events" (Williams, 2019). On the other hand, Arlington's Strategic Planner noted that "we kind of by design have built our operating hours to not really serve most of the special events that happen in the Entertainment District" (Mitchell, 2018), due to cost, and noted that this was a motivation for ending the service at 9 PM. This is "because the service ends at 9 [PM] and most events go on after that; we are intentionally really trying to not serve special events [as] it is not going to save anybody any time; really it would just be adding another hailing service to what is already out there... There are tons of Uber and Lyft and whatever else during special events, and Via would be within that mix..." (Mitchell, 2018). This indicates that serving event goers is not a central priority for the service, from the city's point of view, though if this is not a key priority, it is unclear what the city *does* see as its central focus. Is it the riders who have no access to cars? If that were the case, the city would devote more funding to serve all of them, and would do more to promote the program's existence through signage and advertising. Or the long distance commuters? If that were the case, the city would strive for better connections with areas outside its boundaries.

The Via program is a city-initiated public transit project that lacks regional as well as local coordination in many respects. The City of Arlington's Via program is a pilot project for a city that did not previously have a comprehensive public transit service. Arlington only had one bus service that had three stops along a single bus route. Via has been executed for only a limited portion of the city, making it less accessible to the rest of the residents and leaving them without any public transit. The city is using JARC section 5307 FTA funds for more than 70% of the project. But there are no requirements in this federal grant for regional coordination. The grant also has no requirement for coordination and guidance from NCTCOG, which makes the city the sole decision-maker regarding utilization of the grant money, and service zone for the program. The program has not coordinated with any neighboring transit agencies and cities to ensure that people travelling from or to other parts of the region are aware of this service. Even at important destinations like CentrePort Station there is no signage or advertisement about this system. Nor

is there any kind of fare discount for riders travelling from one system to another, requiring riders to pay the entire \$3 Via fare in addition to the entire TRE fare. (Riders making this transfer have to pay more than they did under Via's predecessor system, the MAX bus, which was operated by DART, and had a transfer discount). Furthermore, the schedules of Via and Trinity Rail Express are uncoordinated. All riders getting off at CentrePort Station beyond 9:00 PM have no access to affordable travel options from the station to City of Arlington. Most notably, one westbound weekend TRE train arrives at CentrePort Station at 9:01 PM, just one minute too late for riders to take Via. All interviewees were unaware of this situation, indicating they had not considered it in their planning. Interviewees from the city were similarly uninterested in signage indicating the program's existence, or how to download the app, with concerns that this could make the stops too permanent, or that this would be making a commitment to serving the stop. Even places like CentrePort, where there is no other place to stop, do not have a permanent space to park, leaving riders confused. Perhaps this is, in part, due to a lack of communications between the city and the owner of the station.

Special events are also not a key priority. Currently the program is not coordinated with other services in the region but they hope to do so for the future. All the Mayors of Tarrant County have signed a resolution to use this program for any such demands in rest of the smaller cities and towns in Tarrant County (Williams, 2019). The hope is that with the involvement of regional entities like the county and the COG, the outreach of the program can become more regional in scope. They have recognized that the current situation leaves Tarrant County with many pilot programs that need coordination. As one county administrator told us, "...pilots need to be kept within a larger plan..." (Schaffner, 2018). But the Via program is not yet doing this. One year into its service, it is still confined mostly to its home jurisdiction (with CentrePort Station as the exception); there are certainly many opportunities for greater integration across city boundaries, services, schedules and fares, as Via continues to grow. But this will require more open conversations across cities, with FTA, NCTCOG, and Via.

## **Methodology**

Information was collected through websites, released reports, board minutes, personal communication, and interviews. The JARC Federal Approval Grant document, the signed contract between Via and the City of Arlington and Via price analysis and independent cost estimate, which the city submitted to FTA were received through FOIA requests. Interviewees were chosen by proximity of their relationship to the project. Lyndsay Mitchell was identified by our contact at the NCTCOG (Jing Xu) as one of the people leading the program for the City of Arlington. From there, the Mayor of Arlington, Jeff Williams, was chosen for his role as a key champion of the project, and we interviewed him to understand his perspective, and fill in missing informational gaps. Another interview was requested from Alicia Winkelblech, also leading the program for the City of Arlington, but did not occur because she was on a leave during the research period.

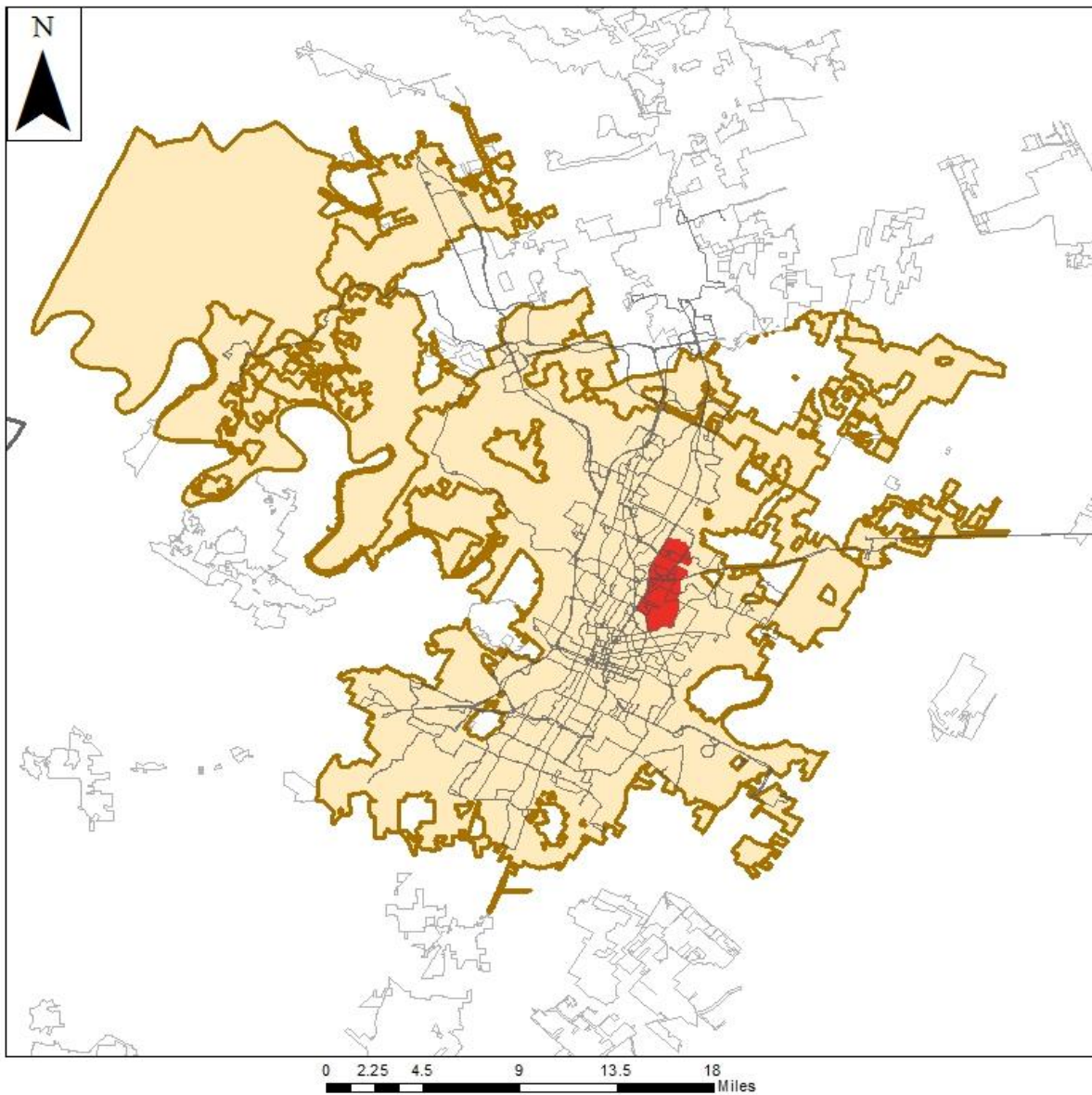
## Capital Metropolitan Transportation Authority (Austin, TX)

Capital Metropolitan Transportation Authority operates the transit service in Austin and surrounding cities, encompassing 544 sq. miles, with 30 million annual boardings (Capital Metropolitan Transportation Authority, n.d.). As part of Texas Transportation Code Chapter 451, Capital Metro operates on a 1% sales tax paid by residents living in cities that have joined the system (Capital Metropolitan Transportation Authority, n.d.) (Texas Comptroller of Public Accounts, n.d.). Capital Metro has a previously-existing phone application, called CapMetro that allows for trip planning, eticketing, and bus routes and schedules (Capital Metropolitan Transportation Authority, n.d.). Currently the CapMetro app is not used with on-demand services.

Since June 2017 Capital Metro has operated two separate app-based, on-demand pilot services within the Austin city limits: “Pickup” and “MetroLink” (Capital Metropolitan Transportation Authority, 2017) (Capital Metropolitan Transportation Authority, 2018). The two services have operated within or near Mobility Innovation Zones outlined in their Capital Metro Transit Development Plan: Connections 2025 (Capital Metropolitan Transportation Authority, 2017). Mobility Innovation Zones were highlighted through Capital Metro’s service area to identify potential replacement of underused fixed-route transit with new mobility options (Capital Metropolitan Transportation Authority, 2017).

For almost a year between June 2017 and June 2018, Capital Metro’s pilot program, Capital Metro Pickup, worked in partnership with the same private company Arlington is working with, Via Transportation INC., to service a small point-to-point zone in Northern Austin (Capital Metropolitan Transportation Authority, n.d.) (Lynch, Interview, 2018). Phase 1 ran June-September, 2017, and operated Tuesday, Thursday, and Saturday 9:00 AM to 6:00 PM (Lynch & Authority, Pickup by Metro, 2018). Phase 2, operating from October 2017-June 2018, offered service weekdays 7:00 AM to 7:00 PM, and Saturdays 10:00 AM to 5:00 PM, and extended the service area to a nearby fixed route station, MLK Station (Lynch & Authority, Pickup by Metro, 2018). “The lower third of the [Pickup] service [zone] didn’t have a lot of transit, which was one of the motivators that drove us to select that area” (Lynch, Interview, 2018), though this changed with the fixed route remap in June 2018 (Capital Metropolitan Transportation Authority, 2018). The remap “tripled the number of MetroBus routes that operate every 15 minutes” and “improved east-west connections” by adding new routes, removing low performing routes, and altering existing routes (Capital Metropolitan Transportation Authority, 2018). Specific to the Pickup Zone, see **Maps 3 & 4** to see Capital Metro’s pre and post remap routes and where the Pickup pilot existed.

**Map 3: Capital Metropolitan Transportation Authority App-Based, On-Demand Pickup Pilot**



Map creator: Steven Matthew Reeves (February, 2019)

**Legend**

- Capital Metro Transit Routes PreRemap (2017)
- Pickup Pilot Zone
- Capital Metro Service Area
- Texas City Boundaries
- MPO Boundaries

Source:

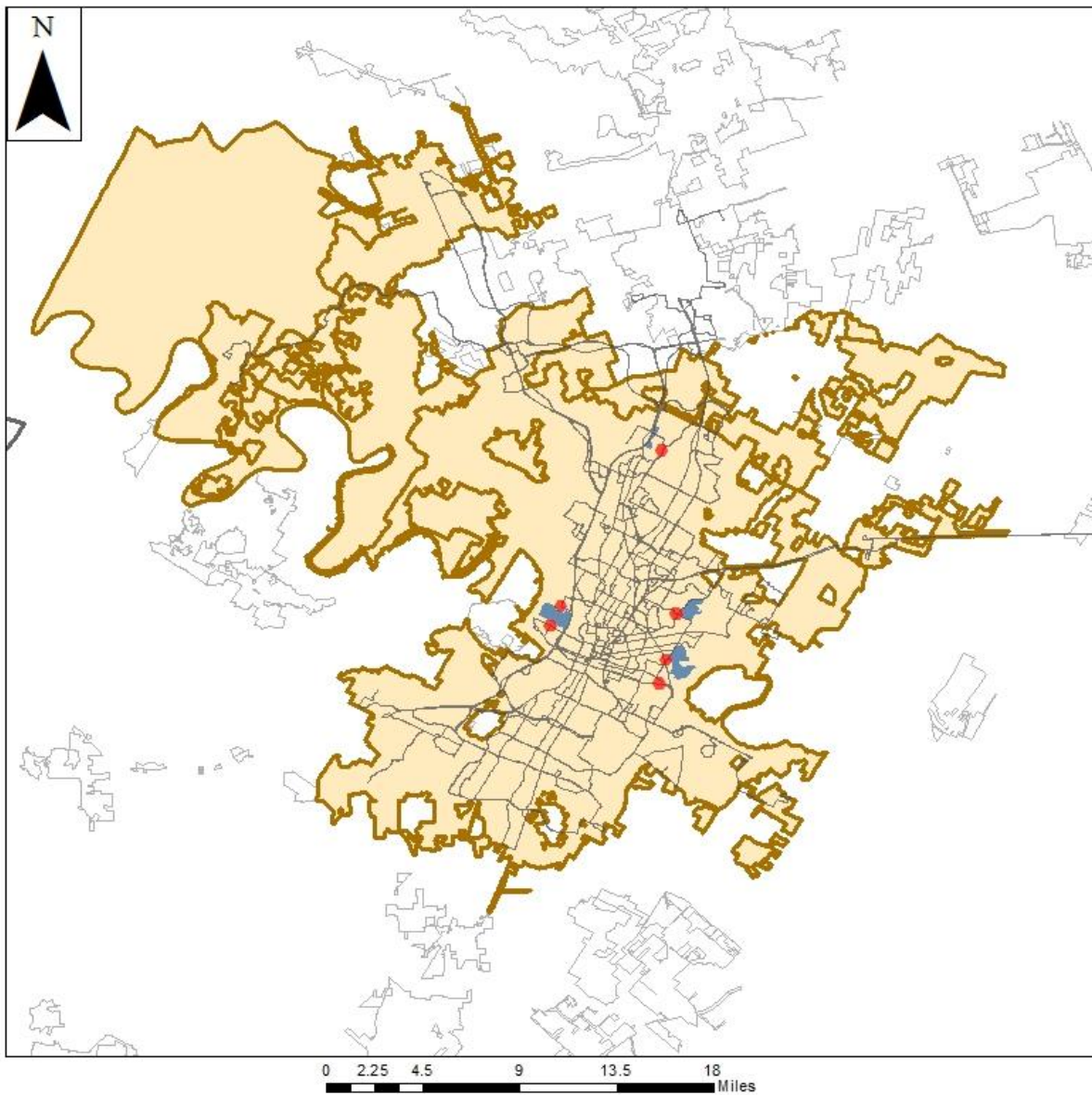
MPO Boundaries (2019), City\* Boundaries (2018), and Highways (2019) from TxDOT. Service Areas from CTEDD (2018) CapMetro Routes (2017) from TransitFeed Zones provided by Capital Metro

gis-txdot.opendata.arcgis.com  
transitfeeds.com

\* Includes most recent city boundaries, no annexations



**Map 4: Capital Metropolitan Transportation Authority App-Based, On-Demand MetroLink Pilots**



**Legend**

- Transit Stops Connected to MetroLink
- Capital Metro Transit Routes PostRemap (2018)
- MetroLink Pilot Zone
- Capital Metro Service Area
- Texas City Boundaries
- MPO Boundaries

Map creator: Steven Matthew Reeves (February, 2019)

Source:

MPO Boundaries (2019), City\* Boundaries (2018), and Highways (2019) from TxDOT. Service Areas from CTEDD (2018) CapMetro Routes (2018) from TransitFeed Zones provided by Capital Metro

gis-txdot.opendata.arcgis.com  
transitfeeds.com

\* Includes most recent city boundaries, no annexations

Rides were requested either through the Via-powered “Pickup” mobile application or by telephone call and were of no charge to the rider. However both the pickup and the destination, needed to fall within 12-square-miles of Northeast Austin (roughly bounded by Interstate 35 on the West, Airport Boulevard and Manor Road to the South and Little Walnut Creek on the East and North) (Wear, 2017). See **Map 3** for a map of the Pickup Pilot service. As for the finances, Via provided the pilot app at no cost. Capital Metro already owned the two minibuses it used for Pickup, and the drivers worked for a contractor on the MetroAccess service, CapMetro’s pre-existing paratransit service (Wear, 2017). By using Capital Metro’s existing paratransit buses, the Pickup Pilot was accessible to all ADA passengers. Additional software, such as the driver dashboard and dispatch were also provided at no cost by Via Inc. (Lynch, Interview, 2018).

The result of the Pickup pilot program was considered a success by Capital Metro (Lynch, Interview, 2018). Ridership increased over the duration of the pilot and the average per-rider cost is less than Capital Metro’s average for paratransit services, which remains around \$50 per passenger (Lynch, Interview, 2018). “When we were doing three days a week, we were at roughly 950 riders,” and “when we went to six days a week, we jumped up to 1950” (Lynch, Interview, 2018). The Pickup pilot ended with a total of over 20,000 rides provided and an ending monthly rider count of over 3,000 (Lynch, Project Summary: Capital Metro 'Pickup' Demonstration, 2018). The average ridership cost generally declined over the duration of the pilot and ended at \$17.42 per passenger (Lynch, Project Summary: Capital Metro 'Pickup' Demonstration, 2018).

However, Capital Metro commented that the Pickup Pilot existed to gain information and learn from it (Lynch, Interview, 2018). Nearly half of the service requests were still scheduled via phone service throughout the entire pilot, even with marketing and education promoting mobile application use (Lynch, Interview, 2018). “It started out at 50/50. Then at the end of the program, 40% of the people were still calling in” (Lynch, Interview, 2018). Additional points for improvement were compiled in the project report including “a designated Pickup pick-up location” at fixed route stations and “better coordination between Pickup and the rail schedule -- perhaps at least have the drivers know the train schedule” (Lynch & Authority, Pickup by Metro, 2018). Capital Metro further included that it “would prefer to focus on first/last mile service for locations within its service area,” which likely contributed heavily in decisions made for the second pilot, MetroLink (Lynch, Project Summary: Capital Metro 'Pickup' Demonstration, 2018).

Starting only two days after the first pilot, Capital Metro’s MetroLink service partnered with a local nonprofit, RideAustin, to provide another free on-demand transit pilot (Capital Metropolitan Transportation Authority, 2018). Like the Pickup Pilot, MetroLink also operates within geographical zones and is designed to provide service within the zone to nearby existing transit stops (Capital Metropolitan Transportation Authority, n.d.). However, the MetroLink pilot is strictly a first/last mile service and will only offer a no-cost ride either from anywhere in the zone to the associated fixed route stop, or from the fixed route stop to anywhere in the zone (Lynch, Interview, 2018). Only rides that are within MetroLink’s approved zones are free of charge by directly discounting the ride price within the RideAustin phone application (Capital Metropolitan Transportation Authority, n.d.). If the ride is compatible with the service rules, Capital Metro will be charged for the ride by RideAustin (Lynch, Interview, 2018). For any ride that does not follow MetroLink’s service area or process, selecting non-standard vehicles, the

rider will be charged the standard price by RideAustin (Capital Metropolitan Transportation Authority, n.d.).

There are currently four “Innovation Zones” that operate the MetroLink Pilot, all of which are within the city limits of Austin. See **Map 4** for a map of MetroLink Pilot zones. The Exposition Zone was the first to launch, on June 4<sup>th</sup>, 2018, ending December 7<sup>th</sup>, 2018 (Capital Metropolitan Transportation Authority, 2018) (Capital Metropolitan Transportation Authority, n.d.). The other three zones: Sprindale/Johnston Terrace, Springdale/Rogge Lane, and St. David’s North began October 22<sup>nd</sup>, 2018 and were intended to “...continue indefinitely as [Capital Metro] gather[s] data on the service” (Capital Metropolitan Transportation Authority, n.d.). During Capital Metro’s June 25<sup>th</sup> Board Meeting, it was said that the Exposition Zone was initially chosen to “help provide rides to/from bus stops to customers within a specific zone adjacent to where service was pulled under Cap Remap” (Capital Metropolitan Transportation Authority, 2018). The intention to place the Exposition Zones where fixed transit was removed was re-affirmed by Tony Lynch during our interview, in addition to pointing out that each current pilot zone has been chosen to service a gap left after the remap of fixed transit routes (Lynch, Interview, 2018). “When we redesigned our bus routes we got rid of some fixed route service and in order to do that the board said then you need to create these innovation zones that provide something” (Lynch, Interview, 2018). However “we are actually finding out there is poor ridership on the TNC style MetroLink service as well” for those areas that replaced poor performing fixed transit (Lynch, Interview, 2018).

Both pilot programs, up to now, remain in the city limits of Austin, however, Capital Metro is currently planning to operate an app-based, on-demand service outside of their service area to the Hornsby Bend neighborhood and a location within the city of Manor (Lynch, Interview, 2018). This came after an interagency agreement with Travis County, following interest expressed by citizens and Travis County (Lynch, Interview, 2018). Michelle Meaux works as a Regional Coordination Manager with Capital Metro and is currently working with Travis County and Capital Area Regional Transportation (CARTS), to coordinate and plan app-based, on-demand service outside of Capital Metro’s service area (Meaux, 2018). The project is still in a planning phase and would not launch until June 2019 at the earliest (Meaux, 2018).

The initial app-based, on-demand idea began during the creation of Travis County’s 3-Year Transportation Development Plan (TDP), brought about by the Office of Mobility Management, as part of Capital Metro’s Service Expansion Policy. This interagency team was created as a joint effort between Capital Metro and CARTS to identify regional transit solutions. (Office of Mobility Management, n.d.) (Meaux, 2018). As the area of Hornsby Bend and Manor City are qualified as urbanized, they are not serviced by CARTS and they are currently out of the standard service area of Capital Metro (Meaux, 2018). The areas are identified as not dense enough for fixed transit (Walker & Stephens, 2018).

Funding sources helped support coordination across agencies. Capital Metro receives FTA funding through Section 5307 (Federal Transit Administration, n.d.). Capital Metro receives FTA funding for all urbanized areas in their region, regardless of whether the operator is in Capital Metro’s own service area, which encourages cooperation with the county and CARTS.. From this fund, Capital Metro allocates \$221,422 to Travis County as part of their Service Expansion Policy to provide transportation solutions to the areas outside Capital Metro’s standard service areas (Meaux, 2018) (Travis County, Capital Metro, CARTS, HNTB

Corporation, 2018). The Travis County TDP, as required by Capital Metro's Service Expansion Policy (the policy to receive 5307 funding), identified Hornsby Bend and the City of Manor as zones to implement a first/last mile app-based, on-demand service (Meaux, 2018) (Travis County, Capital Metro, CARTS, HNTB Corporation, 2018). Services that are operated outside of Capital Metro's service area will be paid for by the allocated FTA Section 5307 funds and Travis County (Meaux, 2018) (Travis County, Capital Metro, CARTS, HNTB Corporation, 2018).

As for the two proposed areas of Travis County, Hornsby Bend and the area within the City of Manor, the app-based, on-demand project will resemble a mix of Capital Metro's current and previous pilot services, Pickup and MetroLink. Buses operating the Via software will connect riders from anywhere in the service area to a nearby fixed route bus station, and also operate point-to-point within the zone (Meaux, 2018) (Walker & Stephens, 2018).

A small area within the City of Manor already contains a flex route service through Capital Metro. While the 470 Manor Flex route operates hourly, 7:30 AM to 6:30 PM on weekdays, and 10:30 AM to 4:30 PM on Saturday, it "has never gotten the ridership [Capital Metro] wanted," and would be replaced by an app-based, on-demand solution if this plan moves forward (Capital Metropolitan Transportation Authority, n.d.) (Meaux, 2018). The app-based, on-demand service would connect to the commuter route from Austin, passing through Manor, ending at Elgin, and likely also operate a point-to-point service within the zone (Walker & Stephens, 2018). The full details of the plan have not yet been established, as the scheduling depends on Capital Metro's June 2019 service changes to the 990 Manor/Elgin Express route (Walker & Stephens, 2018).

The Hornsby Bend service area does not have any fixed route. The current plan of implementation will provide a point-to-point service zone in Hornsby Bend that will also connect to Capital Metro's existing high frequency fixed route, a distance of about six miles West of the proposed zone (Meaux, 2018) (Walker & Stephens, 2018).

These proposed pilots that will service areas outside of Capital Metro's existing service area will be operated by the regional transportation agency, CARTS, and funded by Travis County. "Travis County will be paying for the part outside of our service area" (Lynch, Interview, 2018). "CARTS and Capital Metro have an ongoing interlocal agreement, the Regional Mobility Agreement (RMA), through which we collaborate on service deployments in the gap areas in the metropolitan area, mostly in zones outside of the Metro jurisdiction but within the metropolitan area" (Marsh, David, personal communication, January 4, 2019).

For the MetroLink Pilots service, Capital Metro chose to switch from their previous partner, Via Transportation INC., to RideAustin. RideAustin is an Austin-based nonprofit ride-sharing service with a TNC model that better aligns with the MetroLink pilot's intentions of first/last mile service (Lynch, Interview, 2018) (RideAustin, n.d.). Available for download on iPhones and Android devices, RideAustin currently serves the entire greater Austin Area (RideAustin, n.d.). The ride-sharing nonprofit was created after TNC companies Uber and Lyft left the city in May 2016, following the imposition of rules requiring fingerprinting of drivers (RideAustin, n.d.). While Uber and Lyft later returned in May 2017, RideAustin remained as a competitor, and bid for this service (Samuels, 2017).

Capital Metro and RideAustin were previously connected by the Transit Empowerment Fund, an organization created in partnership by Capital Metro and One Voice Central Texas

(Transit Empowerment Fund, n.d.). Capital Metro currently provides \$35,000 annually and oversees the Fund, with the goal being to “...expand transit services in under-served neighborhoods in the Capital Metro service area” (Transit Empowerment Fund, n.d.). The Transit Empowerment Fund has a history of providing grants to RideAustin that allowed the non-profit rideshare organization to partner with Community Care Collaborative, so riders without healthcare could request low/no cost rides to medical appointments (Capital Metropolitan Transportation Authority, n.d.).

While Capital Metro is working with private TNCs and other local organizations, Andres Junca, a regional planner at Capitol Area Metropolitan Planning Organization (CAMPO), said CapMetro did not reach out to CAMPO for either of those two projects, when asked about Capital Metro’s previous Pickup pilot and current MetroLink pilot programs (personal communication, November, 15 2018). Furthermore, it was confirmed that there are no app-based on-demand projects listed on CAMPO’s 2040 plan nor their 2019-2022 TIP (Junca, personal communication, November, 15 2018) (Capitol Area Metropolitan Planning Organization, 2018) (Capitol Area Metropolitan Planning Organization, 2015). A search of CAMPO’s 2035 and 2040 Regional Transportation Plan, as well as the 2019-2022 TIP, also found no inclusion of app-based, on-demand studies subject to implementation (Capitol Area Metropolitan Planning Organization, 2018) (Capitol Area Metropolitan Planning Organization, 2015).<sup>8</sup> Indeed, CAMPO helped coordinate the beginning of Capital Metro’s Service Expansion Policy<sup>9</sup> and has been informed about Travis County’s current TDP (Meaux, 2018). The areas within Manor and Hornsby Bend were identified by CAMPO as “Activity Centers” in need of transit (Meaux, 2018) (Walker & Stephens, 2018). However, they have not participated in the planning of app-based, on-demand projects (Meaux, 2018) (Walker & Stephens, 2018).

### **Cross-Service Integration**

As part of the currently running MetroLink pilot, Capital Metro offers a simple infrastructure integration. “We have chloroplast signage created, put on the polls” at the applicable bus stop locations, adjacent to service zones, that provide details on downloading and using the application, as well as the “phone number if they don’t have a smart phone to use the app” (Lynch, Interview, 2018). See **Figure 5.7** for an example sign found in connection with the Springdale/Rogge Zone. Currently there are no other infrastructure integrations and MetroLink service vehicles will drop off passengers at nearby existing public parking near existing transit stops (Lynch, Interview, 2018). Michelle noted that similar signs will be used in the planned app-based, on-demand service for the City of Manor and Hornsby Bend areas (Meaux, 2018). Ideally, dedicated signage and parking bays would exist in the City of Manor’s park and ride (Walker & Stephens, 2018). Outside of the pilot, Capital Metro has recognized that fixed parking or on-demand vehicle docs would be considered in a full implementation of a mobility-on-demand service (Lynch, Interview, 2018).

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<sup>8</sup> Searched the document with keywords: “demand” “Uber” “Lyft” “hailing” “ride-sharing” “mobility”, then read the context surrounding the term use.

<sup>9</sup> Capital Metro’s Service Expansion policy was initially started with a working group from CAMPO. The program allocates Section 5307 funding to areas outside of CapMetro’s service area using the same population based portioning that are interested in participating. Another requirement is the development and revision of a Transit Development Plan, created with CapMetro’s assistance (Meaux, 2018).

**Figure 5.7: Image of MetroLink pilot signage present adjacent to Springdale/Rogge Zone, Texas (Osborn, 2019)**



*Translated:*

**Capital Metro Users:**

Use the RideAustin App for free round trips, between this bus stop and any other location within the MetroLink Zone, Springdale/Rogge. If you don't have a smart phone or if you need assistance from Capital Metro with an adaptive vehicle for a wheelchair, please call us at 512-369-6200.

To access a free trip, the clients should view this ad at the top of the reservation page in the RideAustin app.

In regards to schedule and information integration, neither the RideAustin application used in the MetroLink pilot nor the Via-powered application used in the Pickup pilot provided data on fixed route schedules or real time Capital Metro route information (Lynch, Interview, 2018). The fixed transit routes that service the zone-adjacent bus stops run every 15 minutes, seven days a week, roughly 5:00 AM to 12:00 AM. By contrast, the on-demand pilot service operates weekdays from 6:00 AM to 9:00 PM (Lynch, Interview, 2018) (Capital Metropolitan Transportation Authority, 2018). Therefore, there exists a service gap for riders utilizing fixed transit between 5:00 AM – 6:00 AM, and 9:00 PM – 12:00 AM, and on weekends. In regards to Hornsby Bend’s proposed service, on-demand vehicles carrying passengers will schedule to meet at the fixed route’s bus stop at predetermined times. “We would just have to identify which specific times we want to meet that bus schedule and connect them” (Meaux, 2018). Given that the fixed route is six miles from Hornsby Bend, Capital Metro recognizes the importance of preparing and planning the on-demand passenger vehicle arrival around the fixed route’s schedule to minimize wait time (Meaux, 2018). However, since each first/last mile service connects to the high-frequency routes, riders will wait at most 15 minutes under standard operation.

Fare payment integration is not a current concern, as the pilot rides have been no cost to riders, who only incur the cost of the bus ticket. “We figure we get you to the bus, then you’ll pay your fee when you get on the bus” and “we didn’t want to charge somebody twice” (Lynch, Interview, 2018). However, Capital Metro recognizes fare payment integration is a concern to fully implement an app-based, on-demand service (Lynch, Interview, 2018). Capital Metro currently offers no transfer discounts and riders will need to pay for an existing ticket option that meets their needs. Current fixed route fare pricing for connecting High-Frequency routes can be seen in Table 5.3: Capital Metro ticket fares for High-Frequency Transit Routes (Dec. 2018). It is Capital Metro’s eventual goal that a single payment, available through their mobile application, will cover each mode of transportation for the entire trip, including on-demand, fixed transit, or doc-less scooters (Lynch, Interview, 2018).

**Table 5.3: Capital Metro ticket fares for High-Frequency Transit Routes (Dec. 2018)**

| Ticket            | Price   |
|-------------------|---------|
| Local 7-Day Pass  | \$11.25 |
| Local 31-Day Pass | \$41.25 |
| Local Single Ride | \$1.25  |
| Local Day Pass    | \$2.50  |

In the case of the proposed services in the City of Manor and Hornsby Bend, the fare payment will ultimately be decided by Travis County (Meaux, 2018). Should Travis County impose a per-ride charge, riders will need to pay the cost of the on-demand ride and once again when boarding Capital Metro’s bus. However, Capital Metro mandates that all partnering entities must honor day, week, or month passes purchased by riders (Meaux, 2018). Therefore, only in

the case of purchasing local single ride tickets would riders incur two separate charges. At the moment, Travis County does not appear to plan to charge riders for the service and Capital Metro would only collect a charge once passengers step aboard the connecting fixed route service (Meaux, 2018).

Information collected from the first pilot has been provided to CARTS and Travis County to estimate the costs of implementing such app-based, on-demand service in Hornsby Bend and the City of Manor as part of Travis County's TDP (Meaux, 2018). Additionally, any information collected from the current or proposed app-based, on-demand services will also be shared to ensure a continued partnership between Capital Metro, Travis County, and CARTS (Meaux, 2018). "The on-demand information will help us do more planning with the county or city we are working with to sort of decide when it is best to transition to fixed route or whatever kind of service is next in line" (Meaux, 2018). Information appears to include, but is not limited to, costs and ridership data.

Overall, Capital Metro operates app-based, on-demand services with coordination of agencies, CARTS and Travis County, and has done reasonably well coordinating services with other agencies outside its own service area, with the shared goal of integrating services with existing fixed route transit. The previous Pickup pilot and the current MetroLink pilot are testaments to Capital Metro's progress of testing separate app-based, on-demand solutions. Speaking with the separate contacts at the County and Capital Metro has proven to be a consistent source of information with few discrepancies. All of the entities are coordinating to understand and address the challenges of integrating the app-based, on-demand service with existing transit, including CARTS and Capital Metro. As the agency is only piloting service areas at this time, large infrastructure integrations are reasonable investments. It appears the current focus is sharing information between agencies and collecting data from the pilot areas. While Capital Metro can improve its rider experience by integrating on-demand with fixed route scheduling and information in the existing mobile application, they are aware and working towards this functionality. They appear to make up for this lack of current integration by providing the pilots at no cost to the riders.

## **Methodology**

Interviewees were chosen by proximity to the project. Tony Lynch was identified as the "point person at Capital Metro on these innovative mobility projects" by Chad Ballentine in personal communication. From there, Tony Lynch identified Michelle as the regional planner, who identified Travis County and CARTS as stakeholders in our interview. Cathy Stephens and Scheleen Walker from Travis County responded to email inquiries about the Transportation Development Plan and suggested Dave Marsh as a point of contact at CARTS. Other interviews were requested of board members and a local journalist, but there has been no response.



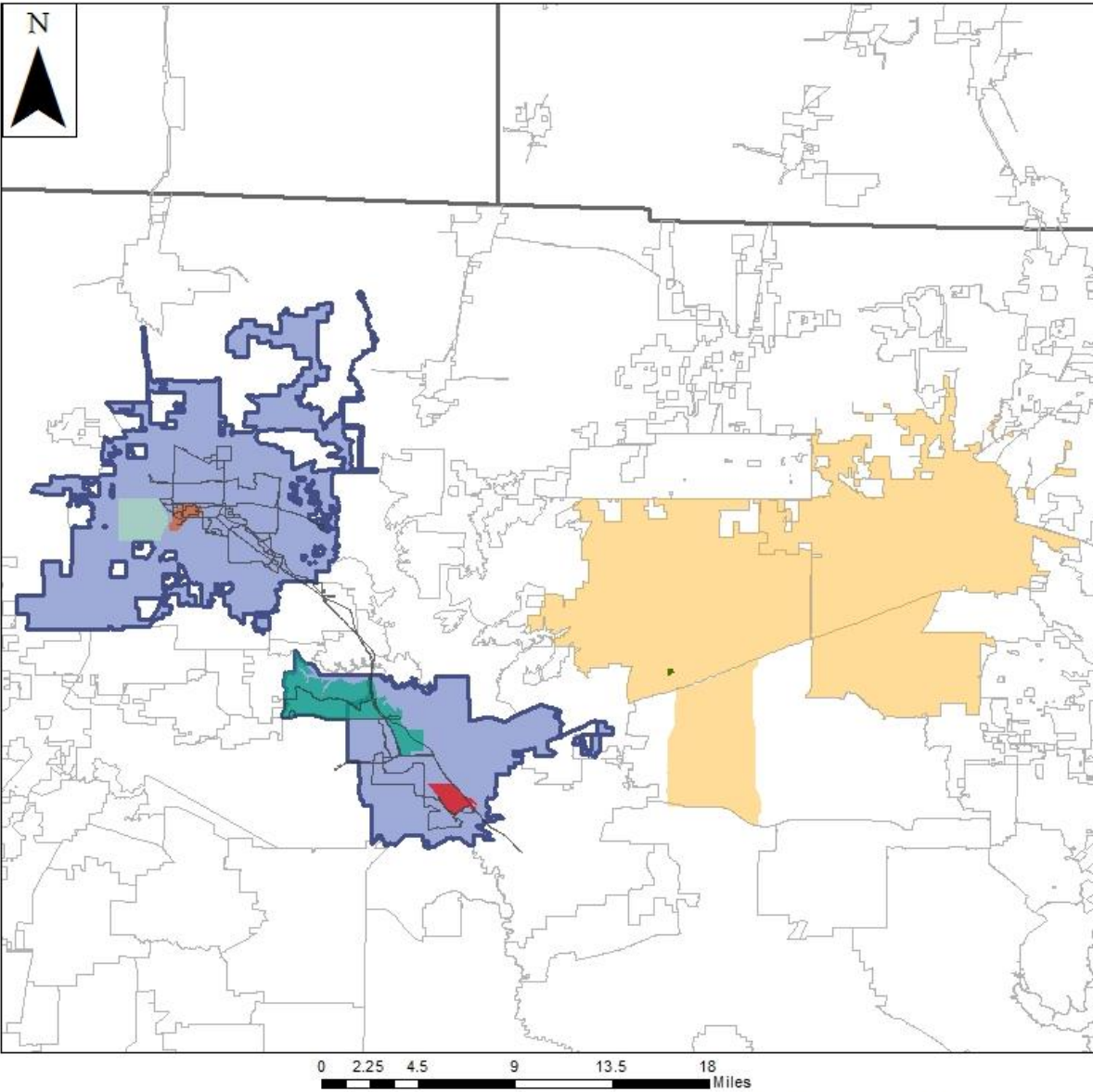
## Denton County Transportation Authority (Denton, TX)

Denton County Transportation Authority (DCTA) is a county level transit agency representing the entire county jurisdiction (Denton County Transportation Authority, n.d.). DCTA primarily uses a half cent local sales tax collected by three member cities, Denton, Highland Village, and Lewisville (Denton County Transportation Authority, 2018, p. 5). In addition to the sales tax, DCTA utilizes federal grants, service contracts and state grants for funding its services (Denton County Transportation Authority, 2018, p. 5). The transit agency does not have its own mobile application. They use the GoPass mobile application, owned by neighboring transit agency DART for planning and e-ticketing fixed route services. This application is not yet used for any app-based, on-demand services in the region, and as mentioned previously, adding app-based, on-demand services to the application would depend on coordination with DART and would come at a cost to DCTA. It is not known at this time if this is under consideration at DCTA.

All member cities of DCTA (Denton, Highland Village and Lewisville) have some form of app-based, on-demand service. DCTA's motivation for developing app-based, on-demand services comes partly from a belief that they represent "a paradigm shift in public transit to a more rider oriented perspective," bringing more diversity to transit options in low density areas of their jurisdiction (Denton County Transportation Authority, 2017). By including cellphone technology, this agency intends to make public transit more attractive and accessible to residents in the Denton region, which currently experiences low ridership in some areas (Denton County Transportation Authority, 2017). The cost effectiveness of solutions also came across as a driving factor for choosing app-based, on-demand programs over fixed route, as DCTA believes they provide cost effective solutions for areas that need transit, but don't have the demand needed to create sufficient ridership for fixed route services (Katz, 2018). App-based, on-demand solutions are a way for DCTA to develop "more innovative ways to provide services rather than invest time in a shuttle and driver to sit idle," providing equivalent services without the same degree of wasted resources (Katz, 2018).

DCTA currently has six app-based, on-demand services, including Highland Village Lyft, UNT Lyft, Frisco on-demand, Denton Enterprise Airport on-demand, Lewisville Lakeway Zone, and Frisco AV. Given the complexity of different operational styles, the zones will be grouped in our analysis based on their similar operating styles. See also **Table 5.4** in the Appendix for a summary of DCTA's separate app-based, on-demand services, and **Map 5** for a map of pilot services.

Map 5: Denton County Transportation Authority App-Based, On-Demand Pilots



**Legend**

- DCTA Transit Routes
- Denton Enterprise Airport On-Demand
- Frisco AV
- Frisco On-Demand Response Zone
- UNT Lyft
- Highland Village Lyft Zone
- Lakeway Zone
- DCTA Service Area
- Texas City Boundaries
- MPO Boundaries

Map creator: Steven Matthew Reeves  
(February, 2019)  
Source:

MPO Boundaries (2019), City\* Boundaries (2018),  
and Highways (2019) from TxDOT.  
Service Areas from CTEDD (2018)  
DCTA Routes (2019) from DCTA Website  
Zones\*\* georeferenced from provided Maps

gis-txdot.opendata.arcgis.com  
www.dcta.net

\* Includes most recent city boundaries,  
no annexations  
\*\* Should not be considered exact

## Highland Village Lyft, University of North Texas, and Frisco On-Demand Pilot Zones

The Highland Village Lyft, UNT Lyft, and Frisco On-Demand zones all use Lyft, a private TNC company, to operate app-based, on-demand services. These three programs provide \$10 service discounts, a free ride discount, and up to \$7 discount respectively, when riders use Lyft services within the geo-fenced<sup>10</sup> zones. All Lyft programs are subsidized by DCTA. Existing DCTA funds are used to support the programs, and none of the documents and budgets indicates the use of additional external funds (Denton County Transportation Authority, 2017, p. 56).

The Highland Village Lyft program is a multi-jurisdictional app-based, on-demand service, between Highland Park and Lewisville (Denton County Transportation Authority, n.d.). After trying different programs, first a fixed route bus service connecting to the station, then a connector shuttle, and then an on-demand mini-bus, DCTA found that “nothing was improving ridership there, so we decided to try a small subsidy with a pilot program with Uber” (Katz, 2018). The pilot was subsequently developed as a long term program with Lyft (contracted March 23, 2017 with Lyft, Inc).<sup>11</sup>

As indicated on the zone map, **Map 5**, Highland Village Lyft program covers the entire city of Highland Park and northern part of Lewisville (Denton County Transportation Authority, 2018). The service covers only part of Lewisville because ridership in the Highland Village area was too low for it to continue, nor did they want to provide the service as a replacement to fixed route service in the area (Katz, 2018). Additionally, DCTA wanted to include the medical center, which is a popular destination for trips from Highland Village, thus serving areas that did not have fixed route service at the time, while controlling costs (Katz, 2018). In fact, only parts of north Lewisville are covered by the program, even though there are other parts in the North West Lewisville that do not have a fixed route service, but are not covered by the Highland Village Lyft program.

The UNT Lyft is the other program that provides service within the City of Denton, mostly near the University of North Texas. The UNT Lyft zone covers the UNT campus area and DCTA acts as a contractor for the university, while funding comes from UNT’s transportation budget (Katz, 2018). The UNT Lyft zone is only available to riders with a UNT student ID. The program provides a free ride discount for students to use Lyft services within the City of Denton (the service zone).

The Frisco On-Demand zone covers Frisco, McKinney, Allan, and selected areas of Plano (Denton County Transportation Authority, 2018). Eligible<sup>12</sup> customers may utilize Lyft from point to point, as long as both are within the zone (Denton County Transportation

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<sup>10</sup> Geo-fence: a virtual geographic boundary around (an area) by means of GPS or RFID technology, enabling software to trigger a response when a mobile device enters or leaves the area.

<sup>11</sup> DCTA had received responses from three agencies for their RFP. Lyft and Irving Holdings, Inc. were chosen due to their “experience and qualification, schedule, understanding of the work plan, fare payment structure, policy, administration factors and cost” (Denton County Transportation Authority, 2018).

<sup>12</sup> The Frisco On-Demand pilot is eligible to residents of the City of Frisco and that they meet one or both criteria: (1) 65 years or older (2) are disabled.

Authority, 2018). The pilot program will provide up to a \$7 subsidy, provided that the rider pays the initial \$3 fee (Denton County Transportation Authority, 2018). Like the Frisco AV pilot, later mentioned, the Frisco On-Demand pilot was created in coordination between DCTA, Frisco and surrounding cities by contracting the service with DCTA.

### **Lewisville Lakeway and Denton Enterprise Airport On-Demand Zones**

The Denton Enterprise Airport On-Demand and Lewisville Lakeway Zone are on-demand micro transit services that operate “similar to Uber and Lyft, [where] DCTA branded vehicles carry a handful of riders at a time” and offer real-time flexible routing through either private mobile application: TransLoc (Enterprise On-Demand) or Spare Rider (Lewisville Lakeway Zone) (Denton County Transportation Authority, n.d.).

The Denton Enterprise Airport on-demand service is a pilot project providing service to a designated enterprise zone around Denton Airport. The microtransit service offers real-time flexible routing and scheduling of DCTA branded minibus vehicles where passengers can book a trip in real time via the microtransit mobile app, or by calling (Denton County Transportation Authority, n.d.). This was a pilot project provided free of charge until January 14, 2019, with riders now required to pay a fare (Denton County Transportation Authority, n.d.). The fare is paid with the same AM/PM or Day passes used on bus and rail transit systems operated by DCTA (personal communication, Jonah Katz, February 26, 2019).

The zone was started due to interest by the Chamber of Commerce and Hillwood properties, which approached DCTA to help “...find solutions to bring workers to high density job centers that are at far off places not embedded within the DART and Trinity Metro fixed route systems... [especially riders who] do not get paid enough to live near them or have access to a car” (Katz, 2018). This bus stop connects riders to route 64, a regional express bus service connecting to the City of Fort Worth.

### **Frisco AV Zone**

Frisco AV also uses its own app and an autonomous vehicle, which follows a preprogrammed route, and which riders can hail. For this reason, we consider it to be a form of micro-transit<sup>13</sup>. DCTA’s fixed route riders have complained about coordination and integration issues between the train services and bus services in the region, based on surveys and interviews conducted by DCTA in 2017. These showed a lack of coordination between the multiple app-based, on-demand services, adding to rider dissatisfaction (Denton County Transportation Authority, 2017, pp. 53-54). Also, the survey indicates that over three-quarters of on-board and off-board respondents prefer fixed route over on-demand. Whereas for respondents who had not ridden DCTA’s service, 55% preferred on-demand (Denton County Transportation Authority, 2017, p. 50). This indicates that DCTA’s efforts to increase on-demand services are largely focused on getting non-riders to use their service.

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<sup>13</sup> Referring to the micro-transit definition in **Table 2.1**, mirco-transit is a “private commuting services similar to fixed route, with rides reserved by app.” Due to the pre-programmed nature, the route is primarily fixed but still can be requested via mobile app.

The program is intended to support fixed route services, particularly to the Highland Village A-Train station (Katz, 2018). Indeed, DCTA chose to give subsidized service to passengers getting on/off at Highland Village station (Katz, 2018). However the timings of on-demand service and fixed route service are not well coordinated. The Highland Village Lyft program operates Monday to Friday 5:30 AM to 9:30 PM, with no service on weekends (Denton County Transportation Authority, n.d.). The A-train Highland Village / Lewisville Lake station, however, has a northbound train at 10:46 PM, with its last southbound train stopping at 11:31 PM. The Highland Village Connect Shuttle service, which provides free rides from the train station to destinations within the city, stops service at 9:00 PM as well (Denton County Transportation Authority). So A-train riders getting off at Highland Village Station after 9:00 PM do not have access to any on-demand or shuttle services from the station. Though the program is meant to incentivize residents to use public transit, riders who do not use the fixed route services in the zone can also make use of the \$10 discounts by using the Lyft app directly, making Lyft, “almost a free service in the zone” (Katz, 2018). This indicates that the program offers a better incentive to use Lyft than to use public transit.

### **Cross-Service Integration**

Though many areas within DCTA’s jurisdiction only have access to app-based, on-demand services either as a last mile solution or as a point-to-point service, information regarding these services is not shared within the GoPass app. Users have to navigate through DCTA website and click on “Additional Services” to see if there are any such services in their neighborhood. When the Highland Village Lyft program began, DCTA staff recall installing a “lot of signage, billboards and [a] social media push” to share details about the program. There was marketing to increase awareness about the service.

On the other hand, there is no physical integration of services, like signage and dedicated parking/drop off bays at existing fixed route stations, or employment hubs to make people aware of such services. Also there are no transfer discounts given specifically to users who transfer between app-based, on-demand services and fixed route. The same discounts and rates apply to both transfer riders and direct app-based, on-demand service riders (Katz, 2018).

Regarding scheduling integration, the Enterprise On-Demand service hours are coordinated with the closest fixed route services. Enterprise on-demand service is available from 6:00 AM to 9:30 PM on weekdays, which allows access to the first and the last bus service from Highland Fouts Field bus stop in UNT campus (DCTA). The on-demand service has more working hours than the bus service, as it is available on weekends from 8:30 AM to 7:00 PM, when there are no fixed route regional services to connect with. (Note that it does not connect with A-Train, which is not in its service zone).

The UNT Lyft service is available late night between 2:00 AM and 7:00 AM, after service hours of all public transit services in the campus, which ends at 2:00 AM (including the weekends) (Denton County Transportation Authority). Coordination of the services is done in such a way that it is meant to supplement late night campus ride program and provide safe access

to students. The service is available all days of the week, making it accessible to students on weekends as well. The program is also only active during the academic semesters, making it inaccessible during holidays when students might need such services as the campus bus services are not active. Again, note that A-Train is not in the service zone.

DCTA uses five different apps within its jurisdiction, indicating that riders in their region traveling across the jurisdiction have to access five different apps to utilize all the public transit services and subsidies, making integration of services a challenge. DCTA currently uses the LYFT app for all the Lyft programs, TransLoc for the enterprise on-demand, Drive.ai for the Frisco project, Spare rider for Lewisville Lakeway program and GoPass for all its fixed route services. *All these applications and companies do not have any coordination amongst each other to ensure integration. “They are all in different service areas... Not a lot of motivation to put them all together at this time. None of the vendors are working together on behalf of DCTA as they are all distinctive service areas” (Katz, 2018).* DCTA believes that “it would be great to develop a solution that someone taking the train can get off the train and is notified about Lyft services” and discounts available in the region to GoPass users (Katz, 2018).

To integrate DCTA’s fixed route services and app-based, on-demand services, DCTA has to “follow the lead with DART for what they are doing with GoPass.” As DCTA uses DART’s GoPass app for their fixed route services, they are “in kind of the regional situation that we have here where we have to follow GoPass’s lead, prevents them from doing something on our own” (Katz, 2018). The regional link between DCTA and DART stems from their shared app technology, requiring them to “...coordinate with DART, find the right people there, talk about the technologies they have and whether these tools sit within the programs they are developing.” So far DCTA has not had any “discussion [with DART] about how to integrate on-demand programs with fixed route” (Katz, 2018). Also another technological hurdle DCTA has identified is caused by their current private TNC partners, Lyft, which “...have not developed the ability to throw a pass within the GoPass app” and “[private] companies haven’t developed anything that allows integration” of public transit apps and private TNC passes. Whether this is a technological hurdle by private companies or a deliberate attempt to make people rely more on their app for travel solutions requires further research.

## **Methodology**

Information was collected through websites, released reports, board minutes, personal communication, and interviews. DCTA contracts and agreements with Spare platform, City of Frisco, Lyft agreements for Frisco, Highland Village and UNT, Agreement with TransLoc and agreement with UNT were received through FOIA requests. Interviewees were chosen by proximity to the project and recommendation by our contact at NCTCOG (Jing Xu). Other interviews were requested from other staff members at DCTA, Lindsey Baker and Kristina Holcomb. They declined the request and suggested that we direct all our questions to Jonah Katz who would coordinate with them to get answers and provide those to us.

## **Denton County Transportation Authority & Trinity Metro (Denton County, TX & Tarrant County, TX)**

Alliance Link is an app-based, on-demand service that provides last mile service for destinations around the North Texas Xpress route 64 bus service. North Texas Xpress bus is a service provided jointly by DCTA, and Trinity Metro, covering member cities Fort Worth, Richland Hills, Blue Mound, Grapevine, and North Richland Hills (Denton County Transportation Authority, 2018). For a map of the pilot service location, see **Map 6**. Alliance Link was a privately funded eight month pilot project by Toyota Motor North America, which was completed in January 2019. Trinity Metro, DCTA, Hillwood Properties, MV transportation, SpareLabs, and United Way were stakeholders for the pilot project, helping improve its execution. Toyota Motor North America is the manager for the program, running and funding the project, as well as partnering with Trinity Metro, DCTA and NCTCOG to search for long term funding, though they have not yet found a long term source.

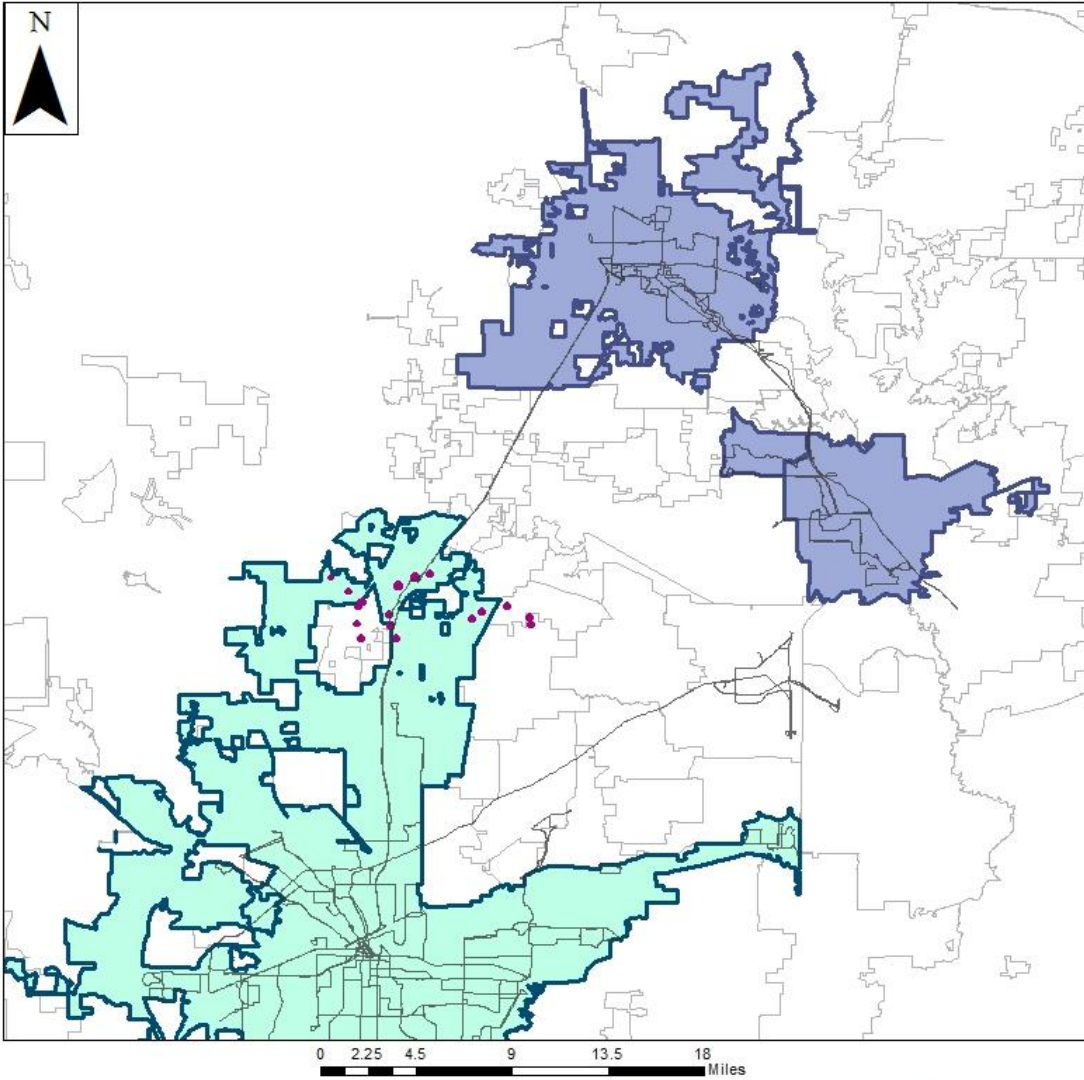
Coordination between transit agencies, private companies and NCTCOG is necessary for this program, due to its unique geographic location connecting two major cities and transit agencies in the region, requiring Trinity Metro and DCTA to coordinate, since the service crosses their service area boundaries. DCTA operates the Route 64 bus service through the zone which Alliance link supports as a last mile solution, operating within Trinity Metro's jurisdiction. Also, since the area is a high employment center, large private companies need transit services for their workers to access their place of employment. This makes the service essential to DCTA, Trinity Metro and private companies like Toyota. Though the pilot was commissioned by Toyota with the stated intention of "facilitate[ing] an on-demand, last mile transportation solution" (Toyota Motor North America, 2018, p. 1) for route 64 transit riders to connect to job destinations, the timings were not well coordinated. For example, the Alliance Link shuttle service starts at 4:30 AM and ends at 7:30 PM, while bus service is available until 9:00 PM. Also as many employment centers in the area are warehouses, the work hours are based on morning and night shifts. This leaves a large gap between 7:30 PM and 4:30 AM for hours of no affordable transit.

As this was a privately funded program, there were no discounts provided for transfers from route 64 to Alliance Link. Nor was information about the service timings and frequency available on GoPass, DCTA's app for fixed route service; however some of the stops on route 64 had signage at the bus stop about the pickup location for Alliance Link. In some cases, however, flyers and board advertisements were displayed on route 64 buses, making riders more aware about Alliance Link service, according to Martin, a Manager at Toyota North America (Martin, 2018).

In January 2019, Trinity Metro submitted a funding request to NCTCOG which stated they were seeking support "...for the continuation of this critical first/last mile service" (North Central Texas Council of Governments, 2019a, p. 186) to transition the privately funded pilot project into a long term public transit service. NCTCOG accepted the funding request, stating that "...these are critical first and last mile connections in the region" and encouraged Trinity

Metro plans to coordinate the service with the Denton County Transportation Authority (North Central Texas Council of Governments, 2019, p. 188).

Map 6: Denton County Transportation Authority & Trinity Metro Alliance Link Pilot



- Legend**
- DCTA Transit Routes
  - FWTA Transit Routes
  - AllianceLink Pilot
  - DCTA Service Area
  - FWTA Service Area
  - Texas City Boundaries
  - MPO Boundaries

Map creator: Steven Matthew Reeves (February, 2019)

Source:  
 MPO Boundaries (2019), City\* Boundaries (2018),  
 and Highways (2019) from TxDOT.  
 Service Areas from CTEDD (2018)  
 FWTA Transit Routes (2019) from TransitFeed  
 DCTA Routes (2019) from DCTA Website  
 Zone\*\* georeferenced from provided Maps

gis.txdot.opendata.arcgis.com  
 transitfeeds.com  
 www.dcta.net

\* Includes most recent city boundaries, no annexations  
 \*\* Should not be considered exact



Though NCTCOG *encourages* coordination between Trinity Metro and DCTA, they do not require it in order for the agencies to receive funding, nor have they developed coordination requirements for similar programs in the future. They have not provided guidance or information on service operation, which is decided amongst the transit agencies (Xu, 2019). NCTCOG only requires the fully developed plan before funding it, but does not consider how each separate plan integrates with other plans or the regional system. The COG will be providing \$250,000 per year for two years, using the Regional Toll Revenue funds that have been approved for transit use, which was approved by their Regional Transportation Council (RTC). Though the COG approved this request, there were clear concerns of RTC board members that went unanswered. Most poignant was the statement by Lee M. Kleinman, council member representing Dallas, that “every time companies like Toyota leave pilots, it is not necessary [for NCTCOG] to pick up private sector pieces... dip into our funds to address little transportation problems” (North Central Texas Council of Governments, 2019).

The discontinuity and unorganized nature of pilot projects becomes evident through this program, which uses completely different modes of travel after the pilot is completed. For example, the new program will not use the buses and infrastructure used in the pilot program which was funded by Toyota. Instead, as Jing Xu, Senior Transportation Planner at NCTCOG, told us, Trinity Metro will partner with DCTA, and contract with Lyft (Xu, 2019) to provide discounts. This means that riders will have to transition to other apps, and modify their way of traveling once the pilot is completed.

In Conclusion, regional coordination between the transit agencies and cities affected by Alliance Link is necessary to ensure that this program is a successful first/last mile solution for the riders. The pilot project had managed some coordination by introducing physical signage and advertisements about the service, but lacked digital coordination as it was a privately funded program. The new program is also in partnership with a private company, so coordination issues will have to still be ironed out. Though the NCTCOG is directly involved in funding the new project, no requirements regarding regional coordination have been introduced.

## **Methodology**

Information was collected through websites, released reports, board minutes, personal communication, and interviews. Interviewees were chosen by proximity to the project. Becky Martin was identified by DCTA as a point of contact at Toyota and questions for NCTCOG were leveraged through existing contact, Jing Xu, who discussed the Regional Transportation Council meeting.

## VIA Metropolitan Transit (San Antonio, TX)

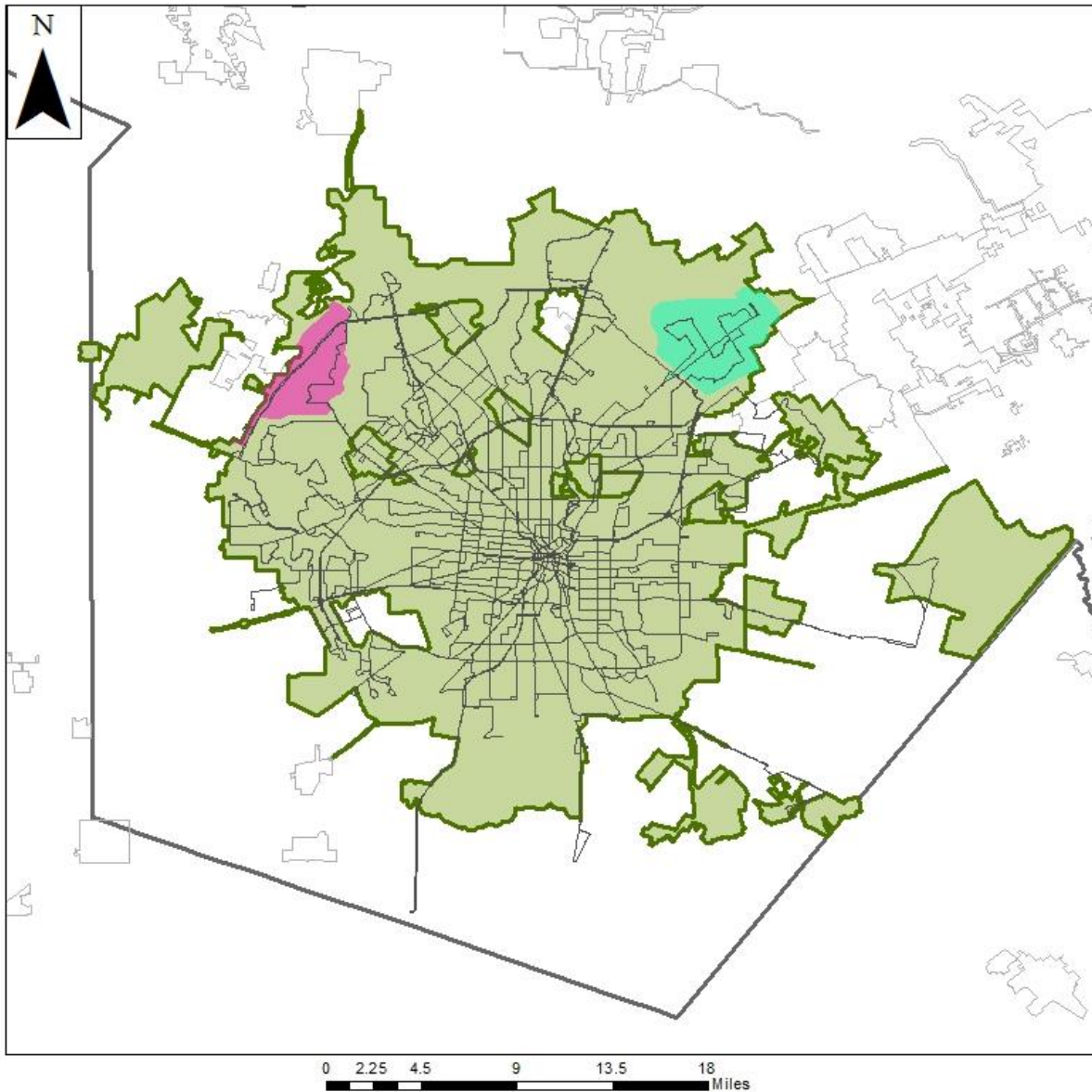
VIA currently operates within 98% of Bexar County, with select cities opting out of the transit agency (VIA Metropolitan Transit, 2018). Services are funded through a half-cent transit sales tax in the service areas, a 1/8-cent tax under the Advanced Transportation District, fares and advertisements, and federal grants (VIA Metropolitan Transit, 2018). The transit agency has a mobile application called VIA goMobile that enables trip planning and e-ticketing (VIA Metropolitan Transit, n.d.). However it is not used for on-demand services.

San Antonio's VIA Metropolitan Transit currently does not offer a mobile application ride hailing service. However, such responsive service is mentioned in the Vision 2040 report and is highlighted as an objective for the current, near, and mid-term goals, years spanning 2018 to 2035 (VIA Metropolitan Transit, 2016). App-based, on-demand solutions are recognized to "cover service gaps," and the city is looking to provide incentives for those using ride-hailing services to transfer between existing services (VIA Metropolitan Transit, 2016). In accordance with the Vision 2040 report, VIA President and CEO delivered a presentation at the 2018 State of Transit event, where he proposed embarking on a pilot app-based, on-demand program to remove poor performing buses and replace them with a app-based, on-demand service to address demand needs in low-density areas that are difficult to service with fixed transit routes (Blevins, 2018) (San Antonio Mobility Coalition, 2018). The goals, as laid out in the RFP, stated app-based, on-demand service should "improve mobility for all, expand mobility options within low-density areas" and "provide access to jobs, educational institutions and VIA's fixed route transit" (VIA Metropolitan Transit, 2018).

The pilot program has not yet started, but Steve Young, VIA's Vice President of Technology and Innovation, said VIA is "awaiting Board approval in [December]" (Young, personal communication, November, 14 2018). Once the contract is approved and awarded, "VIA would like to implement [the pilot] in summer 2019" (Akalkotkar, personal communication, December 6, 2018). Additionally, the approved 2019 VIA Operating Budget indicates the beginning of financial investment in a mobility-on-demand solution apart from the existing non-app-based VIATrans, the agency's current paratransit service (VIA Metropolitan Transit, 2018). The initial pilot is reported to target the Northeast Side (VIA Metropolitan Transit, 2018).

Northeast San Antonio includes municipalities, like Universal City, Live Oak, Windcrest, and Selma that currently are not within the VIA service area. An app-based, on-demand service could present an opportunity to expand VIA's service area, should these municipalities enter into the transit authority, though this would cost them additional tax revenue (VIA Metropolitan Transit, 2018) (Akalkotka, 2019). The current area will be "inside of Loop 1604 and North of Thousand Oaks, West of I-35 and [East] of Bulverde" which exists just inside VIA's existing service (Akalkotkar, personal communication, December 6, 2018). For a map of the proposed pilot service locations, see **Map 7**.

**Map 7: VIA Metropolitan Transit Authority Proposed Pilots**



**Legend**

- VIA Transit Routes
- San Antonio VIA Zone1
- San Antonio VIA Zone 2
- VIA Service Area
- Texas City Boundaries
- MPO Boundaries

Map creator: Steven Matthew Reeves (February, 2019)

Source:

MPO Boundaries (2019), City\* Boundaries (2018), and Highways (2019) from TxDOT. Service Areas from CTEDD (2018) VIA Routes (2019) from TransitFeed Zones\*\* georeferenced from provided Maps

gis-txdot.opendata.arcgis.com  
transitfeeds.com

\* Includes most recent city boundaries, no annexations  
\*\* Should not be considered exact

By email, VIA's Urban Transport Planner noted that the area was chosen for app-based, on-demand service because of its low density, noting that it "falls short of typical demographic requirements for transit propensity," and "has been difficult to serve with fixed route service for a number of years" (Akalkotkar, personal communication, December 6, 2018). Furthermore the chosen area consists of low density residential near at least three "regional centers" identified by San Antonio's Comprehensive Plan (Merck, 2018). San Antonio is expecting large population and employment growth, and the "[plan] is to focus growth in these regional centers," and this pilot aims at the goal of "ensure[ing] connectivity to, between and within each center providing access to employment opportunities and daily activities for [San Antonio's] residents" (MIG, 2016) (Merck, 2018).

The planned pilot will operate for at least one year and be funded by VIA's general sales tax revenue and will replace three existing routes: 640, 641, and 642 after a month of overlap (Akalkotka, 2019). When asked about their intentions for the program, a staff member from VIA said, "The fixed route service in that area has not performed well for the last many years" (Akalkotka, 2019). During the pilot, riders will be able to move point-to-point within the zone and connect to the nearby transit station (Akalkotka, 2019). This was also included as a requirement in the RFP, "Riders should always be able to travel within identified innovation zone or to the identified transit stop" (VIA Metropolitan Transit, 2018).

San Antonio's VIA has not directly worked with the MPO in regards to app-based, on-demand projects. Allison Blazosky, a regional transportation planner for the Alamo Area MPO said, "We are not directly involved in app-based, on-demand at the level NCTCOG apparently is," when asked about any collaboration between the MPO and VIA (personal communication, October 16, 2018). Additionally, any specific app-based, on-demand projects were not found in AAMPO's Transportation Improvement Plan (TIP) or the released Metropolitan Transportation Plan: Mobility 2040 (Alamo Area Metropolitan Planning Organization, 2018) (Alamo Area Metropolitan Planning Organization, 2014).<sup>14</sup> While the two organizations work together on transportation-related projects, at this time the cooperative effort does not include app-based, on-demand.

An overlapping agency, Alamo Regional Transit, the Alamo Area Council of Governments' curb-to-curb on-demand service, also provides a pre-scheduled paratransit service by phone call, to areas within the COG, including Bexar County (Alamo Area Council of Governments). VIA and ART have a history of cooperating, as VIA helps fund ART and they have jointly worked on a pilot study to provide transportation within Bexar County, linking rural and urban areas (Alamo Area Council of Governments, 2013). Though this collaboration exists in the aforementioned accounts, when asked about reaching out to ART, Akalkotkar said, "No, VIA staff has not coordinated with AACOG ART service for the app-based, on-demand service at this point as this is a pilot for VIA" (personal communication, December 6, 2018). However, she also said that VIA staff will be contacting AACOG/ART staff in near future, though was not specific as to what they would discuss (Akalkotkar, personal communication, December 6, 2018).

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<sup>14</sup> Searched the document with keywords: "demand" "Uber" "Lyft" "hailing" "ride-sharing" "mobility", then read the context surrounding the term use.

When asked about which agencies VIA has coordinated with or acquired information from, Akalkotkar said “VIA staff has contacted many agencies in the region (DART, CapMetro, Arlington), nationally (LA Metro, Sacramento, West Sacramento, OCTA, Kansas City ATA, MBTA, PSTA, HART), and internationally (Flex Denmark, Moovel Stuttgart)” (personal communication, December 6, 2018). From these agencies, VIA took away the functionality features of “well defined zones” and understanding how app-based, on-demand was used as an alternative service for “low performing routes or no routes” (Akalkotka, 2019). For those agencies that have already launched some form of app-based, on-demand, the “demand according to them, was low but high enough to provide some kind of service” so “the use of a technology rideshare app” was implemented as a cost effective and attractive solution (Akalkotka, 2019).

Since VIA is currently finalizing a contract with one of their RFP respondents, they were not ready to discuss the specific details of integration in our interview. However, VIA was still able to express their current desires and thoughts regarding how they will implement app-based, on-demand services. Most notably, VIA’s “marketing is working on some kind of plan” for signage that will both inform the user about app-based, on-demand service, and replace fixed route services (Akalkotka, 2019). VIA also plans to have the service run at the same hours that the previous fixed route operated, 5:30 AM-9:30 PM, and extend throughout the weekend as well (Akalkotka, 2019). This schedule will overlap with three routes that still operate through the adjacent transfer center and add service hours to make routes more attractive (Akalkotka, 2019).

VIA also noted how the other contacted agencies were “...offering [the] same fares as their other transit services,” and seemingly adopted the same argument for the program by suggesting they will do the same – one pass, all VIA services, including the pilot (Akalkotka, 2019). VIA’s current fares consist of, but are not limited to, single ride passes for \$1.30, transfer fees of \$0.15, and day passes for \$2.75 (VIA Metropolitan Transit, n.d.). For on-demand service, riders have the ability to use existing VIA passes, and “have the ability to use transfers to get on the bus” from riding a app-based, on-demand service (Akalkotka, 2019). Riders will also be able to purchase their passes on goMobile (Akalkotka, 2019). However, interviewees were not specific on how these payment integrations will be accomplished. Dr. Akalkotka said vaguely, “Once the contractor comes on board, the synchronization of two apps and the methods have to be worked out” (Akalkotka, 2019).

As for information integration, particularly for special events, it is not clear what VIA currently plans on implementing. However, the RFP sets two requirements that would make integrations in each typology possible. For information, the RFP specified that “VIA requires full access to, and ultimate ownership of all, data associated with the Pilot to inform strategic transportation planning efforts” (VIA Metropolitan Transit, 2018). For special events, the RFP states, “...fewer service hours may be proposed for Saturday & Sunday service, but should consider VIA special events service if applicable” (VIA Metropolitan Transit, 2018). However this is the extent of their planning to date.

## **Methodology**

Board meeting minutes were reviewed, however, no information pertaining to the app-based, on-demand pilot was found other than the meeting on November 13<sup>th</sup> 2018, to which the

video recording and meeting minutes are unavailable at this time. Interviewees were chosen by suggestion and position on the board of VIA. Steve Young, Vice President of Technology & Innovation, suggested Manjiri Akalkotkar as VIA's app-based, on-demand expert. She currently serves as an Urban Transport Planner with VIA. VIA's board member, Amanda Merck, was chosen after identifying one city appointed member and one county appointed member. She currently works as a Research Area Specialist for the Institute for Health Promotion Research with UT San Antonio Health.

## Corpus Christi Regional Transportation Authority (Corpus Christi, TX)

Corpus Christi's regional transit services the participating municipalities throughout San Patricio and Nueces County. Derrick Majchszak, Director of Transportation at CCRTA, said while there is no current app-based, on-demand service for CCRTA, the authority is redesigning its fixed route system, with the possibility of "converting some of [the] existing fixed routes to an on-demand service that MV, or [whichever the] current contractor is, will operate" and to "incorporate first/last mile ridesharing such as VIA, UBER, or a local taxi service" (personal communication, September 20, 2018). Corpus Christi also recently made fixed route bus tracking available on TransLoc, a technology that includes arrival predictions, and real-time tracking. However, CCRTA's website claims they "are currently working with a developer to create an on-line ticketing app which [they] hope to announce later this year" (Corpus Christi Regional Transportation Authority, n.d.). It is not clear at this time if the application will have any ride-hailing or on-demand functionality.

Looking to CCRTA's future, the Long Range Plan provides details on CCRTA's ability to meet rider needs by deploying on-demand response zones (Corpus Christi Regional Transportation Authority, 2012). These zones will be chosen to replace low-performing fixed service routes, make transit more applicable to rural areas, and provide more personalized service to the riders (Corpus Christi Regional Transportation Authority, 2012). The plan comes with a map indicating zones that would extend from fixed route stations into the rural areas of municipalities like Bishop, Agua Dulce, and Gregory (Corpus Christi Regional Transportation Authority, 2012). Each city mentioned is included in CCRTA's current service area and is a participating city in the Corpus Christi MTA and its sales tax funding mechanism (Texas Comptroller of Public Accounts, n.d.).

To implement the plan, CCRTA might look to, and coordinate with, the regional MPO, Corpus Christi Metropolitan Planning Organization, which has included a specific focus on CCRTA in its Transit Plan 2020. The plan includes a detailed analysis of the cooperation with private TNCs to address on-demand service needs and possible cautions of public-private TNC agreements. Included in its analysis are key items CCRTA should consider if partnering with a TNC, such as: accessibility, use of service zones, connection to existing transit to reduce cost, and pricing models (Corpus Christi Metropolitan Planning Organization, 2016). However, CCMPO has not included app-based, on-demand projects on the 2019-2022 TIP (Corpus Christi Metropolitan Organization, 2018).<sup>15</sup>

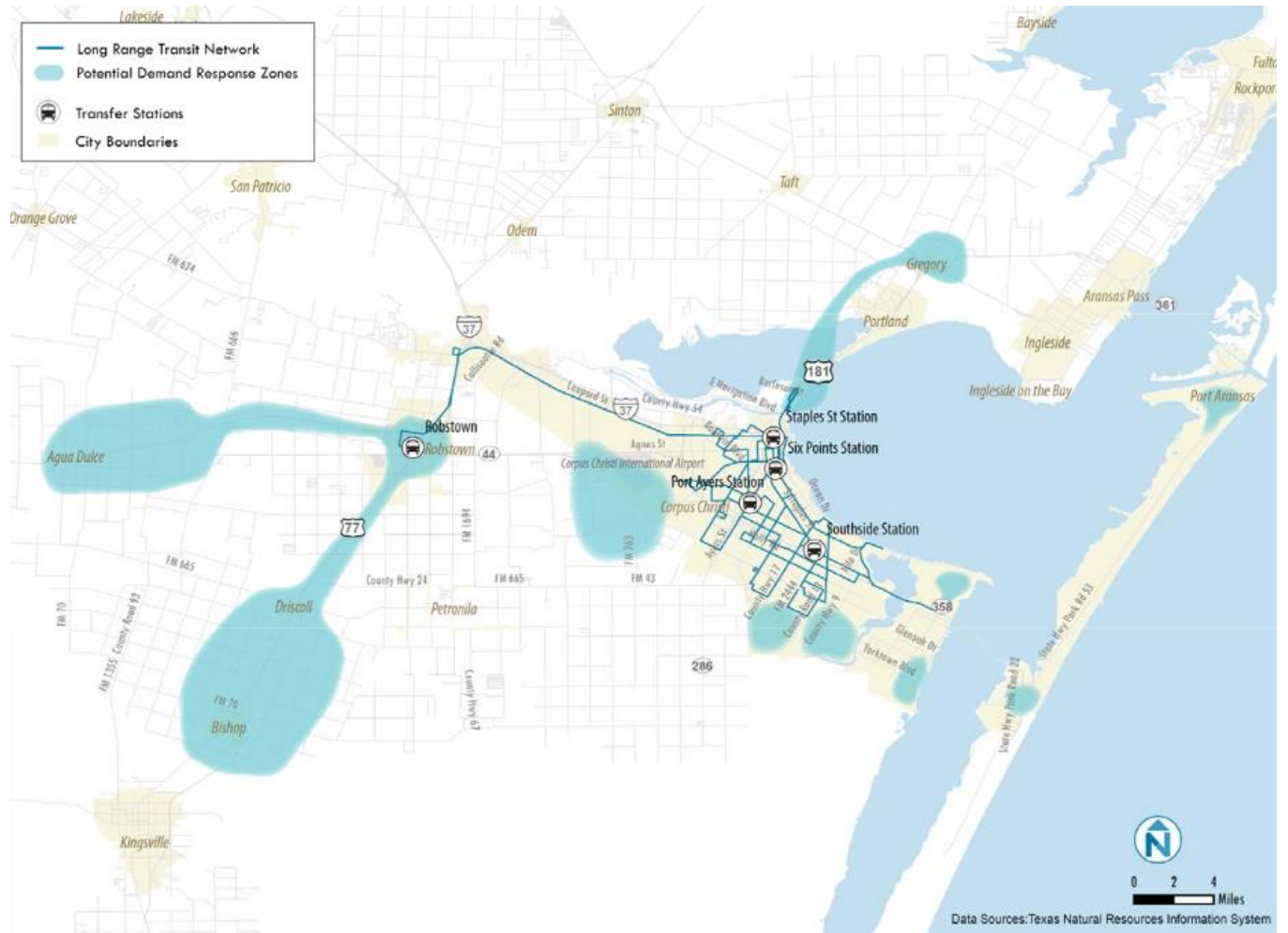
Of the aforementioned possible on-demand service zones being highlighted in CCRTA's Long Term Plan, the service area spans multiple municipalities, county lines, and into the Regional Economic Assistance League's (REAL Inc.) transit service (Rural Economic Assistance League). Please see **Figure 5.8** for CCMPO's suggested app-based, on-demand service areas. While the municipal and county cross-jurisdictional authority can be addressed by Texas Transportation Code Chapter 451, with municipalities currently electing to be included in the transit authority, it is currently unclear if or how CCRTA might be working with REAL Inc. to reduce service overlap while maintaining effectiveness (Texas Stat. § 451.001 – 451.758).

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<sup>15</sup> Searched the document with keywords: "demand" "Uber" "Lyft" "hailing" "ride-sharing" "mobility", then read the context surrounding the term use.

REAL Inc. provides on-demand transportation to the “Coastal Bend,” including San Patricio and Nueces County (Rural Economic Assistance League). The transportation service requires calling 24 hours ahead scheduling with a dispatcher (Rural Economic Assistance League).

**Figure 5.8: Corpus Christi’s Suggested Demand Response Zones (Corpus Christi Metropolitan Planning Organization, 2016)**





Mentioned above by Majchszak, MV transit currently is contracted for paratransit service and low ridership fixed routes (Majchszak, personal communication, September 20, 2018). MV's headquarters is located in Dallas and is the "leading provider of paratransit services" across the United States (MV Transportation, n.d.). While Majchszak referred to it as the "Mobi app"<sup>16</sup>, MV has an application that can be used to request service rides, designating the pick-up and drop-off locations (MV Transportation). However, this app currently is not operating in Corpus Christi (Majchszak, personal communication, September 20, 2018).

## **Methodology**

Those identified in this section were representatives at CCRTA (including personal contact Derrick Majchszak), the CCMPO, and MV Transit. Furthermore, no app-based, on-demand related projects were found when reviewing board meeting minutes of the last half year.

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<sup>16</sup> MV Transit refers to the application as OneMV

## Metropolitan Transit Authority of Harris County (Houston, TX)

Houston's METRO, similar to VIA and CCRTA, currently does not operate an app-based, on-demand service and is currently in the process of acquiring more information about the service and possibilities. METRO's current service area includes Houston, fourteen neighboring municipalities, and much of unincorporated Harris County (Metropolitan Transit Authority of Harris County, n.d.). The transit agency operates multiple smartphone applications, including RideMETRO, METRO Q Mobile Ticketing, and METRO Trip (Metropolitan Transit Authority of Harris County, n.d.). The applications are used as a hub for all other METRO apps, eTicketing, and trip planning respectively (Metropolitan Transit Authority of Harris County, n.d.).

METRO has discussed interest in adopting an app-based, on-demand service, but no evidence of a plan to do this has been produced at this point. METRONext is currently working to devise a transportation plan that will "improve mobility and [METRO's] competitive edge" (Metropolitan Transit Authority of Harris County, n.d.). Current personal communication, with Jamila Gomez, reveal Houston METRO recently reorganized to include a dedicated innovations department led by Jamila Gomez, and a desire to acquire more information about on-demand services like Arlington's partnership with Via. However, this re-organization and plan to implement app-based, on-demand service is not included in METRO's current published plans, or Houston-Galveston MPO's 2019-2022 TIP (Houston-Galveston Metropolitan Planning Organization, 2018).<sup>17</sup>

The City of Houston presents a unique challenge as they recently, in late 2016, passed an ordinance mandating taxicabs operating on the streets of Houston to respond to service requests on a uniform application. Taxicabs, which already are required to have a licensed permit, must "at all times when in service, use the application designated by the director" (Houston Ordinance 2016-736). In this case, the app is called Arro.

Arro Inc., the private tech company, provides the mobile application that all in-service taxicabs must use and respond to the request from. The taxicab can still provide traditional service to non-Arro riders (City of Houston). Furthermore, requests can operate and transport riders to any location within the service of the private taxicab. There is no interference between public jurisdictions, as this service is privately operated and funded. It may cross municipal and transit boundaries and take riders to existing transit nodes if the rider designates the location. The ordinance came as a push to solve transit demands ahead of the 2017 Super Bowl and comes at \$0 cost to the city (City Of Houston, 2016). Since its implementation, Arro has not seen a "wide adoption rate", says Nikki Cooper of the City of Houston (personal communication, November 2, 2018). While not technically public transit, any on-demand service henceforth provided by the city can be in direct competition with Arro, and therefore it will need to be considered.

Regarding integration, Houston METRO is working to integrate its transit service app with Arro. Indeed they have entered into an interlocal agreement with the City of Houston to

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<sup>17</sup> Searched the document with keywords: "demand" "Uber" "Lyft" "hailing" "ride-sharing" "mobility", then read the context surrounding the term use.

make this possible, through integration with the private Arro app. (METRO Board of Directors, 2016).

### **Methodology**

At this time, we have contacted Jamila Gomez and Rachael Die at Houston METRO, Nikki Cooper with the City of Houston, and Thomas B. Gray at Houston-Galveston MPO. Invitations to interview were extended to Jamila Gomez and Rachael Die, but they have not responded to those requests. Those identified were representatives at METRO (including previous contact Jamila Gomez) and the regional MPO. Furthermore, no app-based, on-demand related projects were found when reviewing board meeting minutes of January 2018 until present, and searching for keywords<sup>18</sup> in the archives containing Houston METRO minutes since 2010.

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<sup>18</sup> Keywords are “Mobility on demand” “mobility-on-demand” “ridehailing” “TNC” “ridesharing” “demand-response”

## **Conclusion**

This project sought to understand the extent to which cities have chosen to complement or replace fixed route transit with app-based, on-demand transit services; and the techniques used to overcome jurisdictional fragmentation/integration with pre-existing transit systems. The scope of study also included motivations that led to the coordination between agencies, facilitated integration across agencies or services, or the lack thereof. Through surveys, review of meeting minutes, project documents and interviews with policy makers, this project exposes the current practices used by the transit agencies across the State of Texas to develop and implement app-based, on-demand transit systems in accordance with coordination and integration practices identified in the literature.

Survey completions came from 61 municipalities, including both city and county governments, which responded to our first round of surveys. Combined with a follow up round of surveys, we learned that nine municipalities had implemented an app-based service, while 30 had discussed doing so or were interested in doing so. Most of the cities that were working on app-based, on-demand programs were suburban, with most of them being in the Austin and Dallas-Fort Worth regions. Though practitioners often cite app-based, on-demand service as a low cost alternative to fixed route service, we did not witness many examples of fixed routes being replaced by on-demand service. Instead, locations that interviewees had considered for such services were largely suburban, and complimentary to existing fixed route service. Even in large cities like Dallas, app-based, on-demand services were being developed for low density pockets that already had on-demand service, or to replace peripheral routes, though this was limited to only a few instances. In interviews, we found a number of instances where transit agencies wanted to replace poorly performing fixed route services in low density areas to low density areas, and a conception among practitioners that this mode would be lower cost; though cities that had implemented app-based, on-demand services were also worried about costs, and were trying to keep costs down by simply not funding the service beyond a fixed ridership ceiling.

Therefore we find that the new technology is most appealing to places with low densities and poorly developed transit systems than to core urban areas. Indeed, even in transit agencies like Capital Metro in Austin, or DART in Dallas, which have proposed app-based, on-demand services, they have confined these programs to zones that are not well served by the previously existing fixed route system. This is in line with most transit agencies' response that they intend these services to supplement and compliment existing services, rather than to replace them. (However the qualitative analysis also revealed many instances where transit agencies did want to replace fixed route services to low density areas, which have low ridership and high cost per rider).

68% of respondents said their service only went to areas inside their city boundaries. Places where the service did go outside city boundaries were, indeed rare, and limited, like the case where Arlington's service goes just outside the city boundaries to connect with a commuter rail line, or the case where DART service goes to Inland Port, outside its service area. The

survey revealed a high “willingness” to cooperate across city boundaries through service integration. However when respondents were asked about specific forms of cooperation, they were less enthusiastic about financial integration through transfer discounts or universal fare cards, but more interested in shared equipment and facilities.

Though the literature and policy makers have identified many terms for the concept, including MOD, TNCs, ridesourcing, microtransit, demand responsive connectors and zone routes, we choose to use the term “app-based, on-demand” for its descriptive and inclusive nature, and because differences across types found in the literature (**Table 6.1**) did not appear to lead to differences in integration of services. This is likely because the questions we ask here relate to the motivations for providing service, and the challenges governance structure has created for providing integrated service. Previous literature on app-based, on-demand services did not look into these issues, which is why the service concept types developed prior to this study may yield distinctions in terms of ridership, though they do not provide a helpful explanation of the causes of service dis-integration.

**Table 6.1 Typology of TNCs**

| Type  | Criteria  | Literature  | Examples   |
|---|---|---|--|
| Ridesourcing/Ride-Hailing/Transportation Network Companies/TNCs | App-based service that connects community riders who drive private cars for customers | (Rayle et al., 2016; Clewlow et al., 2017; Jin et al., 2018)                        | -Capital Metro (MetroLink),<br>-DCTA (Highland Village Lyft<br>-Frisco AV<br>-Frisco On-Demand (UNT Lyft)  |
| E-Hail  | Taxi service equipped for apps  | (Jin et al., 2018)  | -Houston Arro  |
| Shared Ride-Hailing/Ridesplitting                               | Combines passengers with a similar route, splits their fare                           | (Rayle et al., 2016; ; Clewlow et al., 2017; Jin et al., 2018)                      | (DART was interested in putting UberPool in GoPass, but technology was not yet available to integrate it). |
| Microtransit/Shared Minibus                                     | Private commuting services similar to fixed route, with rides reserved by app         | (Barbar & Burtch, 2017; Rayle et al., 2016; Clewlow et al., 2017; Jin et al., 2018) | -Alliance Link,<br>-DART Rylie & Kleberg service   |
| Demand Responsive   | Connects passengers with rail   | (Errico et al., 2013;   | -Via,  |

|             |   |                                      |  |
|-------------|---|--------------------------------------|--|
| Connectors  | station                                   | Koffman, 2004)                       | -DART,<br>-Capital Metro (both services),<br>-San Antonio (planned)  |
| Zone routes | Trips around town, within a specific zone | (Errico et al., 2013; Koffman, 2004) | -DART,<br>-Denton (all six services),<br>-Arlington Via,<br>-Capital Metro Pickup Pilot,<br>-San Antonio (planned) |

More helpful in our analysis was literature examining the causes of poor integration in fixed route services, which we apply to app-based, on-demand public transit. Since this is a new and unstudied field, we apply principles of cross-agency integration previously identified for fixed route services to this new mode (Rivasplata, Iseki, & Smith, 2012) (Miller, Englisher, Kaplan, & Halvorsen, 2005). **Categories for integration include 1) physical infrastructure, including stations and signage, 2) scheduling, 3) fare payment and transfer discounts, 4) information and data sharing, 5) special event/emergency planning, and 6) app sharing across agencies.** All but the last category are based on findings from earlier research on fixed route services. We apply these categories to nascent app-based, on-demand services being used as public transportation, identifying challenges and best practices for developing a well-integrated public transit system using app-based, on-demand technology.

The funding and type of operations were considered as key challenges for coordination and/or integration of services. **Figure 6.1** summarizes the factors that impacted coordination of services for all the agencies studied in the interview phase of this project.

The outcome of the project indicates a large variety of integration practices, levels of coordination between agencies, and use of app-based, on-demand service as a complementary system or replacement. The majority of the agencies surveyed currently consider specific implementations of app-based, on-demand service as a replacement to pre-existing, poor-performing fixed route transit service, with Austin's Capital Metro and Dallas Area Rapid Transit providing the most evident examples from our case studies. These two agencies, perhaps coincidentally, also currently offer the strongest integration techniques to provide riders with information through signage, and reliance on their existing infrastructure to provide points for transfer services. San Antonio will likely join the other two when their pilot begins in summer 2019. Each agency indicated the desire to integrate in some capacity, however not all end goals have come to fruition. Each classification of infrastructure and coordination will be addressed separately.

Figure 6.1

| Transit Agency          | Pilot Name                          | Agency's Standard Use App | Funding                                     |   | Operations |                        | App     |                          | Integration Techniques Observed |            |      |             |               |                       |
|-------------------------|-------------------------------------|---------------------------|---|---|------------|------------------------|---------|--------------------------|---------------------------------|------------|------|-------------|---------------|-----------------------|
|                         |                                     |                           | Sandbox Grant Section 5307 / Local Matching | Transit Agency General Fund Other (regional public funds, etc.) | Public     | Contracted Partnership | Private | Private Re-revailing App | Infrastructure                  | Scheduling | Fare | Information | Special Event | Integrated Mobile App |
| DART                    | GoLink                              | GoPass                    | ✓   | ✓   | ✓          | ✓                      | ✓       | ✓                        | ✓                               | ✓          | ✓    | ✓           | ✓             | ✓                     |
| City of Arlington       | Via                                 | -                         | ✓   |   |            |                        | ✓       |                          |                                 |            |      |             | *             |                       |
| Cap Metro               | Pickup                              | CapMetro App              |   | ✓   |            |                        | ✓       |                          |                                 |            |      | ✓           | ✓             |                       |
|                         | MetroLink                           |                           |   | ✓   |            |                        | ✓       |                          |                                 |            |      | ✓           | ✓             |                       |
|                         | Proposed app-based on-demand        |                           | ✓   |   | ✓          |                        | ✓       | ///                      | ///                             | ///        | ///  | ///         | ///           | ///                   |
| DCTA                    | Highland Village Lyft               | GoPass                    |   | ✓   |            |                        | ✓       |                          |                                 |            |      |             |               |                       |
|                         | Frisco AV                           |                           |   | ✓   |            |                        | ✓       |                          |                                 |            |      |             |               |                       |
|                         | Frisco On-Demand                    |                           |   | ✓   |            |                        | ✓       |                          |                                 |            |      |             |               |                       |
|                         | Denton Enterprise Airport On-Demand |                           |   | ✓   |            |                        | ✓       |                          |                                 |            |      |             |               |                       |
|                         | UNT Lyft                            |                           |   | ✓   |            |                        | ✓       |                          | ✓                               |            |      |             |               |                       |
| Levisville Lakeway Zone |                                     | ✓                         |   |   | ✓          |                        |         |                          |                                 |            |      |             |               |                       |
| DCTA & Trinity Metro    | Alliance Link                       | GoPass                    |   | ✓   | ✓          | ✓                      | ✓       |                          |                                 |            | ✓    | ✓           |               |                       |
| VIA                     | Proposed app-based on-demand        | VIA's GoMobile            | ///   | ///   | ///        | ///                    | ///     | ///                      | ///                             | ///        | ///  | ///         | ///           |                       |
| METRO                   | pre-proposal                        |                           |   |   |            |                        |         |                          |                                 |            |      |             |               |                       |
| Corpus Christi          | pre-proposal                        |                           |   |   |            |                        |         |                          |                                 |            |      |             |               |                       |

|         |   |
|---------|---|
| *       | Lack of consistent information to support integration   |
| * *     | Current plans to provide a mobile application with integrated on-demand   |
| * * *   | Information is shared within agency and other agencies  |
| ✓ * * * | Information is provided to riders users through physical signage  |
| ✓ * * * | DART has integrated app-based, on-demand pilot & private TNC in GoPass as of Feb 2019<br>Note, this was after the period of interviews and is not included in DART's report |
| ***     | Re-map provides High-Frequency Network, which arrives every 15 minutes  |
| ///     | Still in planning - representation of agency's current expressed plans  |

### Physical Infrastructure

Physical integration of services, primarily at connecting stations, was the most common form of integration among the agencies in this study. Key examples include DART, Capital Metro, Alliance Link, and the plans for San Antonio’s VIA. DART is currently the only service providing dedicated parking bays for app-based, on-demand vehicles, as seen at Buckner Station. Capital Metro also connects app-based, on-demand pilot zones to fixed transit stops at its stations. By contrast, Arlington’s Via has no formal agreement over where to park at the TRE transfer point, and no signage indicating how to download the app (or even telling riders the service exists). Based on interviews, signage seems to conflict with Via’s philosophy of unfixed Zone Routes. Yet in this instance, CentrePort is a clearly fixed destination on their service map, and would benefit from more permanent infrastructure. Not only is a lack of signage and parking bays problematic for riders trying to navigate the service, but other agencies we interviewed were displeased to learn that Via was not coordinating with them.

### Scheduling

Integration with existing fixed route schedules manifested itself in two ways. We observed cases where the system worked to reduce the maximum wait time for riders transferring from app-based, on-demand services to fixed route transit. Agencies that made strong efforts in this regard included DART (at Buckner Station), and Capital Metro (plans for implementing a

zone connecting Hornsby Bend to fixed transit). It should also be noted that Capital Metro's MetroLink pilot connects on-demand zones to high frequency routes where a maximum wait time of 15 minutes exists. In such cases, high frequency makes scheduling integration of less importance. The second form of scheduling integration we observed related to the hours of service. DCTA's UNT Lyft pilot complements the fixed route schedule by covering the service hours that the fixed transit lacks. San Antonio's VIA also expressed a similar plan, where the proposed scheduled hours will extend beyond the scheduled time of the removed fixed transit.

In all these cases, the above agencies were able to facilitate scheduling coordination by their status as a single provider, or by coordinating multiple contracting agencies in their area. Capital Metro was able to enhance coordination with outside agencies by its status as the agency from which federal funds are distributed. On the other hand, Arlington does not have an established relationship of cross-agency coordination with other cities or transit agencies.

Indeed, we also observed in the Arlington case, where Via's scheduled weekend service ends at 9:00 PM, that a westbound rail line enters CentrePort Station at 9:01 PM—clearly not coordinated. Additionally, DART's GoLink service at Buckner Station could provide more walk-on boarding times to better satisfy the instances when the Green Line arrives only a few minutes after the scheduled departure of :05 and :35 after the hour.

## **Fare**

The forms of fare integration utilized for the app-based, on-demand pilots all consisted of using existing fare pass policies and extending these to the pilots. In the cases of DART, Capital Metro, and San Antonio's planned pilot, the agencies' existing fare policies include passes that can be used on many, if not all, of the agency's services. With the existing structure in place, simply implementing these policies on the pilots provides the integration needed to alleviate transfer charges.

However, there does exist an integrated fare payment technological limitation when contracting with private on-demand operators. In the case of DART's future implementation of subsidizing Uber rides within select zones, riders will pay the discounted price regardless of existing DART passes. As mentioned previously, once DART can add the Uber ride request to their native GoPass application, they will be able to determine previously purchased transit fare, but not until then. However DART can act as a single coordinating agency, ensuring discounted fares despite the existence of multiple private contractors.

Arlington once again presents the most notable area for improvement by offering a transfer discount for those riders connecting to fixed transit at CentrePort Station. However, this would be dependent on coordination with the neighboring transit agencies.

## **Information**

Information integration was not regular or formalized among any of the agencies we interviewed. For the time being, the only form of information integration that exists consist of internal and intra-agency information sharing. DART and DCTA both attend the Mobility Working Groups hosted at NCTCOG to share information. Furthermore DART is required to



share information with the other transit agencies selected for the FTA Sandbox grant, though this sharing is not with other agencies or governments in its own region (which could account for service adjustments). However DCTA and Trinity Metro jointly operate Alliance Link, indicating some level of cross-agency information integration.

A noteworthy example includes Capital Metro providing their app-based, on-demand information and data to neighboring areas in Travis County to help with their transit planning. In the case of Hornsby Bend and Manor, Capital Metro is using their information to extend app-based, on-demand zones outside of their service area through coordination with the county and funding from FTA.

DART presents the nearest example of information integration that is applicable to the transit rider. Once the updated GoPass application is released, app-based, on-demand solutions will be present within the single application that also includes fixed route information, planning, and payment (not only for DART, but also DCTA and Trinity Metro). This application will be a single source to transit information in DART's service area including on-demand services.

### **Special Event**

We found little evidence of special event integration in the Texas app-based, on-demand pilots. Arlington's Via service is the only to mention such integration, however evidence of a change to price or scheduling in regards to a special event were not found. Additionally, conflicting statements from interviews further indicates a lack of special event integration. Rather, we found interest in not serving special events at all, though this conflicted with statements on Via's website indicating a willingness to change its schedule to accommodate such events.

### **App**

A recurring theme of the interviews was the challenge of ensuring coordination across multiple apps, sometimes in the same city. Multiple private and public providers has made this situation worse, with private providers incentivized to keep users on their own app, and public providers confined at this point in time to pilot test services. Most pilot services have been implemented with little thought to the long term need for integration of apps, leading to separate apps for separate services. A notable exception is DART's GoPass, which was developed as a product of its Sandbox grant from the FTA. DART staff repeatedly expressed a desire for a single regional mobile application with integrated information, trip planning, and payment between fixed route services, DART's on-demand services, and third party TNC providers like Uber, Lyft or Via. Other providers in the region may also be able to join this app, but only if they pay to use it. Capital Metro expressed a similar desire to encompass trip planning and fare payment between existing services and private, last mile solutions, but not with similar regional implications affecting nearby transit agencies, partly because Capital Metro is in a smaller region, with fewer agencies, but also because Capital Metro has not yet discussed the possibility of expanding their app to nearby services like CARTS or San Antonio's VIA. DCTA in Denton was the most problematic case, with multiple apps in the same city, and little coordination across services. Also, Arlington represents a case where its app is not integrated with GoPass, or any of

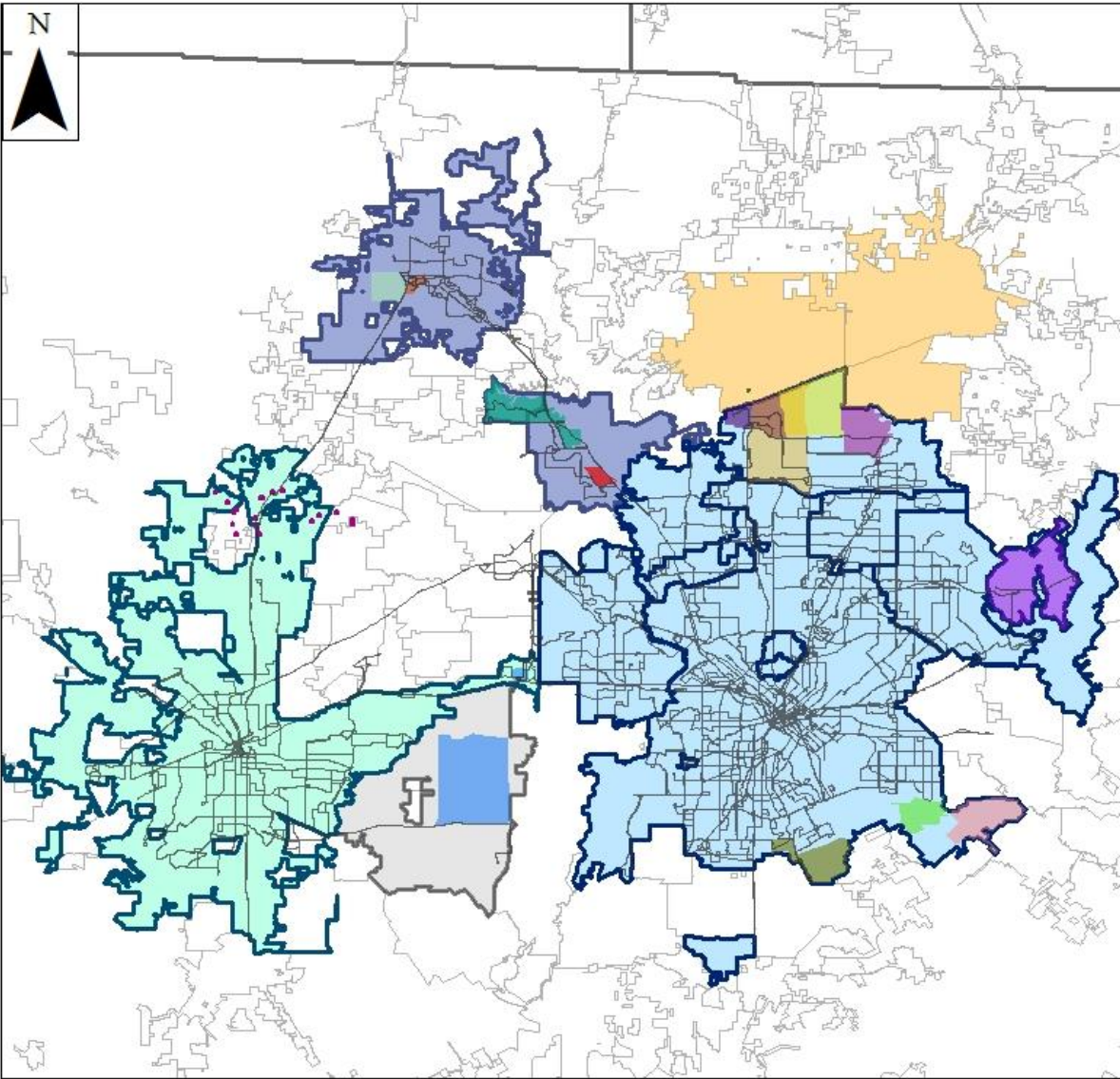
the private providers in the area. Since they also do not want to display signage at stations, many riders do not even know the service exists, and simply call Uber or Lyft.

### **Cross-Jurisdictional Service Planning**

Cross-jurisdictional planning was an underlying cause of poor integration across systems. Certainly, most cities and transit agencies were unwilling to extend initial pilot services outside their pre-existing service areas, out of concern that they would be spending local dollars on external residents and employers. Over time, we observed some agencies expand outside their boundaries in limited circumstances—for example, DART’s interest in serving Inland Port (when local businesses were willing to cover the cost), and Capital Metro’s plans in Austin to extend to Manor and Hornsby Bend, and coordinate service with CARTs rural transit. Another motivation for jurisdictional coordination exists to service commutes such as Arlington’s Via extension to CentrePort Station. This emerged out of a desire to emulate previous fixed route service the city had been supporting, which also went to CentrePort Station, and a desire to connect to both the regional commuter rail (TRE), and the shuttle to DFW airport, which both leave from CentrePort Station, although it is just across the border in Fort Worth city limits. However at this time, Arlington is not considering direct service to major job/housing markets like Fort Worth or Dallas, or to major transportation hubs like DFW or the Grand Prairie Megabus station, which also lie outside its borders. Additionally, in many of the above categories of integration, like transfer discounts and scheduling, borders led to poor coordination between Arlington Via and the other transit in the region.

DCTA provides the greatest amount of app-based, on-demand service outside of their typical service area in the case of Frisco On-Demand, Frisco AV, and the join Alliance Link zones. However, DART and DCTA have not coordinated services across the service area division between the two agencies, in order to better service fast growing job markets like Frisco, even though DCTA’s Frisco On-Demand pilot and two of DART’s pilots overlap the *same area* of northern Plano. See **Map 8**.

Map 8: Dallas – Fort Worth Map of Regional App-Based, On-Demand Pilots



0 3.25 6.5 13 19.5 26 Miles

**Legend**

- DCTA Transit Routes
- DART Transit Routes
- FWTA Transit Routes
- AllianceLink Pilot
- Denton Enterprise Airport On-Demand
- Frisco AV
- Frisco On-Demand Response Zone
- UNT Lyft
- Highland Village Lyft Zone
- Lakeway Zone
- Arlington's Via Zone including CentrePort Station
- GoLink Rylie
- GoLink Kleberg
- GoLink Rowlett
- GoLink Inland Port
- GoLink North Central Plano
- GoLink Legacy West Zone
- GoLink Far North Plano
- DART Service Area
- DCTA Service Area
- FWTA Service Area
- City of Arlington Boundary
- Texas City Boundaries
- MPO Boundaries

Map creator: Steven Matthew Reeves  
 (February, 2019)  
 Source:  
 MPO Boundaries (2019), City\* Boundaries (2018),  
 and Highways (2019) from TxDOT.  
 Service Areas from CTEDD (2018)  
 DART Routes (Dec. 2018) and FWTA  
 Transit Routes (2019) from TransitFeed  
 DCTA Routes (2019) from DCTA Website  
 Zones\*\* georeferenced from provided Maps

gis-txdot.opendata.arcgis.com  
 transitfeeds.com  
 www.dcta.net

\* Includes most recent city boundaries,  
 no annexations  
 \*\* Should not be considered exact

As pointed out by Arlington, cross-jurisdictional services do not necessarily *require* coordination between agencies when app-based, on-demand operations are provided by a private service or TNC. In theory, two neighboring cities could contract with the same private provider, which could coordinate operations. This seems to be the model Arlington imagines for any (potential and highly speculative) future service connecting to Fort Worth. However the challenges of coordinating services across agencies at CentrePort Station indicates that this model is unlikely to work without cooperation across government agencies that are funding and planning the service. Furthermore, the overlapping services in Frisco by DCTA and DART point to the challenge of poor coordination by government agencies supporting the services. Additionally, multiple government providers can mean a lack of coordination over fare policy, scheduling, physical facilities, and all the other integration factors described above.

On the other hand, one example of integration across public agency providers—Alliance Link, between FWTA and DCTA—indicates the potential for coordination. However this happened for two reasons. First, because a private company (Toyota Motor Corporation) established a pilot program for a limited time, developing a proof of concept that government agencies wanted to continue; and second, because the COG decided to fund it. Another example of coordination is in Capital Metro, where FTA Section 5307 funds supported coordination with CARTS rural transit, outside Capital Metro’s service area. Both examples illustrate the merit of using higher levels of government to resolve the challenge of cross-jurisdictional integration. This can increase involvement in governance and funding of app-based, on-demand public transit by strengthening the role of COGs, states and the FTA, thus encouraging stronger coordination across local governments and transit agencies.

### **Additional findings**

1. Agencies exhibit the use of app-based, on-demand services as both a replacement for low performing fixed routes as well as complementing fixed routes. See below **Table 6.2** as a summary of app-based, on-demand pilots intended to replace or complement pre-existing fixed route service. Those that are neither complementary or replacement services operate a point to point zone and do not specify the desire to connect to fixed route transit.

### **Table 6.2**

| Transit Agency       | Pilot Name                          | Replacing Fixed Routes | Complementing Fixed Routes |
|----------------------|-------------------------------------|------------------------|----------------------------|
|                      |                                     | DART                   | GoLink                     |
| City of Arlington    | Via                                 | ✓                      | ✓                          |
| Cap Metro            | Pickup                              |                        | ✓                          |
|                      | MetroLink                           | ✓                      |                            |
|                      | <i>Proposed mobility-on-demand</i>  | ✓                      | ✓                          |
| DCTA                 | Highland Village Lyft               |                        |                            |
|                      | Frisco AV                           |                        |                            |
|                      | Frisco On-Demand                    |                        |                            |
|                      | Denton Enterprise Airport On-Demand |                        |                            |
|                      | UNT Lyft                            |                        | ✓                          |
|                      | Lewisville Lakeway Zone             |                        | ✓                          |
| DCTA & Trinity Metro | Alliance Link                       |                        |                            |
| VIA                  | <i>Proposed mobility-on-demand</i>  | ✓                      | ✓                          |
| METRO                | <i>Pre-proposal</i>                 |                        |                            |
| Corpus Christi       | <i>Pre-proposal</i>                 | ✓                      |                            |

\* To qualify as "replacing fixed routes" there must exist at least one example of a mobility-on-demand pilot used to replace an existing fixed route

- Unfortunately, many of the same barriers to development of fixed route services are re-appearing as transit agencies develop app-based, on-demand services. Very few of the cases examined crossed into another jurisdiction, and when they did (Arlington's Via crossing into Fort Worth to serve CentrePort TRE train station), the service was not developed through coordination with the other transit agency. DART and DCTA did not serve Frisco, a fast-growing jobs center located between them. Alliance Link between DCTA and FWTA only existed due to the involvement by Toyota Motor Corporation, and was only funded by the COG for two years. Indeed, Capital Metro had the most extensive plan to extend app-based, on-demand service outside its service area. Other major providers, particularly DART, City of Arlington and DCTA, were developing services that were confined to either their fixed route transit districts, or their city boundaries, thus not providing any cross-jurisdictional connectivity beyond what fixed route service previously provided. Additionally, new forms of service fragmentation are emerging. In particular, when several apps exist by different providers in the same geographic area, as is the case in Denton, it is hard to coordinate services and data. For the rider, it would be difficult to use public transit TNCs as the first/last mile of a fixed route trip—as is often its *stated* purpose—if the on-demand service and the fixed route service must be booked on different apps. Even more troubling is cases where the on-demand service has no fixed location to stop, schedules that are uncoordinated, and transfers that are not discounted. As was the case with fixed route services, it has proven

much easier to coordinate all of these things when the on-demand and fixed route services are planned and operated by the same agency—as is the case in Austin, and DART

**Table 6.3**

| Transit Agency                  | Pilot Name                          | Extends service outside of service area? | Where?             | Why?   |
|---------------------------------|-------------------------------------|--|--------------------|--|
| <b>DART</b>                     | GoLink                              | *  | -                  | -  |
| <b>City of Arlington</b>        | Via                                 | ✓  | CentrePort Station | The Via service extends to CentrePort station to service commuters accessing fixed transit between Fort Worth and Dallas.  |
| <b>Cap Metro</b>                | Pickup                              |  | -                  | -  |
|                                 | MetroLink                           |  | -                  | -  |
|                                 | <i>Proposed mobility-on-demand</i>  | ✓  |                    | Capital Metro will extend service to Manor and Hornsby Bend outside of their service area. The extended service will be paid for by the county (also using FTA Section 5307 funding). The purpose is to connect transit riders to Capital Metro's fixed service. |
| <b>DCTA</b>                     | Highland Village Lyft               |  | -                  | -  |
|                                 | Frisco AV                           | ✓  | Frisco             | AV technology pilot and demonstration funded by the City of Frisco   |
|                                 | Frisco On-Demand                    | ✓  | Frisco             | This point-to-point service will provide mobility to those Frisco residents over the age of 65 and/or qualifying disabilities within and around Frisco, McKinney, Allen, and parts of Plano. Each is considered outside of DCTA service area.                    |
|                                 | Denton Enterprise Airport On-Demand |  | -                  | -  |
|                                 | UNT Lyft                            |  | -                  | -  |
|                                 | Lewisville Lakeway Zone             |  | -                  | -  |
| <b>DCTA &amp; Trinity Metro</b> | Alliance Link                       | ✓  | Alliance Airport   | Presented as a first/last mile solution, the Alliance Link will connect riders to transit meant to serve employment centers. This service exists within and between DCTA and Trinity Metro.  |

\* DART expressed willingness to extend outside of their service area in the case of Inland Port, however, this does not yet exist, nor were substantial plans to implement such service presented

- Each instance of app-based, on-demand solutions within the state of Texas identified and researched through this project exists as a pilot service, and is very much still under development. These services generally last at least half a year or longer, but operate over a limited time. Over the course of this research the Exposition Zone, within Capital Metro's MetroLink pilot programs ended, citing poor ridership. However the riders who did become

accustomed to using the services faced the challenge of getting around without them. For the operator, establishing many and frequent pilot services runs the risk of creating rider dependency on a service the city or transit agency is not committed to keeping. If, indeed, the local government is not planning to keep the service, or is not planning to commit long-term funds to it, long-term plans, including potential removal of the pilot, need to be a part of the planning process, particularly as the service's existence causes riders to develop workplace and living patterns that depend on it remaining.

4. Mobility-on-demand solutions are gaining favor and rapid adoption within the state of Texas. With relatively low density cities, app-based, on-demand services are frequently considered by those interviewed as the more cost effective transit, as opposed to fixed routes. Dallas Area Rapid Transit, Denton County Transportation Authority, and San Antonio's VIA all mentioned cost-effectiveness as a reason for applying app-based, on-demand pilots in their service area, though they also focused their efforts on low density, suburban areas, rather than dense urban cores with many existing fixed routes. This indicates the existence of a density threshold, beyond which fixed route service is more efficient than app-based, on-demand, particularly because app-based, on-demand stations move, and first/last mile riders need to get to trains and buses on time in order to catch them. Scheduling can be more reliable, and trip time less variable. However determining this threshold will require future research. Additionally, cities need to know the threshold below which app-based, on-demand services are not cost-effective either. A particular challenge in doing such an analysis is the high degree of privately contracted services, which are likely to make such data privately-owned, and difficult to obtain. At this point in time, it appears many transit agencies are interested in replacing low-performing fixed route service based on a *belief* that app-based, on-demand service will be cheaper, but it is too early to say whether this is actually the case, or if their route falls within the density threshold.

Capital Metro's ADA compliant Pickup Pilot also proved to be cost-effective compared per-rider costs to their standard paratransit service. However it is still unclear how cost effective the service is. This was outside the scope of the current project.

5. In general, coordination between transit agencies and regional MPOs was relatively low. Few MPOs were recognized as taking an integral role in the planning, implementation, or initiation of app-based, on-demand transit services. MPOs were involved to support funding, as in the case of Alliance Link and DART's proposal to expand to Inland Port. The only other mention of MPO coordination was the identification of target areas to focus growth, as in San Antonio's proposal to service the Northeastern corner within their service area and Capital Metro's plan to expand to Manor and Hornsby Bend.

Rather, it was more typical to see MPOs play a convening role, as in NCTCOG's MOD Working Group, which brought parties from transit agencies and municipalities across the region together to discuss mutual challenges to implementing app-based, on-demand

services. This has been a forum for trading ideas, and exchanging new concepts, as interest in app-based, on-demand service grows. However this exchange has not led to significant planning or development of cross-jurisdictional services, nor has it led to cross-agency or cross-jurisdictional integration of services in any of the categories identified in this study (physical signage or station infrastructure; scheduling; fares/transfer discounts; information sharing; special event planning; or app sharing), though it might be said that the MOD working group has fostered cooperation on the last category, app sharing.

6. The transit agencies, Dallas Area Rapid Transit, Fort Worth Transportation Authority (Trinity Metro), Denton County Transportation Authority, the City of Arlington, and Capital Metro are direct recipients of FTA funds. Additionally, many are utilizing Section 5307 to implement their on-demand services. Yet they do not have strong coordination between their services. In some cases, more than one service exists in the same city, funded by the FTA, while in others, services exist in close proximity but run by different transit agencies. There exists the unrealized opportunity for FTA to include requirements for stronger coordination in its requirements to receive federal funds to develop app-based, on-demand services. In particular, FTA can work through the MPO to develop a single app-based platform for calling such services, rather than work through a single transit agency. This would help ensure stronger coordination, and avoid the situation now in existence, where DART is charging other agencies to use its GoPass (discouraging use). This would also help ensure FTA funds result in the highest possible benefit to the rider. Furthermore, if FTA is funding more than one app-based, on-demand program, in close geographical proximity, they could require operators to implement policies that encourage ridership and benefit the rider, such as transfer discounts, schedule coordination, and physical coordination of stations and signage.
7. Heavy reliance on private contractors is a serious limitation for cities and transit agencies looking to better coordinate data and special event/emergency information, or to better coordinate transfer discounts across agencies. Interviewees noted the technological barriers of doing this on single mobile applications, partly because private contractors are not interested in using single applications across multiple operators, or sharing data with competitors. To perform such integrations in-house would require the agencies to staff mobile application developers.
8. For those contracting, public-private political barriers should also be considered. It was noted that private entities providing on-demand services that already have a mobile application would prefer riders use only their application. Furthermore, the data collected by the private company will only be shared in the way originally agreed to in their contract. This deprives transit agencies of valuable insights that could potentially be gained from more open data. For example, it would be difficult to know how to ramp up service for riders transferring from one service to another at times when ridership peaks, if the two agencies did not trade data on ridership. It would also be difficult for an on-demand service to cater to higher ridership during scheduled special events if they did not receive data on the events' existence from the city.



9. Like any public service, financial barriers exist for those agencies that take on this project. While, all public services must take cost into account, it was found that Arlington's Via service faces particularly difficult financial constraints, operating without a dedicated sales tax for transit (like DART, DCTA, CCRTA, Capital Metro, Houston Metro, and San Antonio's VIA have), and much of Arlington's service is assisted through special federal grants; indeed, it is unclear whether or not these will be renewed upon expiration. The same is seen for those proposed pilots in Travis County outside of Capital Metro's service area. Texas provides very little state funding for such projects, leaving cities that have not joined a transportation authority with limited federal funding; and unfortunately, this leads to long-term uncertainty over whether the service will be able to continue, particularly if the federal pilot program is altered, for example, if the Sandbox Program is renewed.

### **Policy Recommendation**

- 1) Incorporate requirements for service integration into rules for receipt of FTA funding.
- 2) FTA should promote development of regional or national service apps.
- 3) FTA, state governments and MPOs should incentivize transfer discounts across pilot programs, and between on-demand & fixed route services.
- 4) MPOs can incorporate transfer points into their RTP, promoting use of app-based, on-demand services for first/last mile, through parking bays, signage, and other infrastructure that can ease the transfer process.
- 5) Agencies providing app-based, on-demand services need to carefully consider existing fixed route services and schedules when designing service zones and establishing timing of service around fixed route schedules. Many are not currently doing this. This is especially critical when services require transfer across transit agency or across municipalities.
- 6) Improve data sharing, partly through more in-house service operations, better coordination across agencies, and involvement by states and MPOs.
- 7) Increase long-term commitment to services, through development of physical infrastructure and financing, ensuring riders can plan and invest around them. Long term commitment also requires more investment in physical infrastructure like signage and shelters at frequently used stops, and use of debit payment systems for riders without bank accounts or smart phones.

### **Areas for Further Research**

More research is needed on the relationship between municipalities and transit agencies with private contractors of app-based, on-demand services. Yet this is difficult to do, given the contractual and proprietary relationship, which limits the data available to the researcher. We identified particular incentives in the relationship between some operators and the city

that provide disincentives to increasing service. For example, the City of Arlington cited lower overhead and operating costs as the primary reason for not increasing service to meet rider demand, as variable cost is solely dependent on ridership; for a money-losing service, if they are unable to make it profitable, there is actually a disincentive to add enough supply to meet demand (City of Arlington, 2017). Additional research into the specifications used to contract with private TNC contractors and the financial implications of incorrect forecasting can aid future agencies with their decision-making.

- 1) More research is needed into the role that can be played by the FTA, state governments and MPOs in coordinating app-based, on-demand services across transit agencies and across municipalities. In particular, more research will be needed, as these services develop, into the various tools that municipalities, transit agencies, and states try to overcome the challenges of integration. At this point, we did not observe a strong role by any of these agencies in coordinating services across jurisdictions, or within them, though this could change over time.
- 2) More research will be needed on app-based, on-demand services' ability to cater to rider needs. For example, while we may assume that integration improves ridership, as it does for fixed route services, does it do so to the same extent or in the same way for app-based, on-demand services? This is a particularly important question because so many app-based, on-demand services are developed on the premise that they are designed to serve as first and last mile services to areas where the density is too low to merit fixed routes. Thus, more research is needed into the impact that poor service integration—whether across app-based, on-demand services, or between app-based, on-demand -fixed route—can have on ridership.
- 3) As discussed in more detail above, more research is needed into the impact of density on app-based, on-demand service cost and viability, and the thresholds at which app-based, on-demand and fixed route services become viable. Perhaps other issues are important as well, such as grid vs. cul-de-sac streets, presence of sidewalks, concentration of commercial space and jobs, and others.

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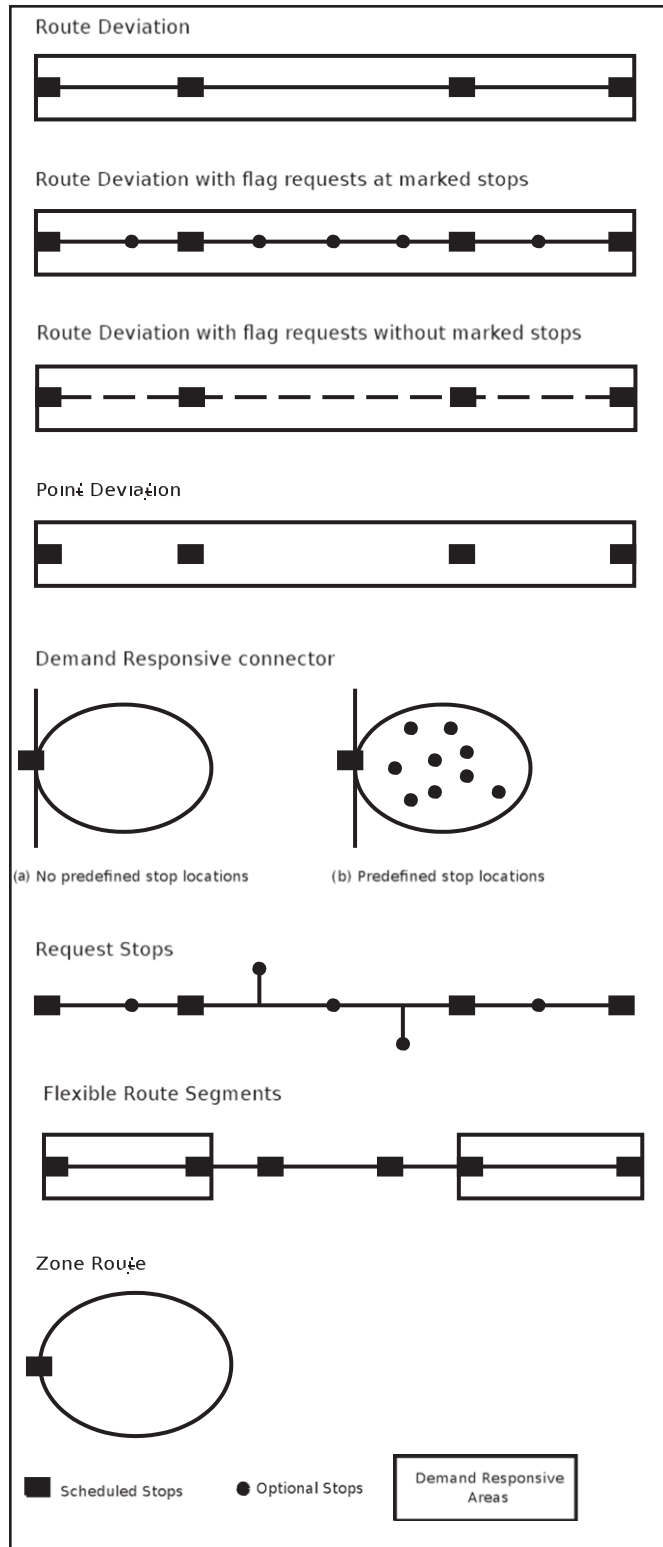
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## Appendix

Figure 2.1: Semi-Flexible Route Models (Errico et al, 2013; Koffman, 2004)

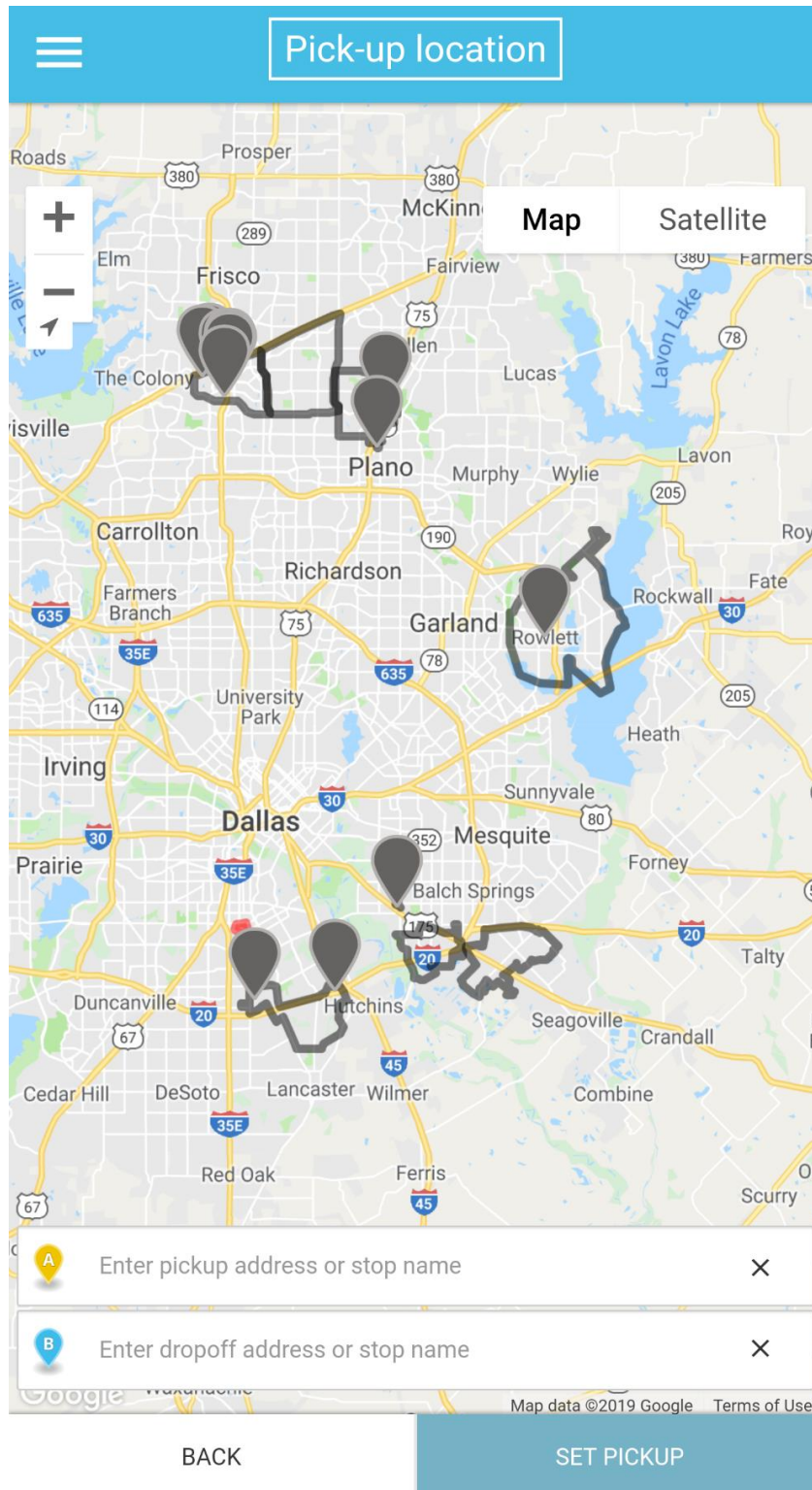


**Table 5.1: Summary of DART App-Based, On-Demand Services**

| City Name       | DART member Y/N | DART Fixed route service Y/N | DART supported app-based, on-demand service Y/N | Name of app-based, on-demand service | Crosses municipality Y/N | Concession services (d) or minivan (m) | Third party partnership |
|-----------------|-----------------|------------------------------|---|--------------------------------------|--------------------------|--|-------------------------|
| Addison         | Y               | Y                            | N   | -                                    | -                        | -                                      | -                       |
| Carrollton      | Y               | Y                            | N   | -                                    | -                        | -                                      | -                       |
| Cockrell Hill   | Y               | Y                            | N   | -                                    | -                        | -                                      | -                       |
| Dallas          | Y               | Y                            | Y   | GoLink                               | N                        | m                                      | None                    |
| Farmers Branch  | Y               | Y                            | N   | -                                    | -                        | -                                      | -                       |
| Garland         | Y               | Y                            | N   | -                                    | -                        | -                                      | -                       |
| Glen Heights    | Y               | Y                            | N   | -                                    | -                        | -                                      | -                       |
| Highland Park   | Y               | Y                            | N   | -                                    | -                        | -                                      | -                       |
| Irving          | Y               | Y                            | N   | -                                    | -                        | -                                      | -                       |
| Plano           | Y               | Y                            | Y   | GoLink                               | N                        | m                                      | None                    |
| Richardson      | Y               | Y                            | N   | -                                    | -                        | -                                      | -                       |
| Rowlett         | Y               | Y                            | Y   | GoLink                               | N                        | m                                      | None                    |
| University Park | Y               | Y                            | N   | -                                    | -                        | -                                      | -                       |



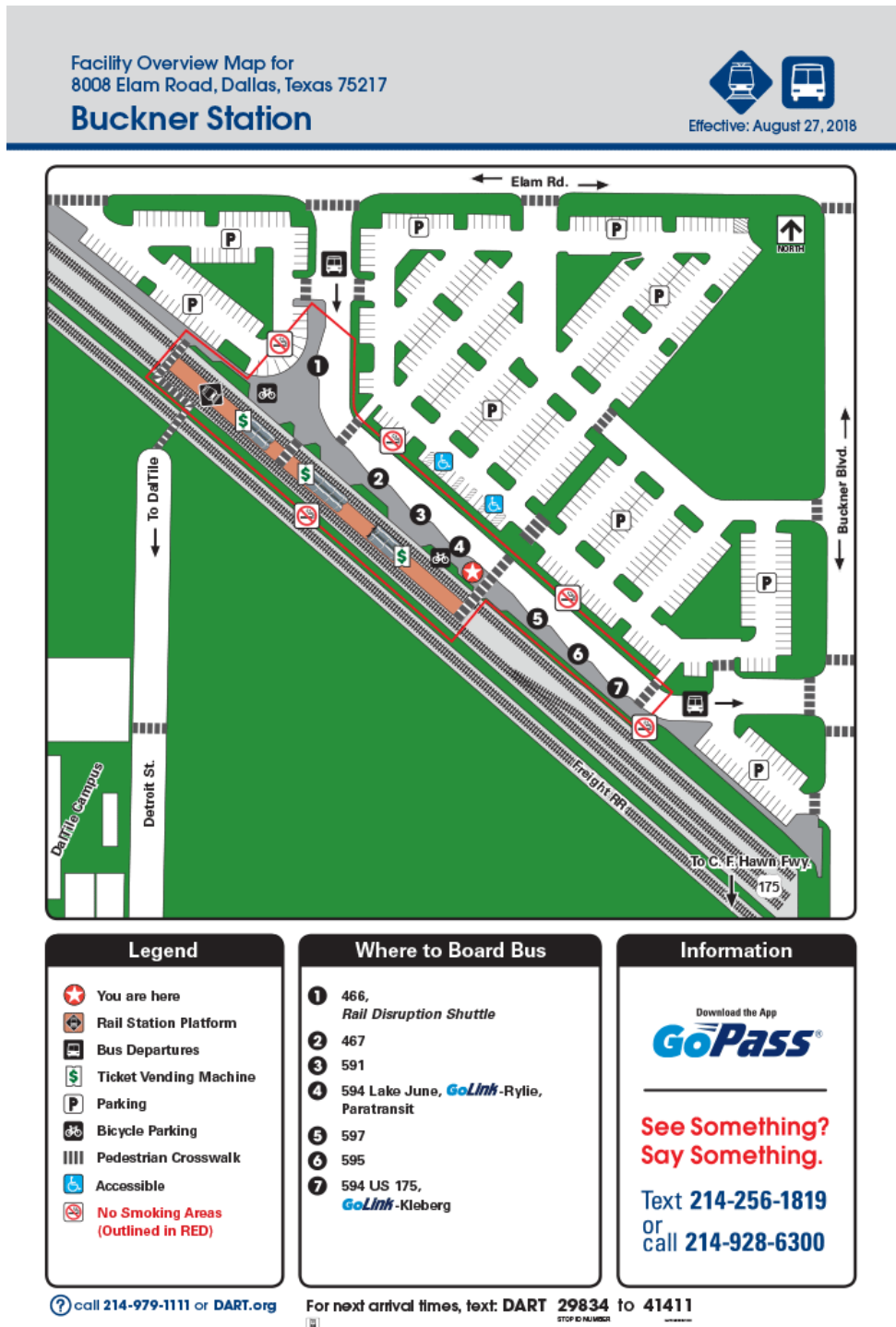
**Figure 5.2: Screenshot of TapRide Application featuring Dallas Area Rapid Transit's GoLink pilots. (Reeves, Screenshot of TapRide Application featuring Dallas Area Rapid Transit's GoLink Pilot Zones, 2019)**



**Figure 5.5: Image of GoLink pilot signage present at Buckner Station Dallas, Texas (Reeves, Collection of Images from Buckner Station, 2019)**



Figure 5.6: Image of GoLink pilot signage present at Buckner Station Dallas, Texas and on DART's website (Dallas Area Rapid Transit, 2018)



**Table 5.2: Schedule of DART's Green Line arrival to Buckner Station compared to GoLink's departure every :05 and :35 minutes past the hour (Dallas Area Rapid Transit, 2018)**

| <b>DART's Green Line Light Rail arrival at Buckner Station</b> |   |
|--|---|
| <b>Arriving</b>  | <b>Within 15 minutes of GoLink departing?</b> |
| <b>4:15</b>  | ---   |
| <b>4:35</b>  | ---   |
| <b>4:59</b>  | ---   |
| <b>5:11</b>  | no  |
| <b>5:24</b>  | yes   |
| <b>5:31</b>  | yes   |
| <b>5:44</b>  | no  |
| <b>6:10</b>  | no  |
| <b>6:26</b>  | yes   |
| <b>6:40</b>  | no  |
| <b>6:56</b>  | yes   |
| <b>7:11</b>  | no  |
| <b>7:26</b>  | yes   |
| <b>7:41</b>  | no  |
| <b>7:56</b>  | yes   |
| <b>8:11</b>  | no  |
| <b>8:26</b>  | yes   |
| <b>8:41</b>  | no  |
| <b>8:56</b>  | yes   |
| <b>9:11</b>  | no  |
| <b>9:29</b>  | yes   |
| <b>9:43</b>  | no  |

|              |     |
|--------------|-----|
| <b>10:03</b> | yes |
| <b>10:23</b> | yes |
| <b>10:43</b> | no  |
| <b>11:03</b> | yes |
| <b>11:23</b> | yes |
| <b>11:43</b> | no  |
| <b>12:03</b> | yes |
| <b>12:23</b> | yes |
| <b>12:43</b> | no  |
| <b>1:03</b>  | yes |
| <b>1:23</b>  | yes |
| <b>1:43</b>  | no  |
| <b>2:03</b>  | yes |
| <b>2:23</b>  | yes |
| <b>2:43</b>  | no  |
| <b>3:03</b>  | yes |
| <b>3:23</b>  | yes |
| <b>3:31</b>  | yes |
| <b>3:43</b>  | no  |
| <b>4:03</b>  | yes |
| <b>4:24</b>  | yes |
| <b>4:39</b>  | no  |
| <b>4:54</b>  | yes |
| <b>5:09</b>  | no  |
| <b>5:24</b>  | yes |
| <b>5:39</b>  | no  |
| <b>5:54</b>  | yes |

|              |     |
|--------------|-----|
| <b>6:09</b>  | no  |
| <b>6:24</b>  | yes |
| <b>6:43</b>  | no  |
| <b>7:00</b>  | yes |
| <b>7:22</b>  | yes |
| <b>7:43</b>  | no  |
| <b>8:03</b>  | --- |
| <b>8:23</b>  | --- |
| <b>8:43</b>  | --- |
| <b>9:03</b>  | --- |
| <b>9:23</b>  | --- |
| <b>9:43</b>  | --- |
| <b>10:03</b> | --- |
| <b>10:23</b> | --- |
| <b>10:43</b> | --- |
| <b>11:10</b> | --- |
| <b>11:40</b> | --- |
| <b>12:10</b> | --- |
| <b>12:42</b> | --- |
|              |     |
| <b>Yes</b>   | 30  |
| <b>No</b>    | 22  |

**Table 5.4: Summary of DCTA App-Based, On-Demand Services**

| City Name        | DCTA member Y/N | DCTA Fixed route service Y/N | DCTA supported app-based, on-demand service Y/N | Name of app-based, on-demand service        | Crosses municipality Y/N | Concession services (d) or minivan (m) | Third party partnership |
|------------------|-----------------|------------------------------|---|---|--------------------------|--|-------------------------|
| Denton           | Y               | Y                            | Y   | UNT Lyft program                            | N                        | c                                      | Lyft                    |
| Denton           | Y               | Y                            | Y   | Denton Enterprise Airport On-demand service | N                        | m                                      | TransLoc                |
| Highland Village | Y               | Y                            | Y   | Highland Village Lyft program               | Y                        | c                                      | Lyft                    |
| Lewisville       | Y               | Y                            | Y (only in north Lewisville)                    | Highland Village Lyft program               | Y                        | c                                      | Lyft                    |
| Fort Worth       | N               | Y                            | Y   | Alliance Link                               | Y                        | m                                      | Alliance                |
| Haslet           | N               | Y                            | Y   | Alliance Link                               | Y                        | m                                      | Alliance                |

