

AGENDA

Mobility on Demand (MOD) Working Group Meeting at NCTCOG

11/05/2018 2:00 pm – 3:30 pm

NCTCOG Transportation Council Room

616 Six Flags Drive, CenterPoint II, Arlington, TX 76011

2:00 pm Welcome and Introductions (Jing Xu - NCTCOG)

2:05 pm DART MOD Sandbox Project Update (Todd Plesko –DART)

2:25 pm Policy Implications of Transportation Network Companies (Todd Hansen – Texas A&M Transportation Institute)

2:45 pm Americans' AV Preferences: Dynamic Ride-Sharing, Privacy & Long-Distance Mode Choices (Dr. Kara Kockelman - University of Texas at Austin) via WebEx

3:00 pm Public Transportation Network Companies and Cross-Jurisdictional Services (Dr. David Weinreich - University of Texas at Arlington)

3:15 pm Q&A, Discussion and Future Topics (All)

Mobility on Demand (MOD) Working Group
November 5, 2018
North Central Texas Council of Governments (NCTCOG)
Transportation Council Room

1. Meeting Summary
 - a. Welcome & Introductions
 - b. DART MOD Sandbox Project Update
 - c. Policy Implications of Transportation Network Companies
 - d. Americans' AV Preferences: Dynamic Ride-Sharing, Privacy & Long-Distance Mode Choices
 - e. Public Transportation Network Companies and Cross-Jurisdictional Services
 - f. Q/A, Discussion and Future Topics
2. Attendee List

1. Meeting Summary

a. Welcome

Jing Xu from NCTCOG welcomed and thanked everyone for attending the meeting. All attendees gave brief introductions.

b. DART MOD Sandbox Project Update

Todd Plesko, Vice President of Planning and Development at DART, provided an update on DART's MOD Sandbox project and discussed elements of DART's shared mobility vision. DART's shared mobility vision focuses on first- and last-mile issues, and one of the solutions includes an update to the GoPass mobile application that integrates TNCs into its functionality. Future updates could possibly include neighborhood electric vehicles, bike share, and other modal opportunities.

DART's mobility vision involves bolstering a high-frequency network, then deploying innovative mobility solutions (such as on-call service or microtransit) in less dense areas. GoLink monthly ridership has been increasing in areas with service gaps.

Some open questions include the question of whether the GoPass app could be a platform for other transit systems in the region. Can the region assist with investment to achieve a regional application? Should the region have a single platform, or should each agency do something different? NCTCOG staff will work on strategies to respond to those open questions.

c. Policy Implications of Transportation Network Companies

Todd Hansen, an Associate Transportation Researcher at Texas A&M Transportation Institute (TTI), provided a summary presentation of a TTI report that he co-authored titled "Policy Implications of Transportation Network Companies," published in October of last year. Two statewide policies exist in Texas: HB 1733 and HB 100, which require TNCs to obtain a permit and meet several operational requirements. Current state law preempts any local regulation on TNCs.

There are no studies that definitively link higher TNC activity with reductions in impaired driving; however, a 2016 study found that TNC drivers behave more safely than average drivers. While fingerprint-based background checks are not required, TNC technology is increasingly providing safety features like vehicle and driver identification information, the ability to track and share routes, and providing ratings for trips.

Some equity and accessibility concerns for TNCs include the lack of wheelchair accessible vehicles and whether services are accessible to other transportation disadvantaged groups (e.g., elderly, low-income, rural).

TNCs and transit agencies have been occurring across the country under different terms—partnerships can focus on technology integration (such as DART’s GoPass App), data sharing, first-/last-mile solutions, or other services. The dominant concern for these partnerships includes longer-term funding for partnerships, and how TNCs can fit into FTA requirements.

d. Americans’ AV Preferences: Dynamic Ride-sharing, Privacy & Long-Distance Mode Choices

Dr. Kara Kockelman, a professor of Transportation Engineering at the University of Texas at Austin, gave a presentation on Americans’ attitudes toward autonomous vehicles. 55 percent of Texans are willing to share rides with no travel delays (for a 5-mile trip), and of those willing to share a trip, the average national willingness-to-pay was 74 cents per trip-mile. 5 percent would be willing to share rides at night.

The survey asked several versions of the ethical “trolley problem,” asking what an autonomous vehicle should do (if anything) if the vehicle were inevitably going to crash into a group of pedestrians. The plurality of Texans (47.6%) stated they would prefer if the vehicle does not change course, no matter what, and must crash into whatever is ahead. In the situation where the autonomous vehicle crashes into other vehicles on the road, a plurality of Texans (38.9%) stated that the crash must occur without any biases toward vehicle type, value, or insurance. Finally, a majority of Texans (59.7%) state that an AV manufacturer should take responsibility for all damages in an unavoidable crash involving an autonomous vehicle.

Anonymization of travel data was important to survey respondents, as well, with 60% of national respondents stating they were willing to pay about \$1 per trip to anonymize their location while using autonomous vehicles. Respondents are uncomfortable with location data being used for advertising purposes. A vast majority (>80%) prefer to use their own vehicle for non-business trips, but that number drops to 40% with autonomous/shared-autonomous vehicles.

Middle-class households strongly preferred shared autonomous vehicles, and children increase household autonomous use by 83%.

e. Public Transportation Network Companies and Cross-Jurisdictional Services

Dr. David Weinreich, a research associate at the University of Texas at Arlington, shared a study on the state of mobility on demand in Texas. Of the entities surveyed as part of the study, the majority of partnerships between TNCs and public entities are to replace service (rather than supplement), and to provide service outside of service boundaries (rather than inside).

Weinreich provided case studies of MOD projects for several regions in Texas. Details on these case studies are listed in his presentation, which can be found at the following link: <https://www.nctcog.org/trans/plan/transit/emerging-transit-trends/mobility-on-demand-working-group>.

f. Q/A, Discussion and Future Topics

1. DCTA is developing a solicitation for various modes of mobility services as a supplement to their existing services. Their RFP is anticipated to be released in January, with an award anticipated by April.
2. NCTCOG is submitting an application to the Access and Mobility Partnership Grant for the Innovative Coordinated Access and Mobility Pilot Program. The grant application will create a regional mobility management program to improve the coordination of transportation services and non-emergency medical transportation services.
3. Federal Transit Administration (FTA) staff announced at the Texas Mobility Summit that FTA is going to issue RFP(s) totaling \$15 million for “Integrated Mobility Initiatives” in the next several months. These initiatives will include: (1) \$8 million for MOD Sandbox 2.0; (2) \$3 million for integrated fare payment technologies; and (3) \$5 million for demonstration of autonomous transportation applications (e.g., autonomous circulators/people movers)

The committee did not recommend topics for the next Mobility on Demand meeting. NCTCOG staff will coordinate content and schedule the next meeting soon.

2. Attendee List

Catholic Charities of Fort Worth: Scott Hurbough

City of Cedar Hill: Dana Woods

City of Fort Worth: Gerald Taylor

City of McKinney: Anthony Cao

Denton County Transportation Authority: Jonah Katz, Mona Pickens, Sarah Martinez

Federal Transit Administration: Melissa Foreman

Irving Holdings: Charlie Johnston, Jack Bewley

NCTCOG: Gypsy Gavia, Jing Xu, Kelli Gregory, Shannon Stevenson, Timothy O’Leary, Travis Liska

Span, Inc.: Laura Joy

STAR Transit: Mike Sims

Trinity Metro: Carla Forman, Phil Dupler

University of Texas at Arlington: Amruta Sakalker, Mehrdad Arabi, Saeed Nargesi, Sina Famili, Steven Reeves



DART Shared Mobility Vision NCTCOG MOD Working Group

**Todd Plesko
Vice President, Planning and
Development**

November 5, 2018



DART'S Shared Mobility Vision



CONTINUOUSLY IMPROVE THE TRANSPORTATION EXPERIENCE

A seamless and user-friendly solution for public and third party mobility transport options with a one-touch payment solution.



EXPAND THE REACH OF PUBLIC TRANSPORT

Lower the cost and expand the reach of public transportation to provide high quality, first and/or last mile services including use of TNC's now and autonomous vehicles when technologically feasible.



ACCESS TO ALL CONSUMERS

Integrate equitable MOD solutions including comparable access for the unbanked, disabled, low income, smartphone challenged customers and typically non-transit customers.

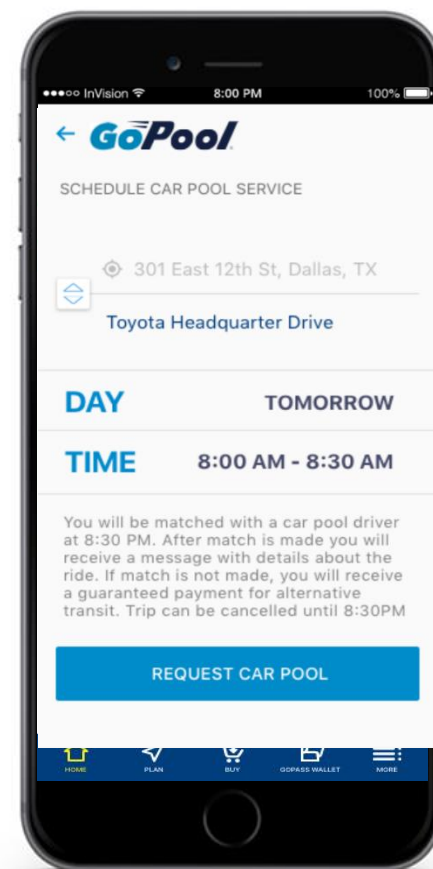
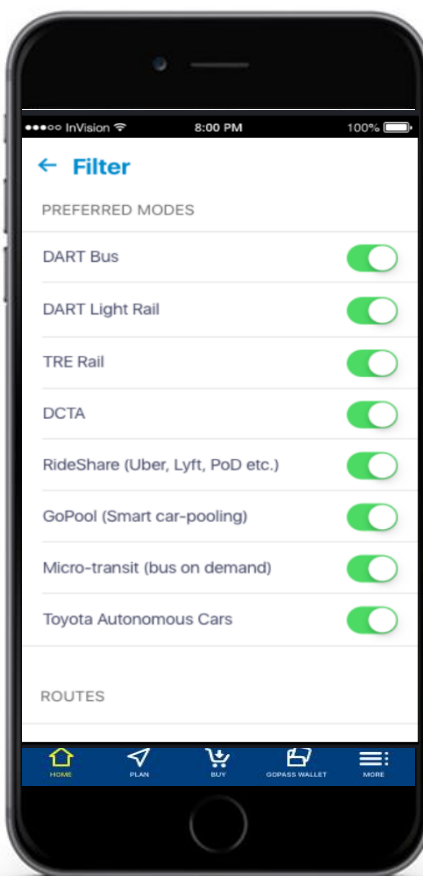
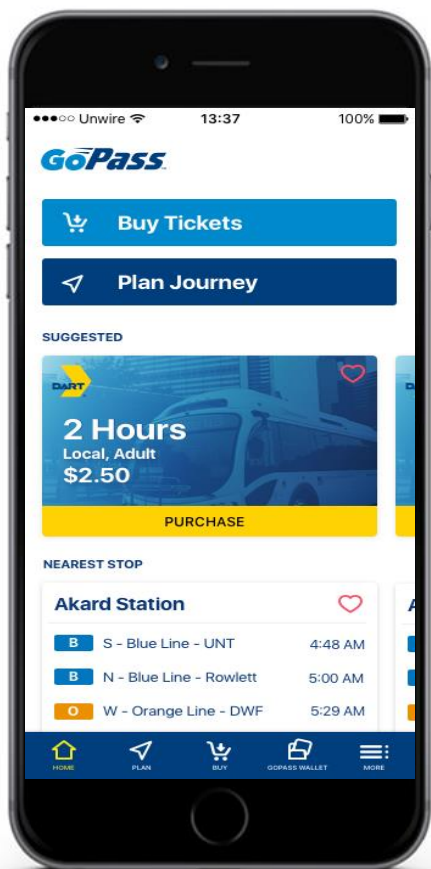
The Last Mile

Increasing transit accessibility

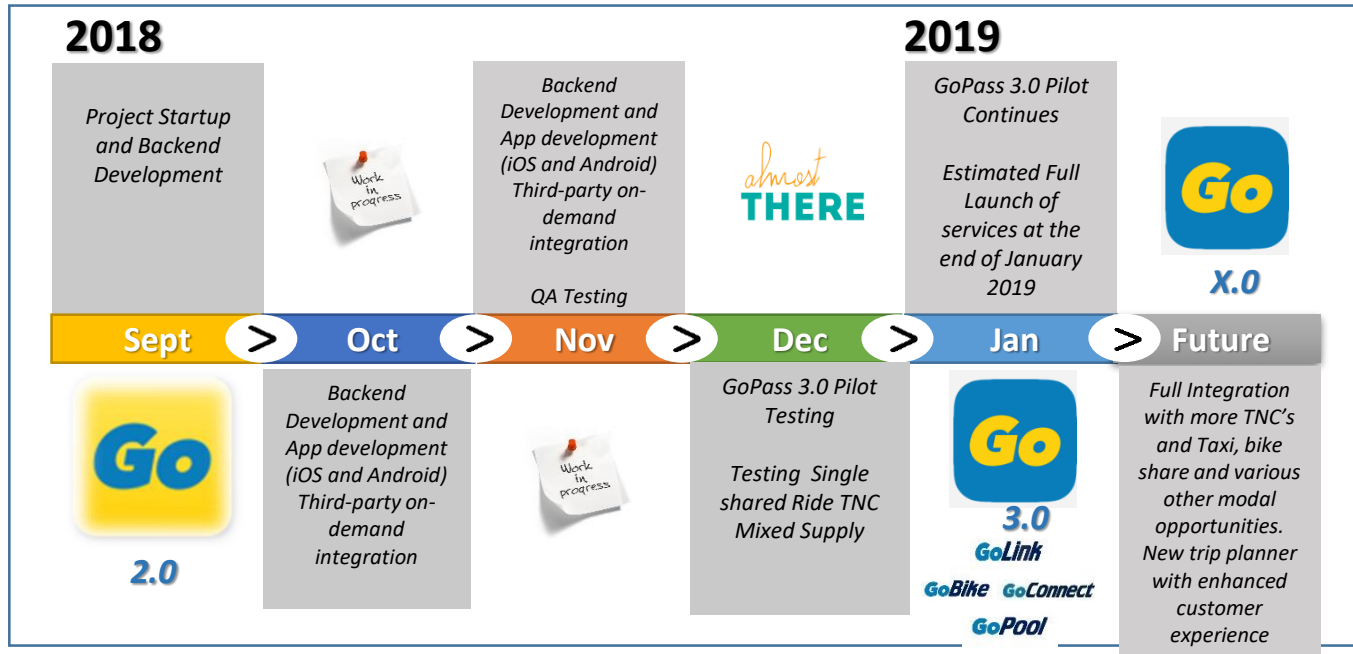


The terms "first mile/last mile" refer to the distance a person must travel to get to or from a transit stop. DART is working with transportation partners to increase the options available to bridge that distance and make riding transit a viable choice for more people.

Simple Idea: Integrated Ticketing, Payment and Mobility Options



GoPass 3.0 Updated Timeline



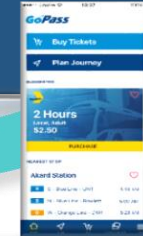
Roadmap

“Go” Platform



Current Deployment Schedule

- ❖ GoPass Tap/App – Mobile Fare-capping
- ❖ GoPass Tap Card – Soft Launch
- ❖ GoPass App – Trip Planning update



Q1 FY19

- ❖ MaaS integration into GoPass 3.0 creating a multimodal experience
 - ❖ GoLink – full
 - ❖ GoPool – full
 - ❖ TNC – app switch
 - ❖ Bike – app switch
 - ❖ Taxi- *pending*
- ❖ GoPass Tap Card – Official Launch
- ❖ GoPass App – Apple Pay

Q2 FY19

- ❖ “Open Payments” – acceptance of contactless credit/debit cards*
- ❖ Paratransit mobile & Tap Card capabilities
- ❖ Paratransit – Travel Ambassador link

**Schedule can be adjusted*

Q3 FY19

- ❖ Account-based integration; “one account” for Tap & App solutions
- ❖ Additional reduced fare acceptance – GoPass App
- ❖ “See something Say something” app integration

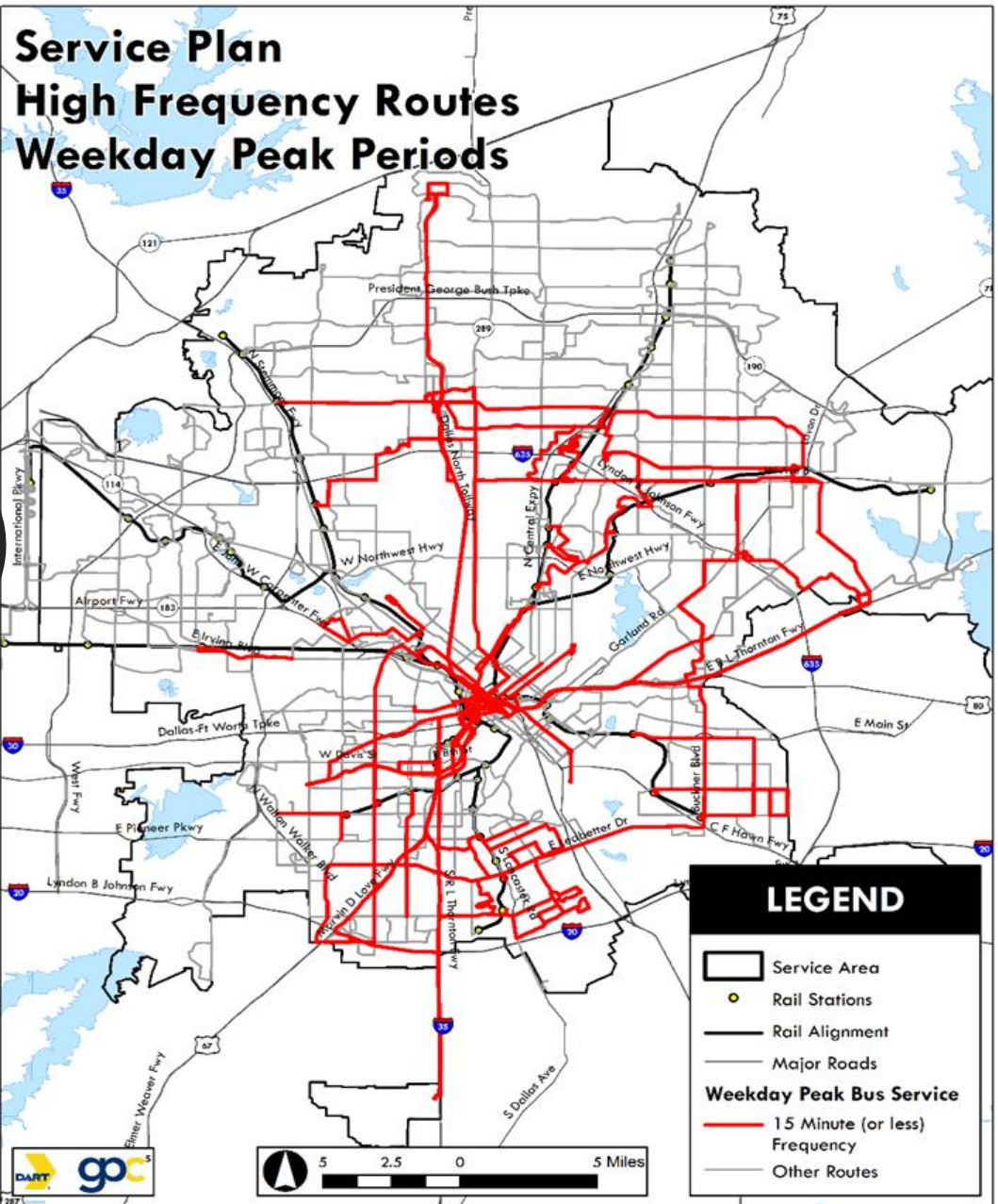
Pending

(no timelines)

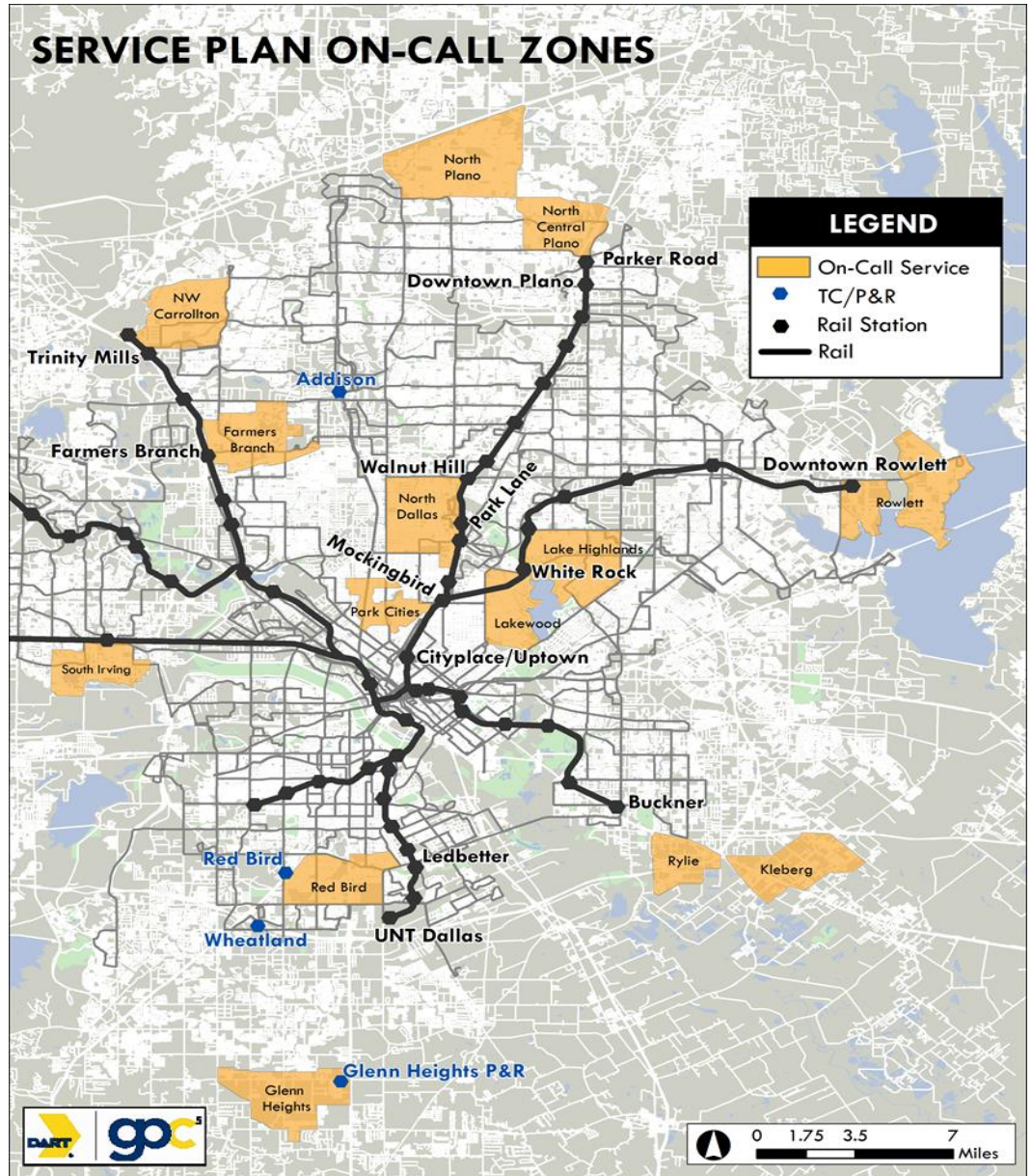
- ❖ Other agency acceptance into the GoPass App & Tap solutions
- ❖ Dallas Streetcar integration into GoPass App & Tap solutions
- ❖ Kiosk app integration for event planning
- ❖ Google & Samsung Pay
- ❖ Paratransit – new contract requirements

Mobility Vision 1

Rail and High Frequency Bus

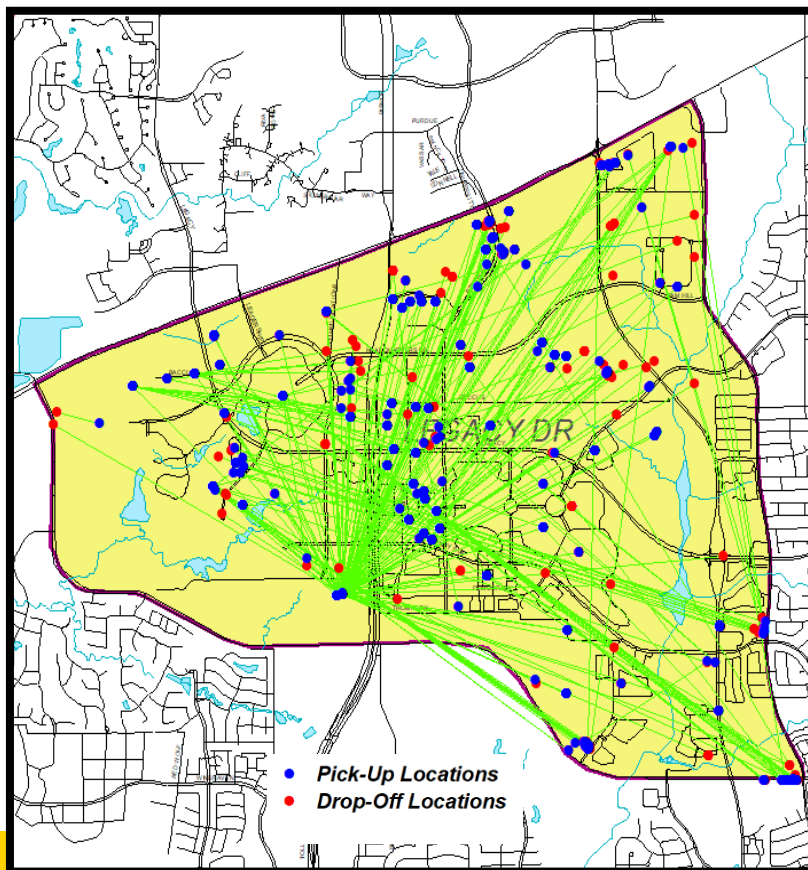


Mobility Vision 2
Shared Mobility
Zones Where
Traditional
Transit Fails

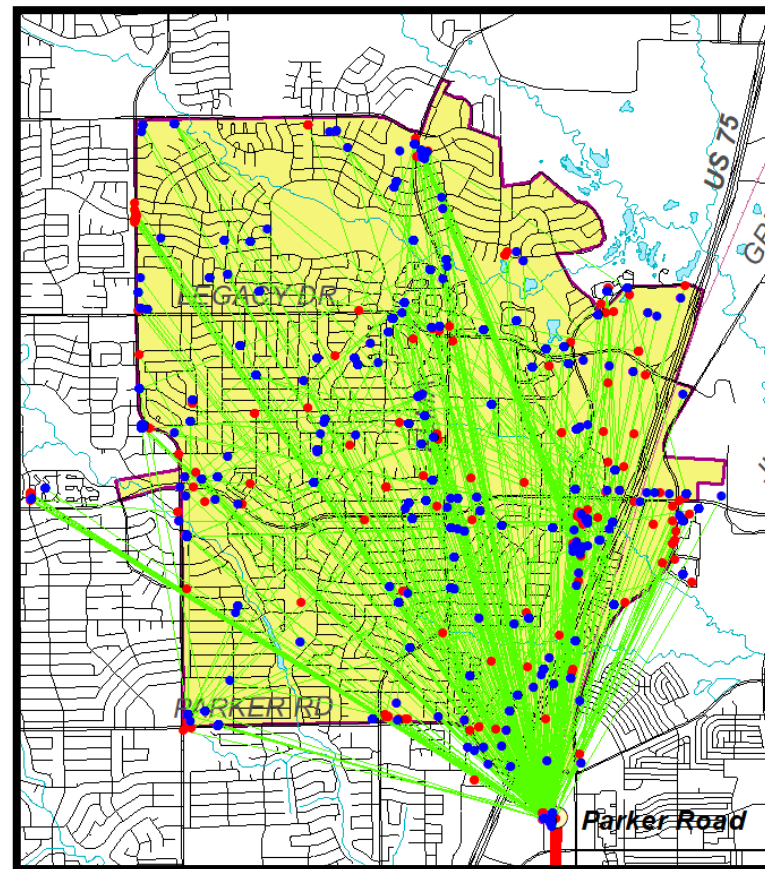


Growing Microtransit Usage in Plan

Legacy

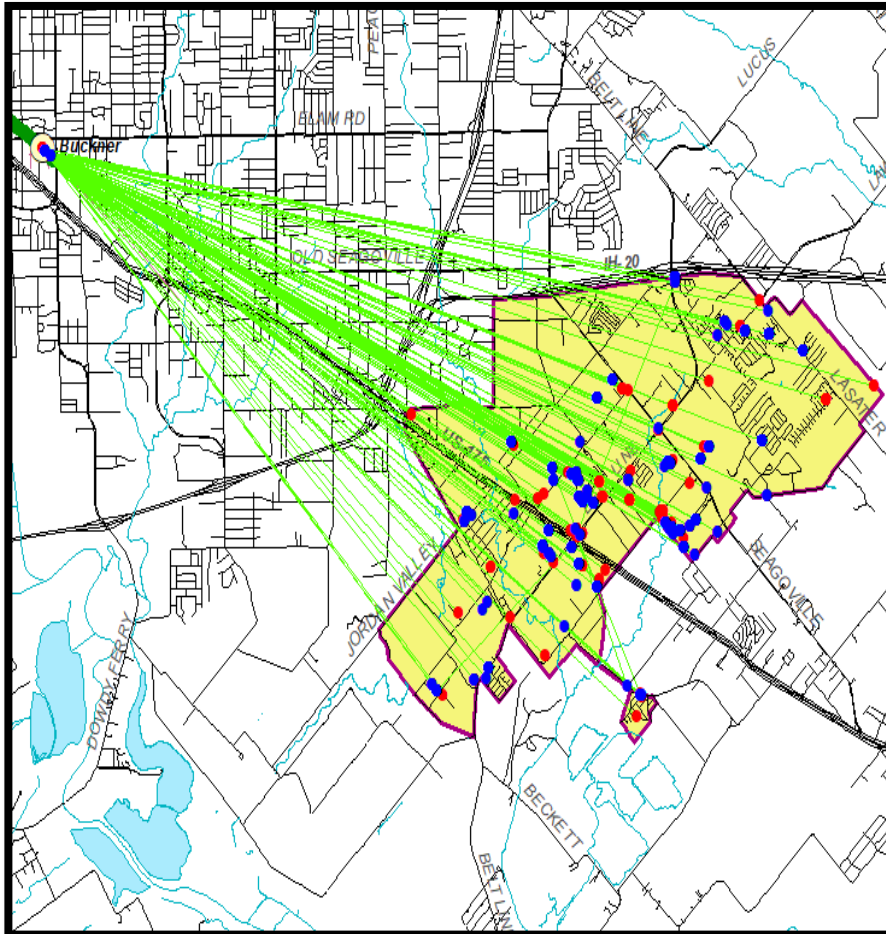


North Central Plano

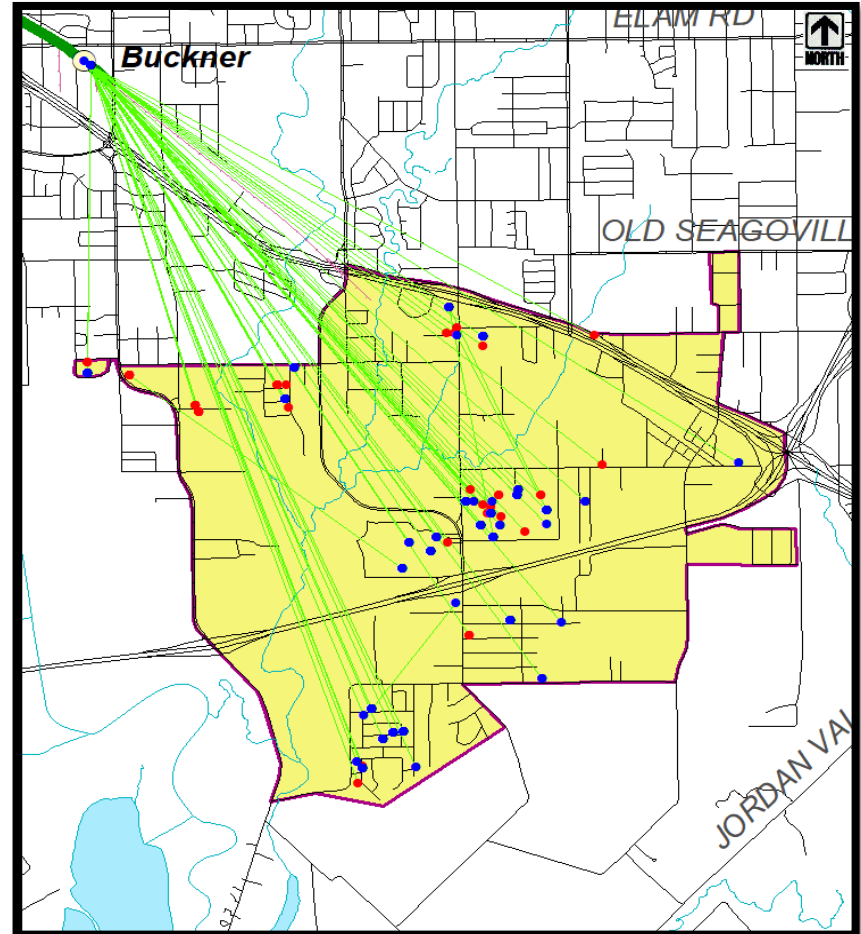


Growing Microtransit Usage in Southern Sector

Kleberg Zone in June 2018



Rylie Zone in June 2018

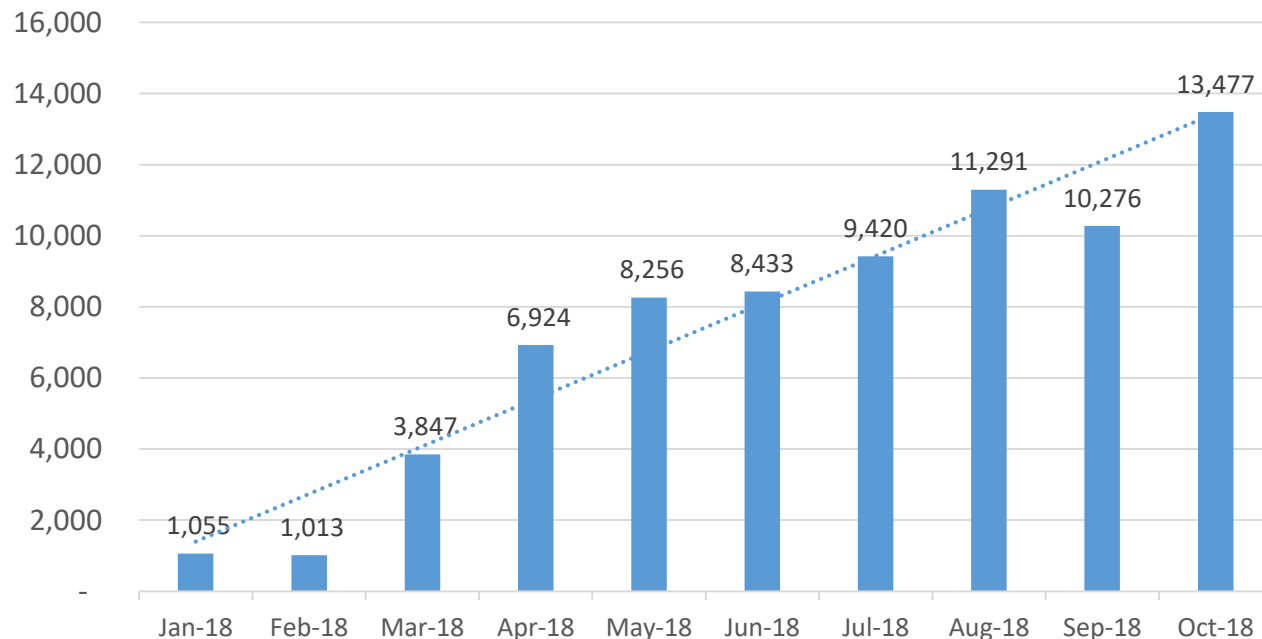


Since DART Initiated GoLink Service Ridership has exploded

Monthly Ridership Results

- Significant ridership increases in areas with service gaps
- Decrease in call volumes due to app usage
- Substantial decline in dispatch activity
- Service provided with 10 minutes of request in all zones

DART Microtransit (GoLink) Monthly Ridership



Is MOD Microtransit Financially Viable?

Not Viable without TNC Style Pricing

Subsidy per rider Legacy
Fixed Route 346 which
was by MicroTransit
\$35



GoLink Subsidy per Rider
\$18.07 In Legacy Zone
\$12.36 in N Central Zone



Shared Ride TNC Subsidy
per Rider in GoLink Zones
\$5.51

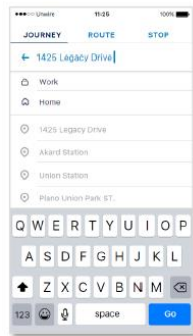


GoLink Supplemented by Shared Ride TNC

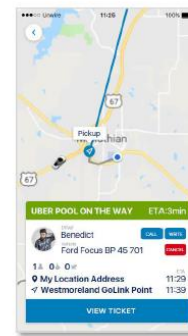
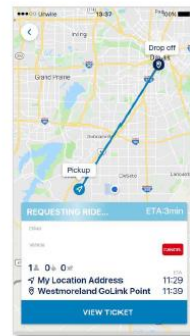
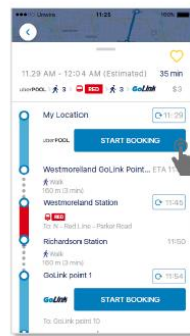


UberPool in GoPass as a mixed supply provider of GoLink

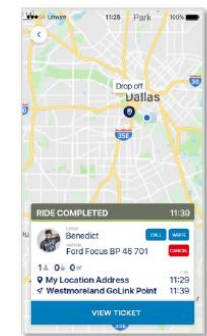
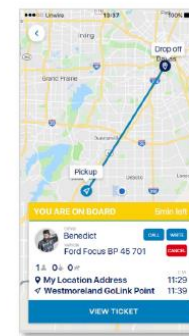
Precondition: The user has planned a journey where the first and last mile can be served by GoLink on-demand services. In this scenario the first mile the micro-transit bus arrival estimate is > 10 mins so the trip is offered to UberPool instead which has a 3 minute estimate.



First mile trip estimate is provided by UberPool instead of GoLink.



When the UberPool is dispatched the driver details are shown to the GoPass user along with the state of the trip.



Regional Challenges

- Can the DFW region afford to build upon multiple APP based solutions?
 - By the end of FY19, DART will have invested over \$2.0 million in MOD technology and over \$3 million in pilot testing.
- Can the platform be used to support other transit systems within the region or does everyone go alone?
- Can the region assist with the continued investment necessary to make the platform achieve all of its objectives for a broader, regional application?

Questions

Todd Plesko
VP Planning & Development
Dallas Area Rapid Transit
214-749-2750
tplesko@DART.org



DART.org

POLICY IMPLICATIONS OF TRANSPORTATION NETWORK COMPANIES

Todd Hansen

Texas A&M Transportation Institute

Mobility on Demand (MOD) Working Group Meeting at NCTCOG
November 5, 2018
Arlington, TX

Overview

Summary of white paper on
policy aspects of TNCs

Published in October 2017

Authors: Maarit Moran, Ben
Ettelman, Gretchen Stoeltje,
Todd Hansen, Ashesh Pant

Policy Implications of Transportation Network
Companies
Final Report

PRC 17-70 F



TNC Policy in Texas

HB 1733 (Jan 2016)

- Requires TNC drivers to have primary automobile insurance that allows them to operate as TNC drivers.

HB 100 (May 2017)

- Statewide regulatory framework for TNCs
- Requires a TNC permit, operational requirements, driver and vehicle standards, and passenger protections
- Nullified all local TNC regulations and by establishing one set of statewide regulations

8 Priority Policy Issues

Are TNCs Considered Motor Carriers in the Texas Transportation Code?

State Preemption of Local TNC Authority

TNCs and Impaired Driving

Concerns with Driver Background Checks

Maintaining Public Safety

Equity and Accessibility Considerations

Data Sharing

TNC and Transit Partnerships



Are TNCs Considered Motor Carriers in the Texas Transportation Code?

- TNCs and TNC drivers offer commercial transportation services that have similarities to commercial motor carrier activities.
- A TNC is probably not considered a motor carrier under Texas Transportation Code because TNCs are explicitly defined to not “control” TNC drivers.
- Texas Insurance Code conforms more closely to the definition of a motor carrier in due to the driver’s role in operating the vehicle.
- HB 100 states, “Transportation network companies and drivers logged in to the company’s digital network are not common carriers, contract carriers, or motor carriers

State Preemption of Local TNC Authority

- HB 100 explicitly overrules, or preempts, existing TNC ordinances and prohibits local authority from regulating TNCs.
- Preemption is a term for the use of state statutory or constitutional law to supersede or nullify a municipal ordinance or authority.
- Lawmakers support statewide TNC legislation preempting local ordinances because it is expected to reduce barriers to TNC operations and enable expansion to more areas of the state.
- A majority of state legislation includes preemption of the local authority to regulate, tax, or impose rules on TNCs.

TNCs and Impaired Driving



- Proponents argue that TNC services offer a safe transportation option for individuals who have been drinking.
- Formal research lacks data to attribute reductions in impaired driving and improved safety to any one factor, such as TNC services.
- Several studies find correlations between TNC activity and impaired-driving activity but cannot conclusively conclude that TNCs are directly responsible for these trends.
- Additional research is needed to link TNC ridership data to impaired-driving outcomes.

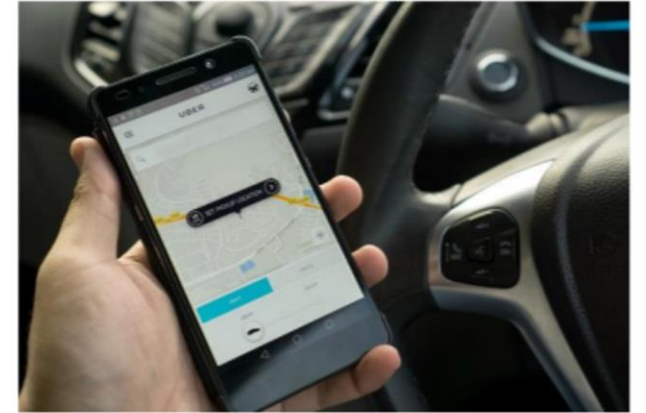
Concerns with Driver Background Checks

- Public discourse about TNC background checks has focused on the relative merits of fingerprint-based background check versus name-based check (preferred by some TNCs).
- Most states require TNCs to have background checks conducted for TNC drivers before or within a specified time window to be allowed to drive.
- State TNC legislation varies in terms of who conducts the background check, what databases are reviewed, and what disqualifies a driver from work eligibility.
- No state law currently requires fingerprint-based background checks for TNC drivers.

Maintaining Public Safety

- TNC technologies provide safety features including driver and vehicle identification info, tracking and sharing the route, and collecting feedback and ratings for each trip.
- A 2016 study found TNC drivers drive more safely than average drivers, based on attributes such as speeding, aggressive driving, phone use, and hard braking.
- State legislation frequently includes driver age minimums, cash payments, vehicle inspections, driver training, and limits on driver hours
- Some policies may have other costs that can be weighed against perceived safety benefits (ex. digital credit card payments)

Equity and Accessibility Considerations



- Existing questions about whether TNC services are accessible to transportation-disadvantaged groups (older adults, low-income, persons with disabilities, rural areas, etc.)
- Limited information available suggests that TNCs primarily serve users who have higher incomes in urban areas.
- Features likely improving equity a reduction of rider rejections due to user traits and destinations being unknown before the trip
- Features creating inequity include requirements to have credit cards or use smartphones as well as unequal availability of wheelchair accessible vehicles

Data Sharing

- The National Association of City Transportation Officials provides guidelines in on how data-sharing standards can improve policy making and transportation planning.
- Guideline areas include better data for transportation planning, equitable access to mobility options, and better tools for safety in order to identify design issues.
- Many states have basic data retention requirements for TNCs to retain driver and trip records for one or more years, but do not typically include a more involved data-sharing agreement.
- Some states allow regulators to audit these records in the case of a crash or violation.

TNC and Transit Partnerships

- Transit agencies across the country have been exploring partnership opportunities with TNCs and tech companies.
- Partnerships may focus on technology integration, data sharing, first-mile/last-mile service connections, gap service, microtransit, carpooling, promotional fares, paratransit services, etc.
- Challenges exist in funding and regulatory frameworks for transit agencies, including liability, insurance, driver training concerns, and nondiscrimination and accessibility policies.
- Solutions are needed for longer-term funding of partnerships and clarification on how TNCs fit into FTA requirements.

Future Policy Considerations

TNC and Taxi Regulation Harmonization

TNCs and Automated Vehicles

Effects of TNC Policy on Future Market Activity



Questions?

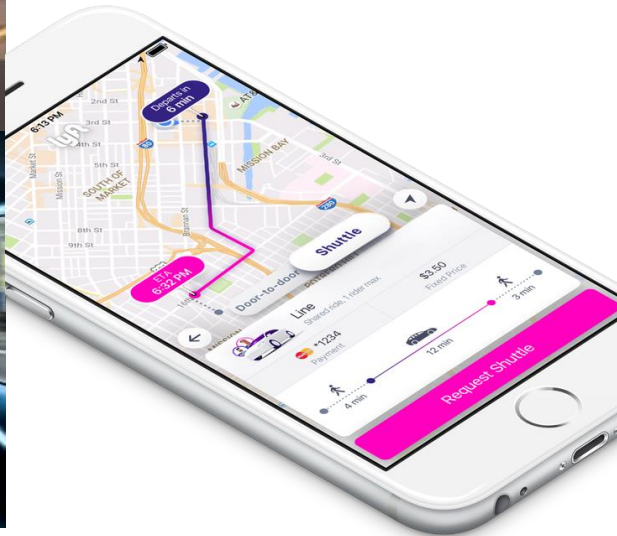
Final Report: <https://static.tti.tamu.edu/tti.tamu.edu/documents/PRC-17-70-F.pdf>



Todd Hansen, AICP
Assistant Research Scientist
Transit Mobility Program
713-613-9205
t-hansen@tti.tamu.edu



Americans' **AV** Preferences: **Dynamic Ride-Sharing, Privacy & Long-Distance Mode Choices**



Dr. Kara Kockelman & Krishna Murthy Gurumurthy

Survey Stats.

- ❑ **2,588 Americans** answered **70-questions**.
- ❑ **1,258 responses** from **Texas**.
- ❑ Each response **weighted** to match **U.S. demographics**.
- ❑ **Weighted summary:**

Wtd. Sample Demographics	Mean	SD	Min	Max
Age (in yrs)	46.0 yrs	16.34	21	70
Gender (Male)	48.6 %	-	0	1
Employed Full-Time	37.6 %	-	0	1
Bachelor's Degree Holder	17.6 %	-	0	1
U.S. License Holder	89.8 %	24.86 %	0	1
Driving Disability	7.9 %	-	0	1
HH Size	2.33 persons	1.05	1	11
HH Annual Income	\$70.3k	\$47.2k	\$5k	\$250k
# Workers in HH	1.15 workers	0.951	0	5
# Children in HH	0.54 children	0.917	0	9
# Vehicles in HH	1.75 vehicles	0.960	0	6

Screening Q's

SE *Self-Driving Automation:* The vehicle is designed to perform all driving functions for the entire trip.
... This design anticipates that the driver will provide the destination or navigation input, but the **driver**

Shared Autonomous Vehicle Fleets: A fleet of self-driving vehicles, which can be shared among people in a city or region, will be referred to as a 'Shared Autonomous Vehicle Fleet' or '**SAVs**' in this survey. This shared self-driving fleet service can be used by people **paying on a per-mile basis**.

Q2. **SAVs** will allow people to...

... **reduce up-front vehicle ownership costs.**

... travel as usual, but **pay on a per-mile basis.**

Both of the above.

None of the above.

... vehicles that **can perform all driving functions** for the entire trip, but **need the driver's attention.**

... vehicles that **can perform all driving functions** for the entire trip, **regardless** of the availability of a **driver.**

Ride-sharing & WTP

- ❑ Only **63% Americans** & **55% Texans** may be willing to share their ride with **no travel delays** (for a 5-mile trip) during the day.
- ❑ These %'s dropped to **25%** & **30%** for **15-minute** travel delays & **<10%** for **30-minute** or higher delays.
- ❑ National average of **WTP** was **74¢** per trip-mile for all respondents **willing to share rides** irrespective of **travel delays**.
- ❑ **Very few Americans** willing to share rides **at night (<5%)**.
- ❑ But those willing to share show **long duration: 40 min** (day & night).
- ❑ **Another 8%** want to opt in if the **stranger** in the shared ride is **pre-checked** for a **criminal record**.
- ❑ **Location broadcasting** services seem to encourage up to **15% more** Americans to share their ride.

Crash Ethics

Crash Scenario & Responsibility	Most preferred outcome/choice	Next preferred outcome/choice
AVs inevitably crash into a group of pedestrians		
AVs inevitably crash into other vehicles on the road		
Who is responsible for all damages in an unavoidable crash involving an AV ?		

Privacy Concerns & Long-distance (LD) Impacts

- ❑ **89%** respondents have at least **some privacy concerns**.
- ❑ Americans (**~60%**) are **WTPay ~\$1 per trip** to **anonymize** their **location** while using **AVs & SAVs**.
- ❑ **Comfortable** with location data being used for **Managing traffic & forecasting travel conditions (53.5%)**, **Policing activities (53.7%)**, & **Community surveillance (46.8%)**.
- ❑ **Uncomfortable** with location data used for directed **advertising (60.4%)**.
- ❑ **>80%** of Americans **prefer** to use **own household vehicle** for a **non-business trip < 500 miles**.
- ❑ Introduction of **AVs & SAVs** drops this use to **40%**.
- ❑ **AVs & SAVs** enjoy a **combined mode-share** of **50%** for **business trips under 500 miles**.

WTP for **Dynamic Ride-Sharing:** Model Estimation

- ❑ % Respondents **not WTP** to share rides was **high: 47%** (even if only **5 min added**)
- ❑ Cragg's Hurdle (2-stage) model:
 - ❑ Selection variable captures **binary willingness** to share ride.
 - ❑ **Exponential regression** estimates the **\$ WTP**.
- ❑ **Heteroscedasticity** was allowed as **function of age**.

Binary Selection Model (WTP > \$0 or Not)		
Independent Variables	Coefficients	T-stat
Constant	1.14	4.86
Time added to the shared ride (in minutes)	-0.04	-13.80
Worker present in the household?	-0.30	-2.61
Age (in years)	-0.01	-3.83
Have U.S. driver's license ?	-0.47	-2.59
HH's income between \$75k & \$125k ?	0.36	3.22
Has attended some college ?	0.26	2.14
Population density (per square mile)	-0.3E-4	-2.99
Employment density (per square mile)	0.5E-4	3.08
Exponential Regression Model		
Independent Variables	Coefficients	T-stat
Constant	-0.68	-4.82
Age (in years)	0.01	3.13
Has attended some college ?	-0.21	-2.66
Functional Variables for Heteroscedasticity		
Age (in years): Exponential model	-0.01	-8.00
Fit statistics		
Pseudo R-square	0.7034	
# Observations & # Respondents	12,940 (2,588)	

Practical Impacts in WTP for DRS

- Practical significance obtained by **studying % change** in WTP values after **changing X values** of an **average American**.
- If **age increases**, **26% less** WTP for DRS may be observed.
- Lack** of **driver's license** associated with **38% higher** WTP.
- 1 std. dev. higher jobs** density comes with **21% rise** in WTP.
- Higher household income** comes with **rise** in WTP.

Independent Variables		% Change in WTP
Worker present in the household?	Y	+19.6%
	N	-7.8%
Age of respondent (in years)	+1SD	-26.9%
	-1SD	+18.1%
Have U.S. driver's license?	Y	-4.7%
	N	+38.2%
Household income between \$75k & \$125k?	Y	+26.1%
	N	-6.6%
Has attended some college?	Y	+6.7%
	N	-10.0%
Population density (per sq mile)	+1SD	-19.5%
	-1SD	+10.5%
Employment density (per sq mile)	+1SD	+21.6%
	-1SD	-5.9%

WTP for **Anonymization** of **Trip Ends**: Model Estimation

- ❑ Cragg's **Hurdle** (two-part) model
- ❑ **Heteroscedasticity** as **function of age**.
- ❑ Many **variables** significant.
- ❑ **Men** less willing to anonymize trip ends, on average.
- ❑ **Older** people typ. willing to **pay less**.
- ❑ **Privacy concerns** increase **WTP**.

Binary Selection Model (WTP > \$0 or Not)		
<i>Independent Variables</i>	<i>Coef.</i>	<i>T-stat</i>
Constant	-0.40	-1.61
Exponential Regression Model		
<i>Independent Variables</i>	<i>Coef.</i>	<i>T-stat</i>
Constant	-0.86	-7.23
Age of respondent (in years)	-0.4E-2	-3.24
Have U.S. driver's license?	0.26	3.72
Caucasian?	-0.14	-3.10
Household has 2 or less children?	0.48	6.11
Household income: < \$20,000	0.23	2.45
Or < \$30,000	0.52	5.20
Or < \$40,000	0.39	3.67
Or < \$50,000	0.18	1.77
Or < \$60,000	0.08	0.72
Or < \$75,000	0.41	4.07
Or < \$100,000	0.38	3.94
Or < \$125,000	0.38	3.60
Or < \$150,000	0.36	3.22
Or < \$200,000	0.54	4.52
Or > \$200,000	0.06	0.56
Population density (per square mile)	-0.2E-4	-3.13
Employment density (per square mile)	0.1E-4	2.48
Variables with Heteroscedasticity		
Age of respondent (in years): Exponential model	-0.6E-2	-16.62
Fit statistics		
Pseudo R-square	0.6140	
Or > \$200,000	0.70	4.06

Practical Effects in WTP to Anonymize

- Obtained by **studying % change** in values by **changing 1 attribute** of an **avg. person**.
- All % changes in WTP negative**.
- Lack of HH vehicle reduces WTP (-56%)**.
- Old people less willing to pay (-56%)**.
- Negative sensitivities** for all predictors.
- Lack of WTPay in the future to anonymize trip ends**.

Independent Variables	% Change in WTP
HH Income: < \$20,000	WTP -21.0%
Or No disability? \$30,000	Y: -35.1%
Or < \$40,000	-42.5%
Or < \$50,000	-40.0%
Or < \$60,000	-42.3%
Or < \$75,000?	-32.8%
Or < \$100,000?	-30.2%
Or HH size equal to 1?	-36.2%
Or equal to 2?	-30.3%
Or < \$150,000	-43.7%
Or equal to 3?	-26.5%
Or < \$200,000	-31.9%
Or equal to 4+?	-40.2%
Or HH workers equal to 0?	-29.7%
Have U.S. driver's license?	Y: -34.0%
	N: -39.1%
Caucasian?	Y: -35.2%
	N: -48.7%
Age of respondent (in years)	+1SD: -55.8%
	-1SD: -36.5%
Population density (per sq. mi)	+1SD: -15.0%
	-1SD: -30.0%
Is Male?	Y: -40.0%
Employment density (per sq. mi)	+1SD: -22.4%
	-1SD: -34.4%

Long-Distance (LD) Mode Choice

- ❑ **Practical impact** studied using **multinomial logit**.
- ❑ **SAVs** focused on **business** trips (+**67%** share).
- ❑ **HHs** with more **Workers** prefer private **AVs** (+**50%**).
- ❑ **Non-owners** of **cars** prefer SAV for LD Trip (+**43%**).

Independent Variables	Change in Mode Share		
	AVs	SAVs	Airplane
Trip Type – Personal?	+3.8%	-25.0%	-7.2%
– Business ?	-22.2%	+67.4%	+11.9%
– Recreation?	-5.0%	-16.4%	+1.4%
Distance : 100 – 500 miles	+19.5%	+24.5%	-38.7%
> 500 miles	-18.6%	-22.6%	+37.3%
HH owns 0 vehicles ?	+43.6%	-10.4%	-18.8%
1 vehicle?	+2.1%	-31.0%	+12.2%
2 vehicles?	-15.4%	+1.8%	+4.8%
3 vehicles?	+14.3%	+51.7%	-18.3%
4+ vehicles?	+22.6%	+51.8%	-37.6%
HH size equal to 1?	-8.9%	+8.4%	+11.7%
equal to 2?	+33.4%	+22.2%	-27.2%
equal to 3?	-14.9%	-13.8%	+14.1%
equal to 4+?	-22.7%	-20.2%	+10.6%
HH workers equal to 0?	+0.6%	+33.7%	+9.0%
equal to 1?	+6.2%	-11.9%	-17.9%
equal to 2?	-10.8%	+11.7%	+14.8%
equal to 3?	+2.0%	-37.3%	-12.8%
equal to 4+?	+50.3%	-44.9%	-6.8%
Age of respondent (in years)	+1SD: -10.5%	-11.8%	-8.0%
	-1SD: +9.5%	-8.0%	+4.6%
Have U.S. driver's license ?	Y: -5.5%	-3.5%	-0.2%
	N: +57.9%	+50.7%	-7.4%

LD Mode Choice (2)

- ❑ **Middle-class** households strongly prefer **SAVs** - with **196%** higher mode share!
- ❑ **Children increase** household use of **AVs 83%** & lower **airplane** use **39%**.
- ❑ Those in **wealthy HHs** may continue to **fly** (+**44%**).
- ❑ **Singles** may not own **AVs** (with **40%** lower probability for LD trips).

Independent Variables	% Change in Mode Share		
	AVs	SAVs	Airplane
Caucasian?	Y: +5.9%	-22.5%	-8.8%
	N: -6.3%	+32.3%	+14.0%
No child in HH	-17.7%	-23.6%	+19.8%
Children in the HH: 1 child?	+23.7%	+65.7%	-39.4%
2 children?	+64.1%	+23.5%	-43.5%
3 children?	+84.0%	+38.4%	-39.4%
4+ children?	-31.9%	+36.7%	-14.4%
HH Income... < \$20,000	+14.6%	-53.1%	-29.4%
Or < \$30,000	+23.2%	+56.7%	-55.0%
Or < \$40,000	-4.0%	+45.4%	-32.7%
Or < \$50,000	-32.3%	-32.0%	+6.7%
Or < \$60,000	+23.4%	+196.6%	-44.6%
Or < \$75,000	+22.2%	-77.6%	+6.7%
Or < \$100,000	-23.5%	+44.5%	+17.4%
Or < \$125,000	-5.8%	+6.8%	+30.0%
Or < \$150,000	-4.6%	-51.5%	+45.2%
Or < \$200,000	+5.6%	-76.2%	+43.5%
Or > \$200,000	-8.9%	-61.9%	+44.3%
Has attended some college ?	Y: -3.1%	+13.5%	+7.8%
	N: +9.9%	-27.2%	-16.7%
Currently working ?	Y: +54.9%	+13.3%	-8.2%
	N: -8.9%	-8.1%	+0.6%
Single ?	Y: -40.3%	-7.5%	+21.7%
	N: +22.0%	-0.5%	-16.2%
Pop. density (per sq. mi)	+1SD: -5.4%	+20.6%	+10.1%
	-1SD: +1.3%	-7.3%	-5.0%
Employment density (per sq. mil)	+1SD: -1.8%	-15.7%	-9.4%
	-1SD: -0.5%	+9.1%	+2.1%

Key Results

- ❑ **Current U.S. perceptions** of **ride-sharing** in an **automated future** are **cautious**.
- ❑ **Ride-sharing** **expected to increase**, with **Millennials** opting in, alongside their anticipated **income increases**.
- ❑ **Privacy** is a **concern now** (**WTPay** ~\$1 to anonymize each trip).
- ❑ But, in the **future**, **anonymization may not be necessary**.
- ❑ **Most long-distance business** trips may be made in **SAVs**.
- ❑ **Flying** may still be **avored by older people & families with no children**.
- ❑ **Evolving** perceptions warrant **continuing survey** effort.

Thank you!
Questions & Suggestions?



30 CAV papers & reports
at [www.caee.utexas.edu](http://www.caee.utexas.edu/prof/kockelman)
prof/kockelman



Transit in Flex: State of MOD in Texas

David Weinreich

Amruta Sakalker

Matt Reeves

November 5, 2018



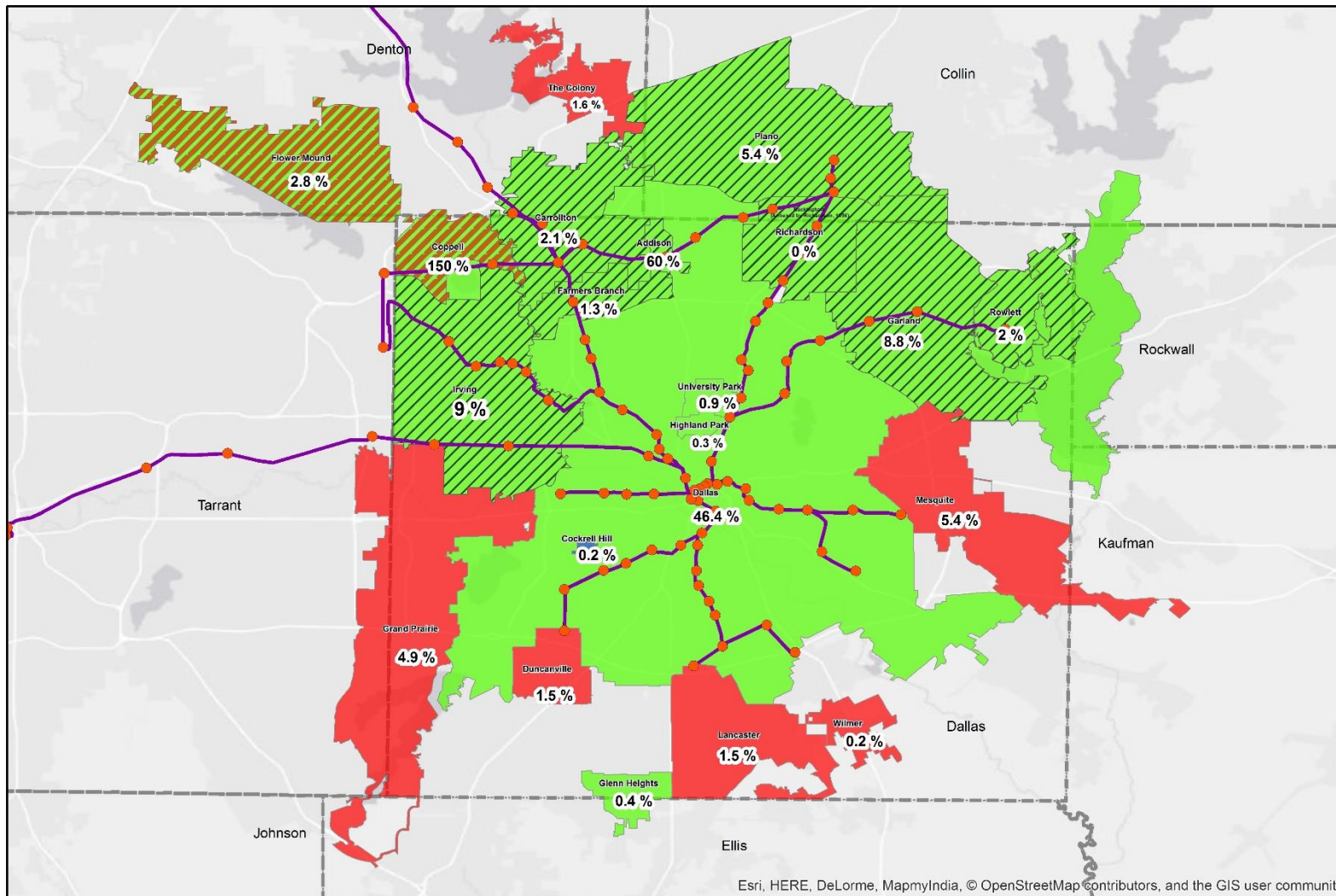
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Esri, HERE, DeLorme, MapmyIndia, © OpenStreetMap contributors, and the GIS user community

Joined in 1983	Never Joined	Rejected Referendum to Withdraw	2030 Rail System
Joined in 1988	Exited in 1989	County boundaries	2030 Rail Stops

4.9% Percentage of Population 2016

0 2.75 5.5 11 16.5 22 Miles

DART Membership
From 1983 to Present

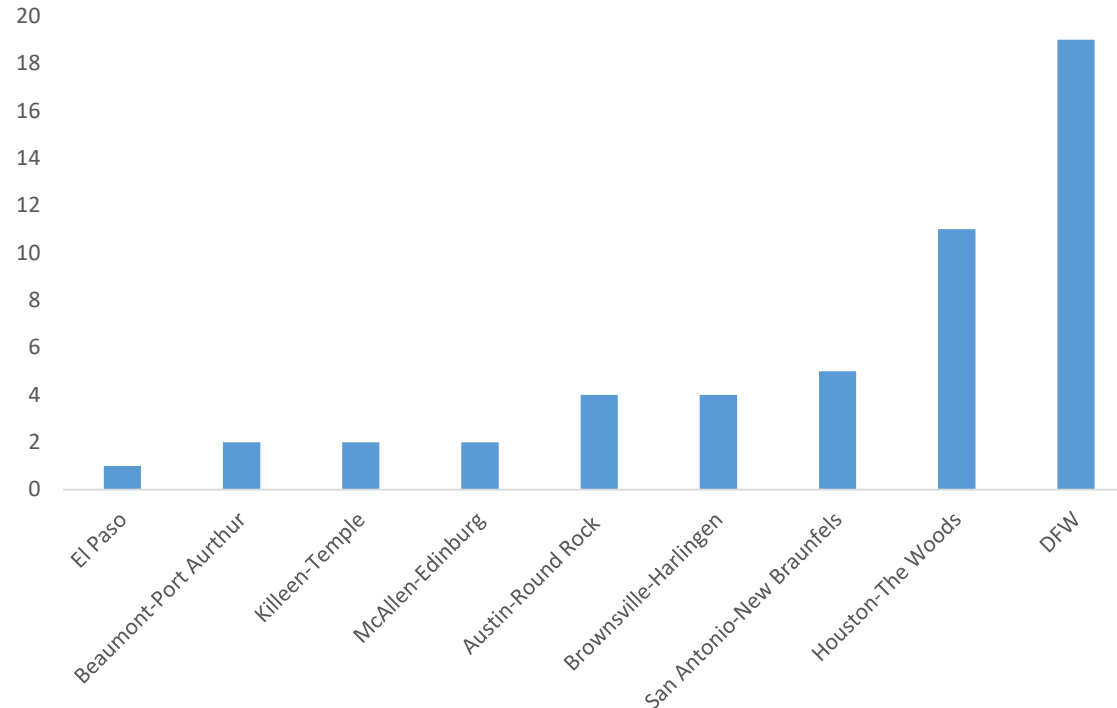
Source: DART History and Texas Association of Counties-2017

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Descriptive Data



- Survey Population: 2,997, from Texas Municipal League list, Counties, MPOs, Transit Providers
- Responses: 353
- 333 completed survey
- Indicated on-demand service: 90
- Indicated app-based, on-demand service: 23
- Most cases were paratransit, rural, or suburban. Few urban.

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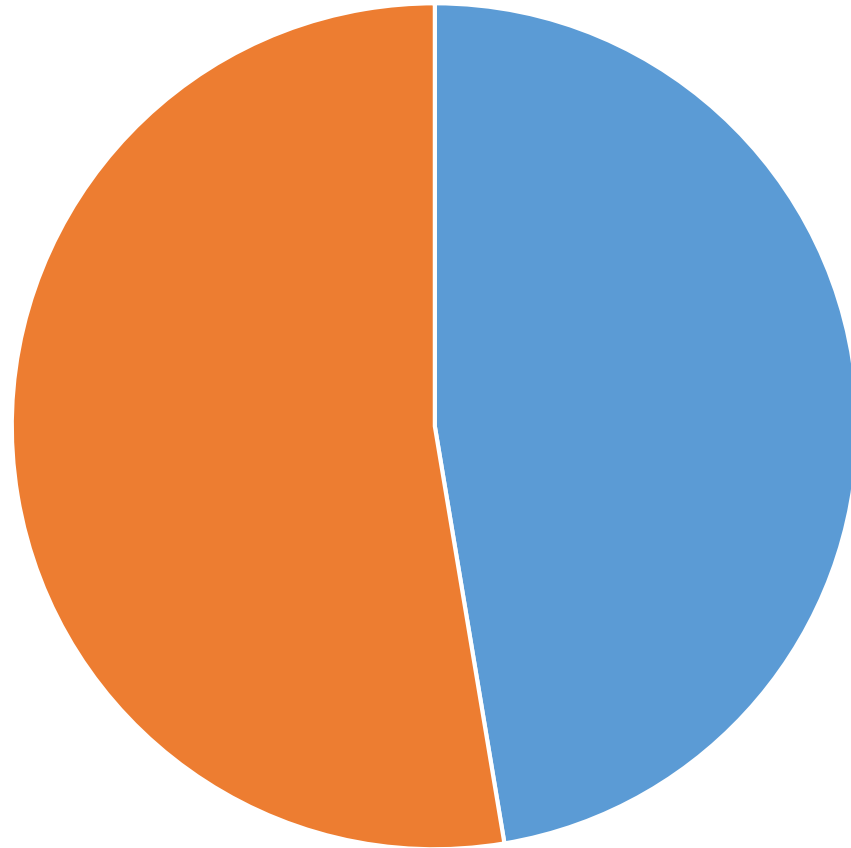


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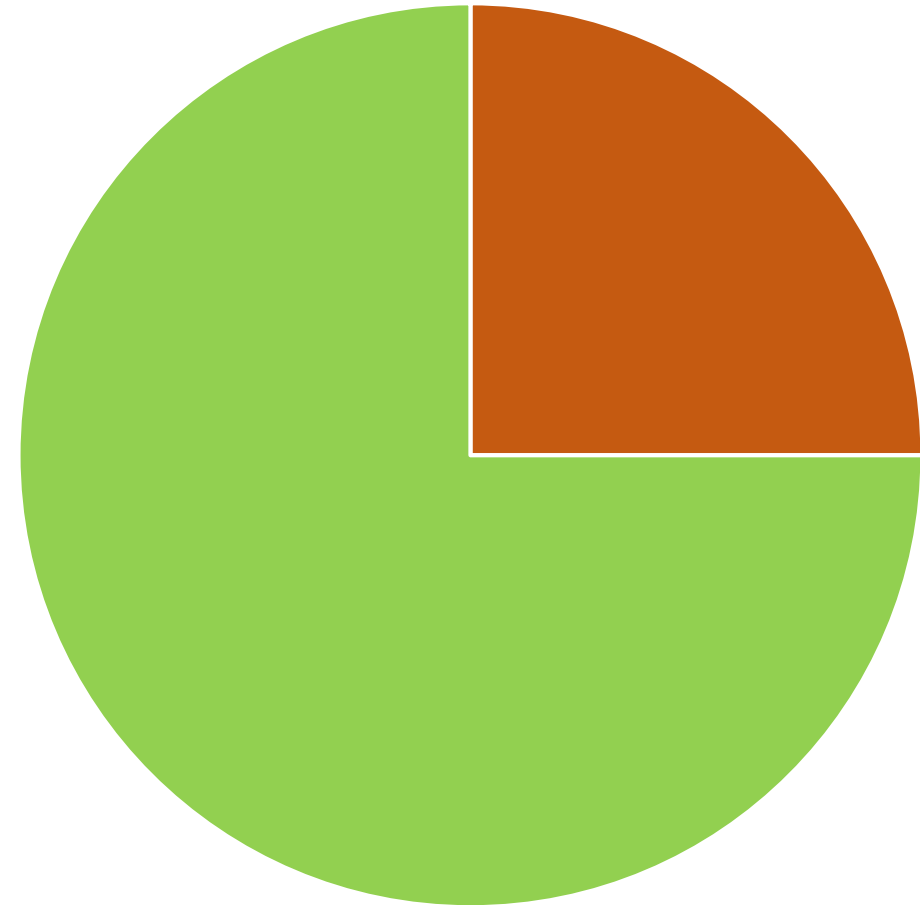


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Other Service Characteristics

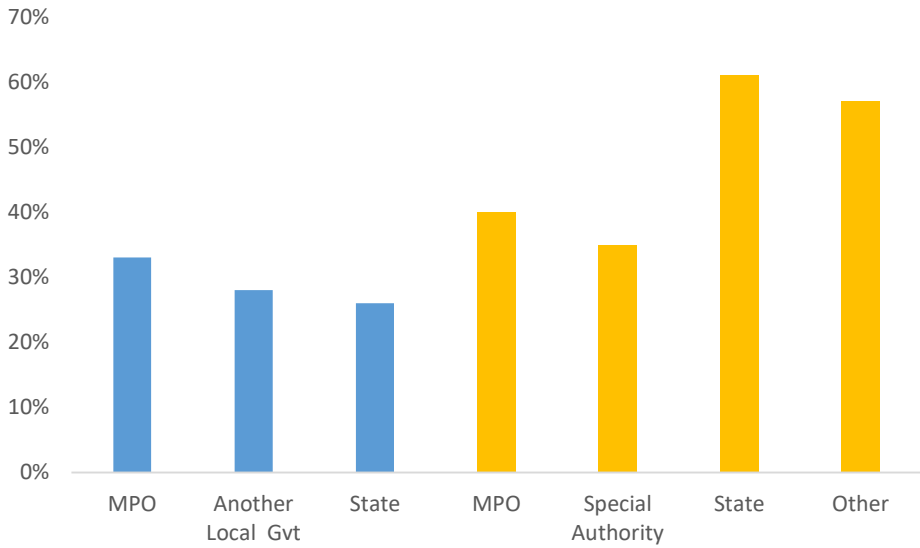


■ Supplement ■ Replacement



■ Inside Boundaries ■ Outside Boundaries

Sources of Support



*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.

Potential for Interagency Cooperation

- Strong *willingness* to cooperate
 - Shared Equipment
 - Shared Facilities
 - Not as much so for integrated fare payment
- Federal & state programs
 - 5310 program: vulnerable communities
 - 5311 program: rural transit
 - 5316: remaining JARC funds
 - Renewal of Sandbox program or



Case Study: Denton



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DCTA has 4 app-based on-demand services

Multi-jurisdictional services:

- Highland Village Lyft Zone
- Alliance Link

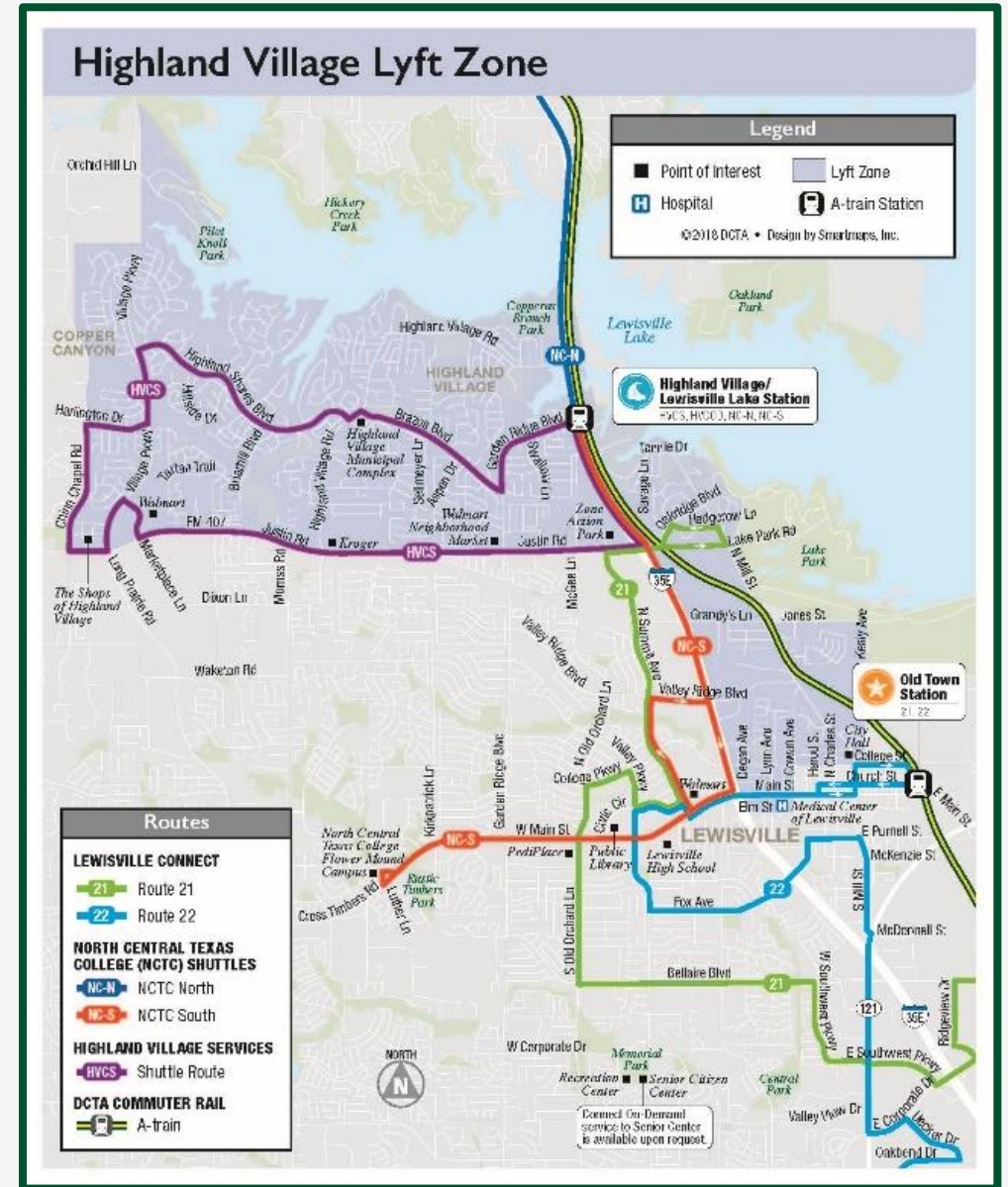
Single jurisdictional services:

- Denton Airport Enterprise Zone
- UNT Lyft Program

DCTA Denton County Transportation Authority

Highland Village Lyft Zone:

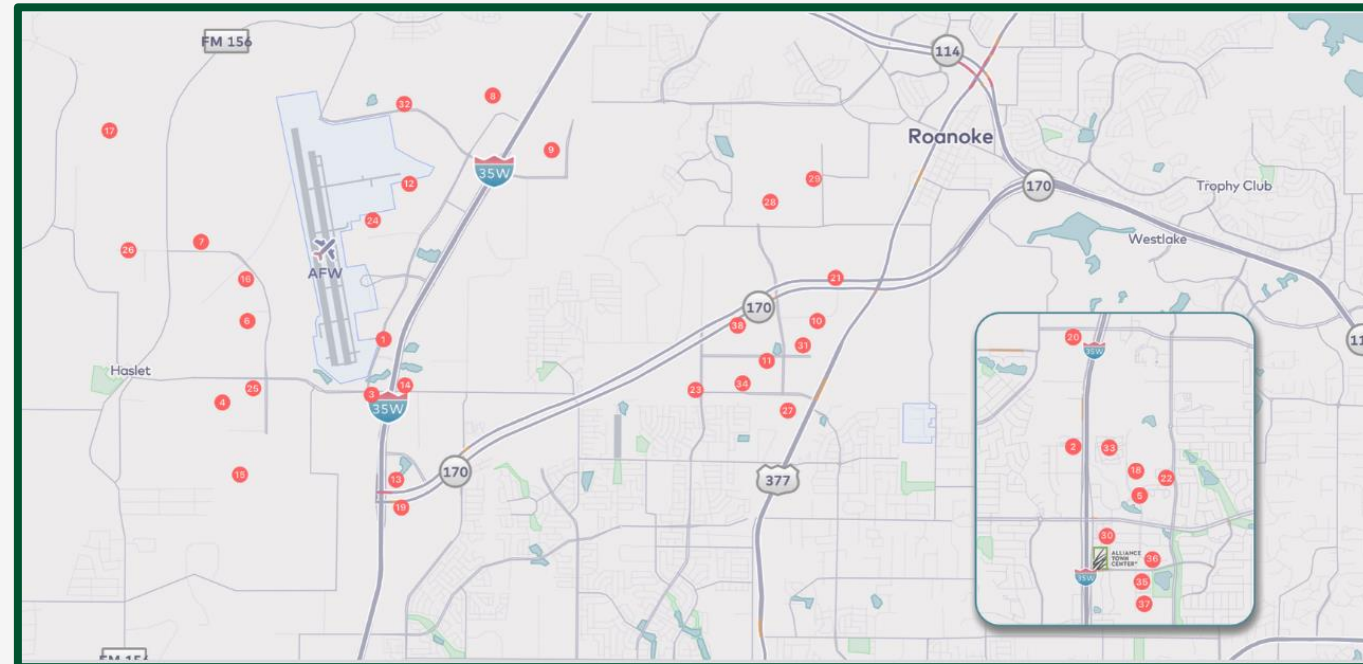
- The service is within the DCTA jurisdiction, within Denton County but crosses municipal boundaries of Highland Village and Lewisville
- The program is governed by the DCTA in coordination with the two cities
- **Coordination**
 - Both fares have to be paid separately. Lyft discounts are separate from DCTA fixed routes.
 - The Lyft app for the area does not show DCTA fixed route schedules.
- Coordination with MPO not discussed



DCTA Denton County Transportation Authority

Alliance Link:

- Part of the service is outside DCTA jurisdiction, it is shared
- The program is governed by the DCTA in coordination with the two cities
- **Coordination**
 - **Both fares have to be paid separately. As it is a transfer discount between DCTA fixed route and Lyft rides payment are made separately from DCTA payments.**
 - **The lyft app for the area does not show DCTA fixed route schedules**
- Coordination with MPO not discussed





Denton County Transportation Authority



UNT Lyft Program

Zone within city of Denton, in UNT campus



Denton Airport Enterprise Zone

Zone within Denton city, around the airport



Austin



Capital Metro

Capital Metro app-based on-demand services

- Currently in discussion to develop RFPs for other areas within jurisdiction & outside – Manor & Pflugerville.
- **Working on an agreement with Travis County for services outside jurisdiction boundary.**
- Two pilot projects completed since 2016.
- Flex and Pickup (last ended in June 2018).
- **Both pilots were within Austin city limits**

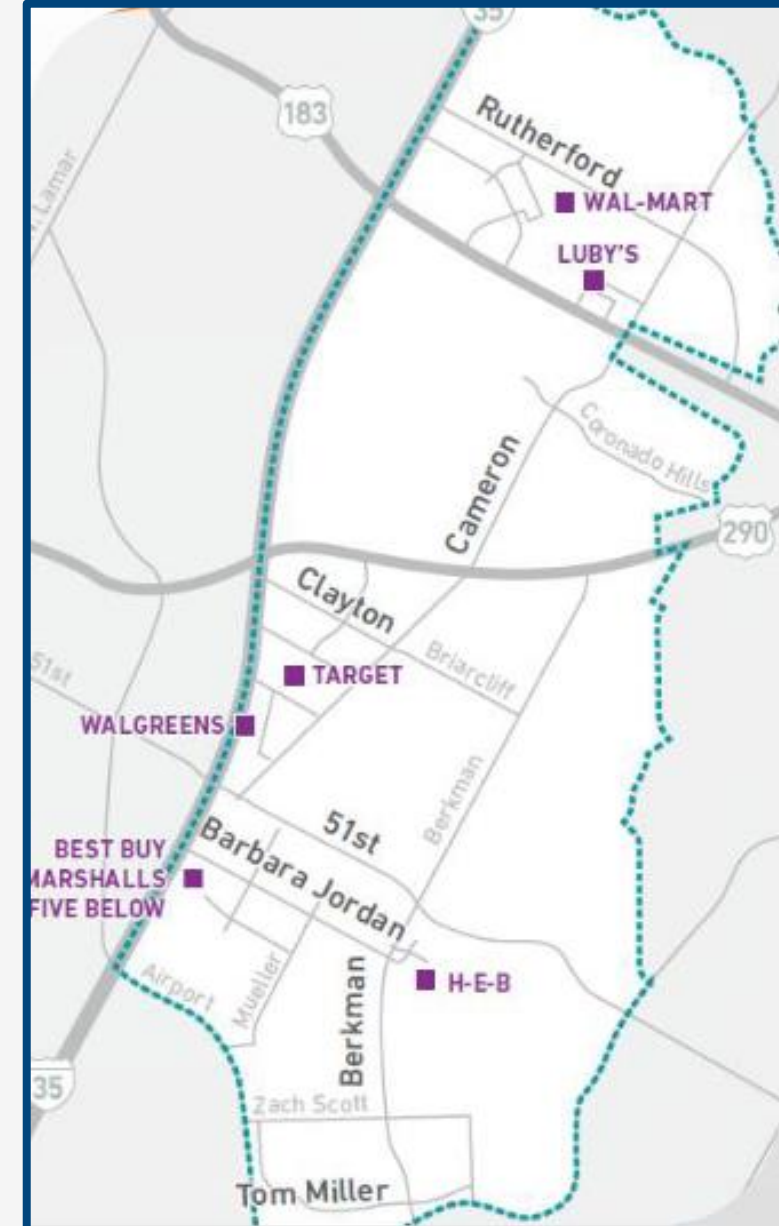




Capital Metro

Pickup Pilot Project:

- The service is in a zone within Austin
- A pilot program was run by the innovation team
- Coordination
- **Both fares have to be paid separately for Pickup and fixed route using two different apps**
- The Lyft app for the area does not show fixed route schedules?
- Coordination with MPO not discussed
- Funding – Capital Metro



Dallas



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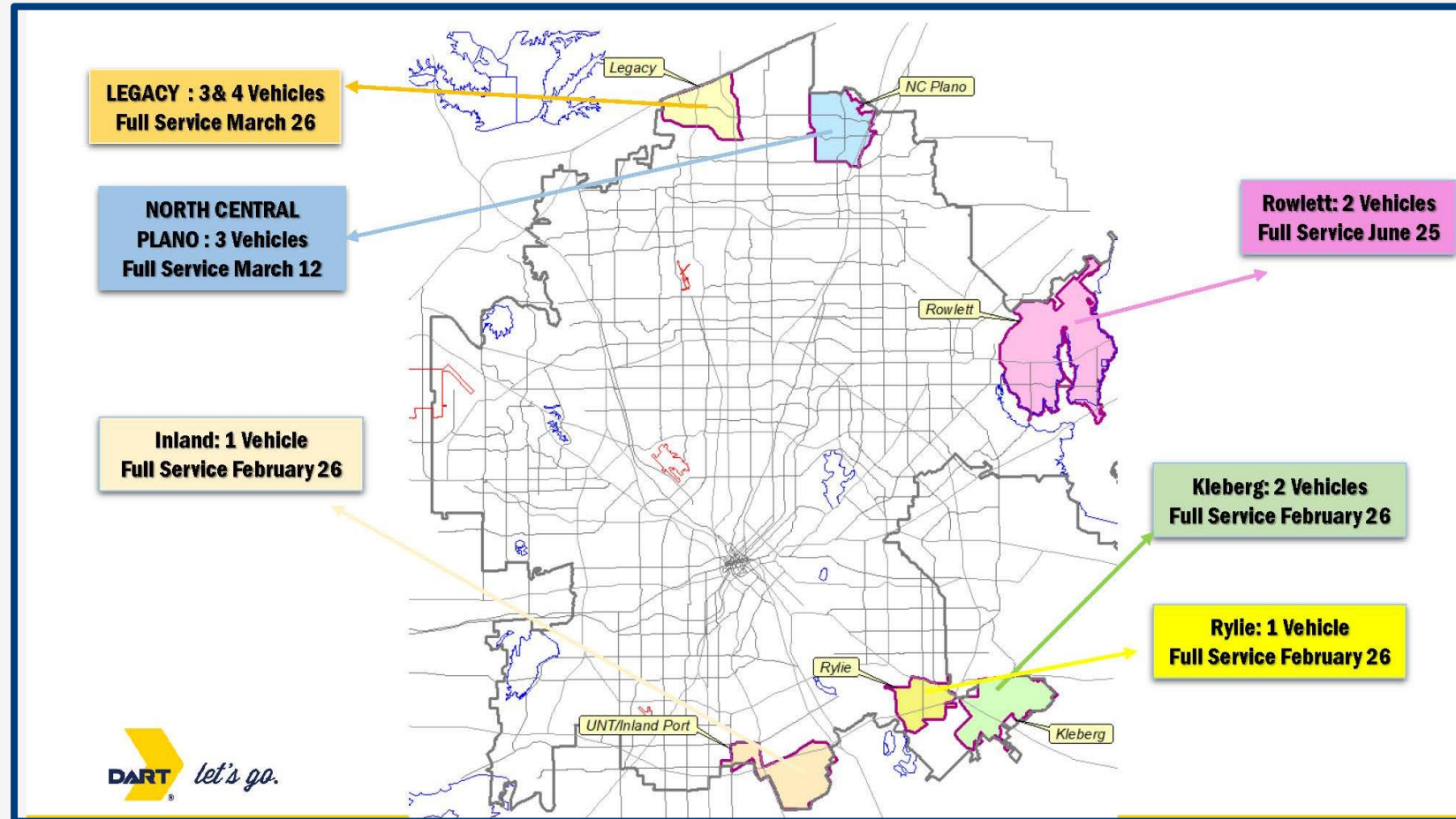


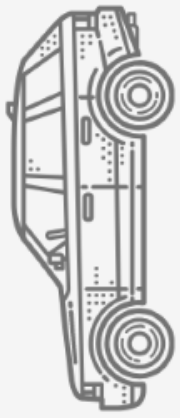
The logo for Dallas Area Rapid Transit (DART) features the word "DART" in a bold, blue, sans-serif font. The letters are partially overlaid by a large, yellow, stylized arrow pointing to the right.

Dallas Area Rapid Transit

MOD zones are for first and last mile. Zones are currently not catering to all cities within DART service area.

- 3 zones in Plano
- 1 zone in Rowlett
- 1 zone in Inland
- 1 zone in Kleberg
- 1 zone in Rylie



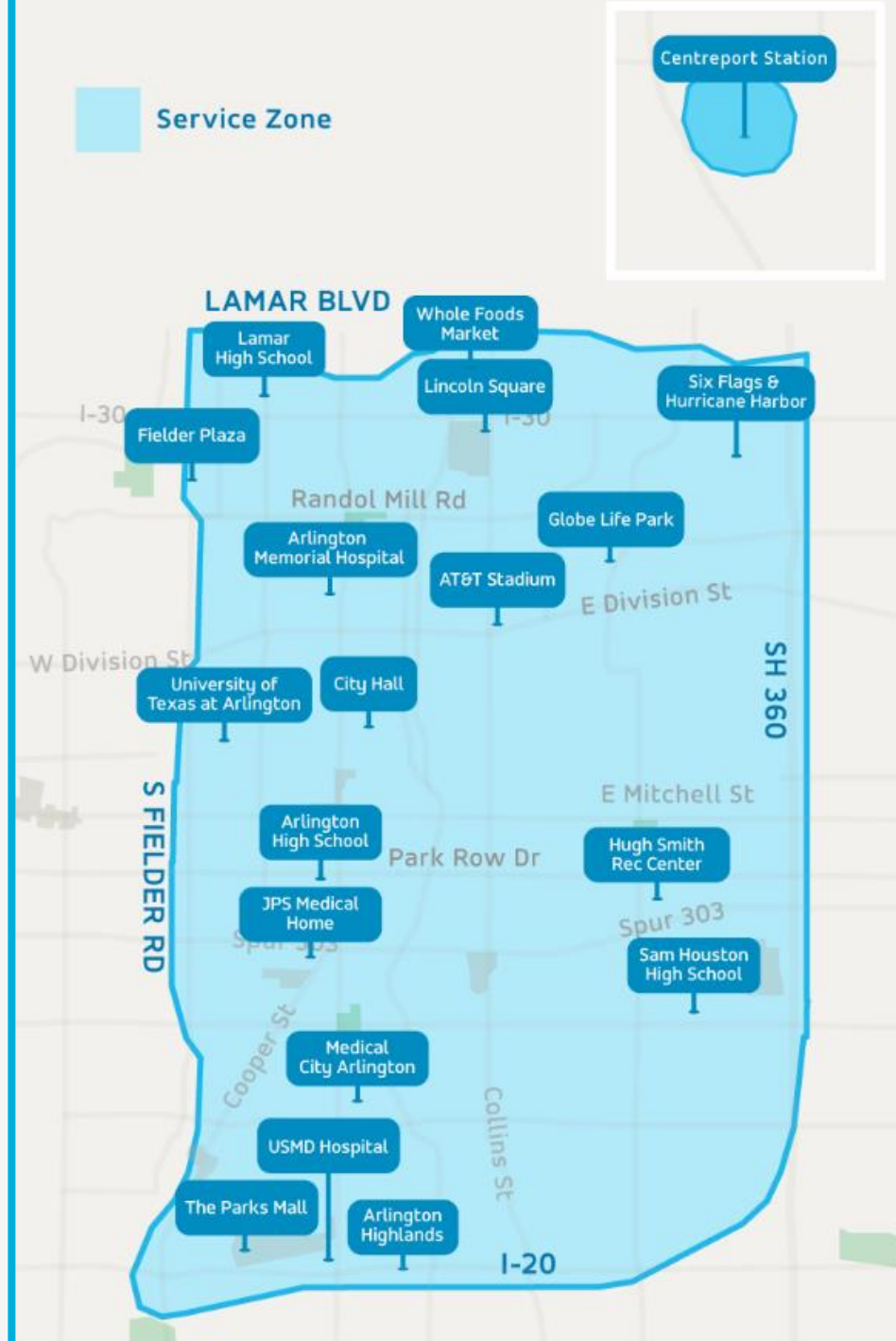


Arlington



Arlington On-Demand w/ VIA Rideshare

- Arlington On-Demand, operated by Via, offers a MOD zone for a flat fee of \$3 (M-F 6am – 9pm.)
 - Currently there are no monetary incentives to transfer between Arlington's On-Demand service and existing transit.



San Antonio



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VIA Metropolitan Transit

- Current state: RFP/RFI
- Via recently finished an initiative to provide real-time transit information through several third party apps, however there are no ride-hailing capabilities at this time.
- Though it is not available yet, VIA is currently seeking to integrate ride-hailing capabilities within their application





VIA Metropolitan Transit

Vision 2040, VIA's long range plan

- Recognizes the inevitable need of mobile applications to provide transit data and possible ride-hailing services
- Cover service gaps with ride-hailing technology
- Provide incentives for those using ride-hailing services to transfer between existing services

	CURRENT (current-2020)	NEAR TERM (2021-2025)	MID TERM (2026-2035)	LONG TERM (2035-2040)
Innovative Solutions Bringing together technology, development and strategic partnerships to build a stronger region.	Real-time Arrival Signs & Multimodal applications			
			Real-time Arrival Signs & Multimodal applications	
	Car Share/Bike Share/Ride-hailing Applications			
	Transit-oriented Development			





VIA Metropolitan Transit

Service:

- Via current services 98% of Bexar County
- Services are funded through:
 - Half-cent transit sales tax in VIA's service area
 - 1/8-cent tax under Advanced Transportation District
 - Fares
 - Bus advertisement space
 - Grant money from FTA



- Alamo Heights
- Balcones Heights
- Castle Hills
- China Grove
- Converse
- Elmendorf
- Leon Valley
- Olmos Park
- San Antonio
- Shavano Park
- St. Hedwig
- Terrell Hills

About Via: <https://www.viainfo.net/about-via/>



VIA Metropolitan Transit (Review)

- Currently there exists no public app-based on demand services
- Long-term planning mentions the possibility of serve gaps and transfers between existing services
 - *Not included in Alamo Area MPO 2019 -2022 TIP*

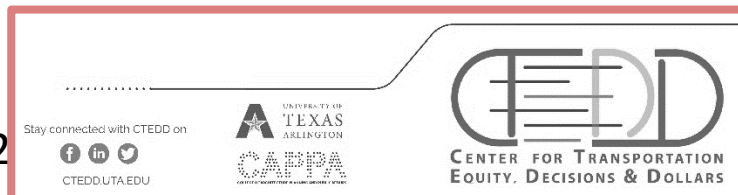


Alamo Regional Transit

- Current state: NA
- ART currently services 12 counties providing on-demand, curb-to-curb response
 - Service types typically provided: Adult day care, medical, shopping, work, school
 - Available to all residents
- **Example Opportunity**: Currently reservations must be made 24 hours in advance through a placed phone call or through an electronic form on the internet. Given the existing service, creating a mobile application to facilitate transportation requests could reduce call dispatchers and increase ridership.

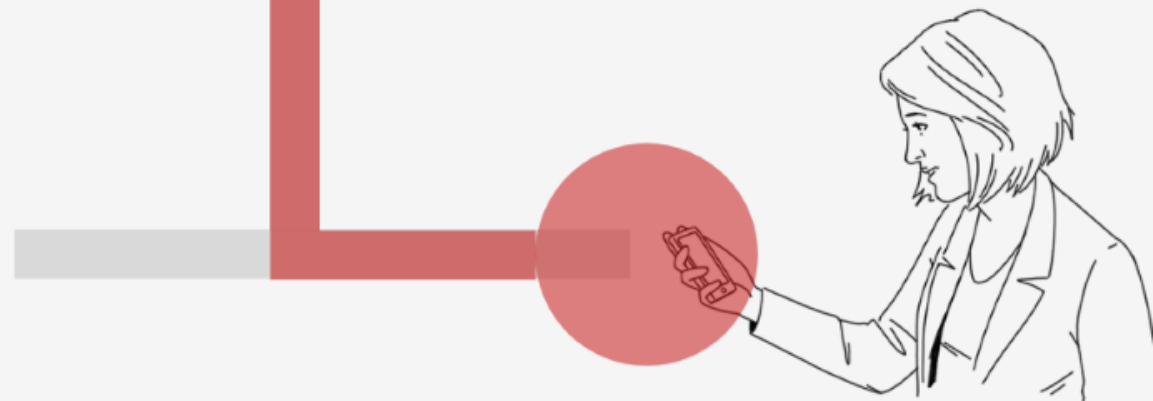
About ART: <https://www.aacog.com/67/Alamo-Regional-Transit>

<http://www.alamoareampo.org/Plans/MTP/docs/Mobility2040/Final%20MTP%20Revised%20>





Corpus Christi





Corpus Christi Regional Transportation Authority

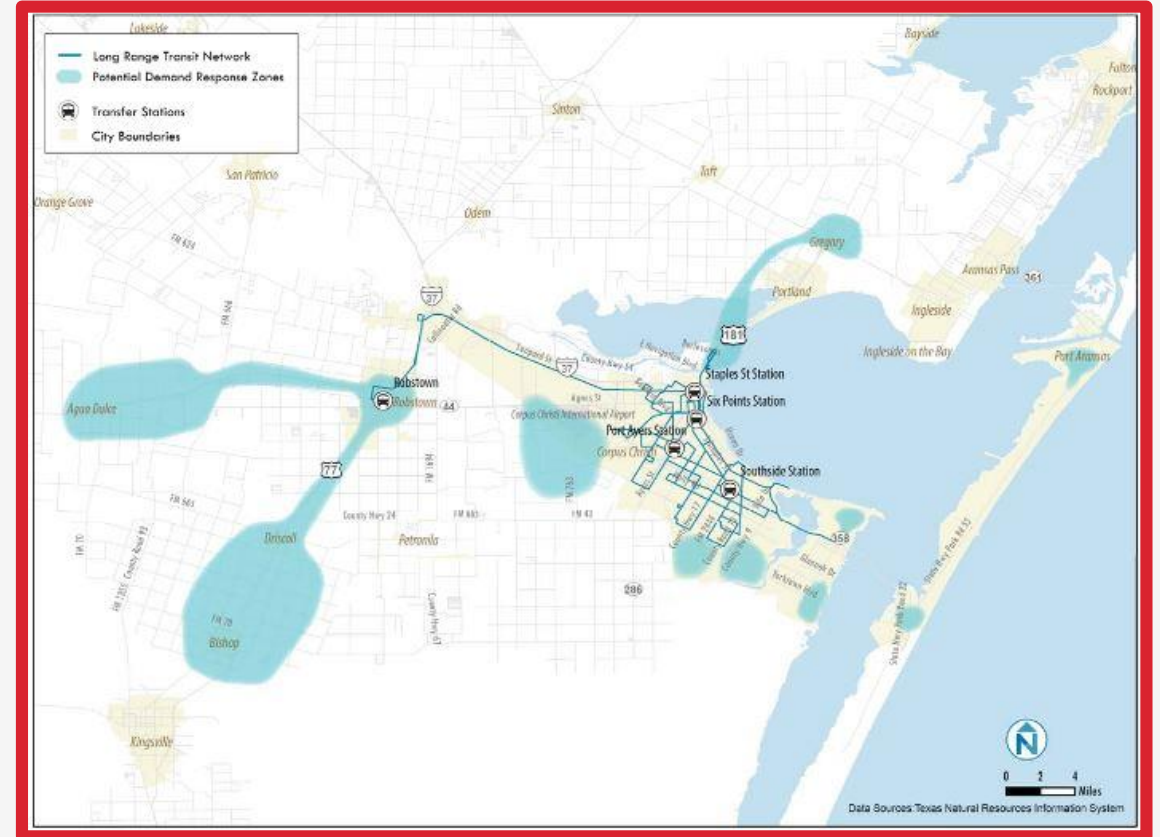
- Current state: pre-proposal
- CCRTA's 2020 plan includes:
 - Using TNCs to provide transit to low-density areas
 - Consideration of: Zones, rate control, subsidies
 - Identified target areas: Southside (Rodd Field and south of Yorktown)
Corpus Christi International Airport
Late-evening service after fixed-route ends

About 2020 plan: http://www.corpuschristi-mpo.org/ccrta/CCRTA_Transit_Plan_2020_Final_Report.pdf



Corpus Christi Regional Transportation Authority

- CCRTA's Long Range Plan
 - Implementation of demand responsive services to rural areas
 - "Demand response service is provided in areas where demand is very low. Service is offered in a designated zone and should connect passengers to fixed-routes for out-of-zone trips"



About CCRTA's LTP: <https://www.ccrta.org/wp-content/uploads/2017/03/vamonos-lrp-final.pdf>

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CAPPA



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Corpus Christi Regional Transportation Authority

Service Area

- CCRTA currently spans 841 square miles, crossing the Nueces and San Patricio county line.
- Financing currently comes from: operating fees, sales taxes, grants and other income -- no property taxes.
 - Half-percent sales tax for the following areas

Agua Dulce

Port Aransas

Bishop

Robstown

Corpus Christi

San Patricio

Driscoll

Unincorporated areas of

Gregory

Nueces County

About CCRTA Finances: <https://www.ccrta.org/financial-transparency/>
<https://comptroller.texas.gov/taxes/sales/mta.php>



Corpus Christi Regional Transportation Authority (Review)

- Currently there exists no public app-based on demand services
- Long-term planning mentions the possibility to serve zones and providing first/last mile service for existing fixed transportation
 - *Not included in Corpus Christi MPO 2019 -2022 TIP*
- Service area mentioned within long term plan includes zones within CCRTA's current service areas



Houston



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Houston's METRO

- Current state: pre-proposal
- METRONext
 - Initial draft identifies emerging ideas in innovation: TNC integrations and mobile applications
 - Not many details or documented reports
- **Not included in Houston-Galveston Area Council MPO 2019 -2022 TIP**

About METRO: <https://www.ccrta.org/financial-transparency/>

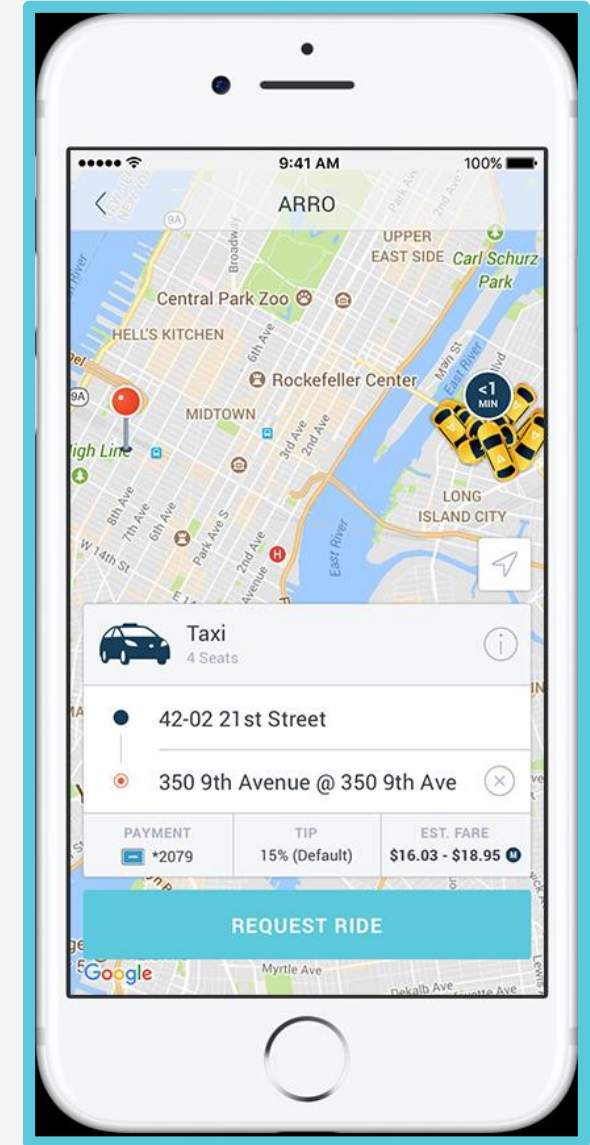
About METRONext: <http://www.metronext.org/resources/>

<https://www.documentcloud.org/documents/4951523-METRONext-Moving-Forward-Plan-a-Project-Profile.html#document/p40>



Arro, Inc

- Current state: Available
- Implemented to serve transit needs for the 2017 SuperBowl, Houston contracted Arro, Inc to provide a uniform application. Houston’s city ordinance mandates every taxicab to use and respond to requests through Arro’s mobile application
- Ordinance extends to licensed taxicab services that operate any taxicab “upon or over the streets” of the city of Houston.



Houston’s Minutes: <http://houstontx.swagit.com/mini/10042016-1594/#78>

About Arro: www.ridearro.com/houston

Ordinance: https://library.municode.com/tx/houston/ordinances/code_of_ordinances?node



Arro, Inc

- Funding is completely private with \$0 provided by the city.
- Houston approves rates that will be charged by the application based on time/distance
- All taxi drivers must on the application, though not required to use it exclusively
- Houston's Administration & Regulatory Affairs Department told us:
“There was not a wide adoption rate for Arro.”

Ordinance:

https://library.municode.com/tx/houston/ordinances/code_of_ordinances?nodeId=7942

94

Contract Number: S30-Q25807

Questions & Discussion

David Weinreich dpwein@umich.edu
Amruta Sakalker amrutaamol.sakalker@uta.edu
Matt Reeves Reeves steven.reeves@uta.edu

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