THE UNIVERSITY OF TEXAS AT AUSTIN
CENTER FOR TRANSPORTATION RESEARCH

Transit Performance and Reliability Evaluation for Arterial Corridors

Presented at the Transportation Planning Applications Conference (TRBAppcon), Portland, OR, June 2019.

Natalia Zuniga Garcia, M.Sc.
Randy B. Machemehl, Ph.D.
Natalia Ruiz-Juri, Ph.D.
Heidi W. Ross, M.Sc.
Nadia Florez-Morcote, M.Sc.

June 2019

Cite as:
Zuniga-Garcia, N., N. Ruiz-Juri, N. Florez-Morcote, H.W. Ross, and R.B. Machemehl. Transit Performance and Reliability Evaluation for Arterial Corridors. Transportation Planning Applications Conference (TRBAppcon), Portland, OR, June 2019.

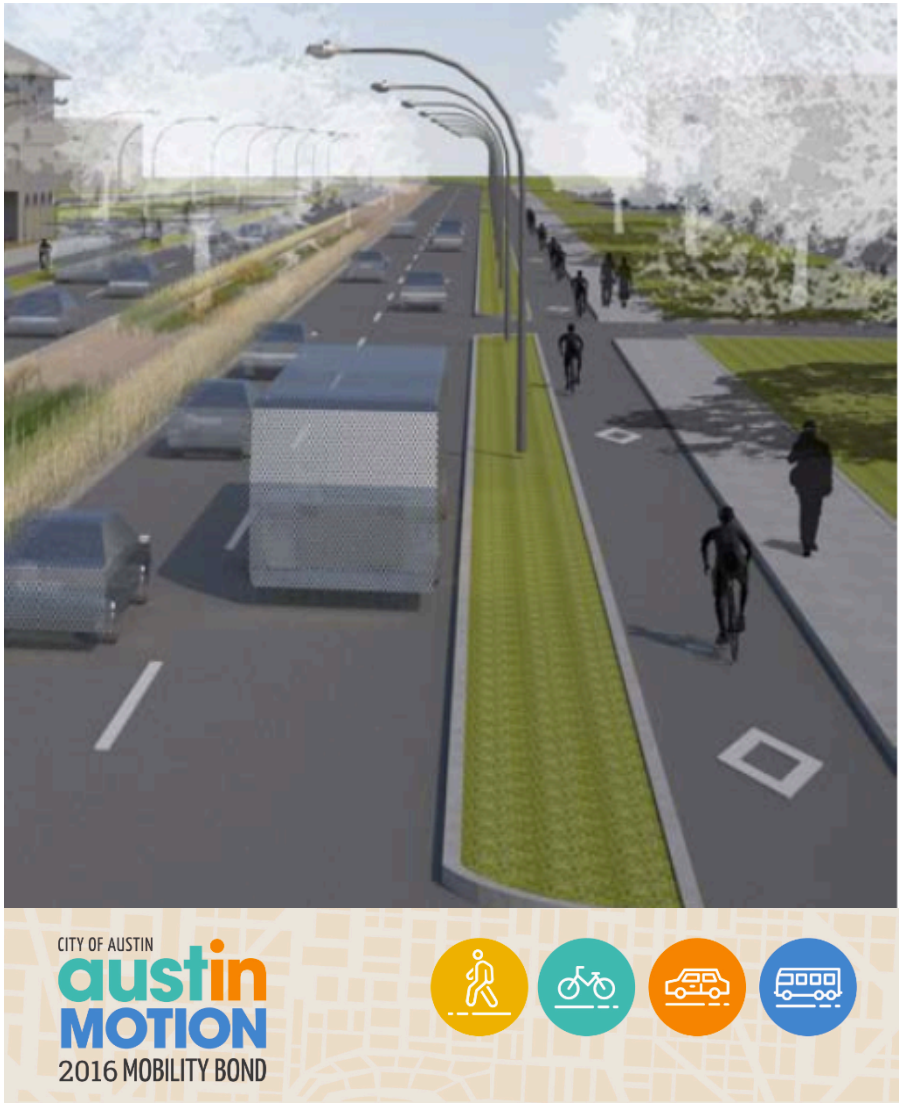
Outline

1. Background
2. Introduction
3. Case Study
4. Metrics
5. Future Work

Background

Corridor Mobility Program

- Development, design, and construct improvements along key Austin corridors that enhance mobility, safety, and connectivity for all users.
- Recommendations supported by identifiable **metrics** to prioritize:
  a) reduction in congestion
  b) improved level of service for all modes of travel
  c) connectivity, and improved effectiveness of transit operations

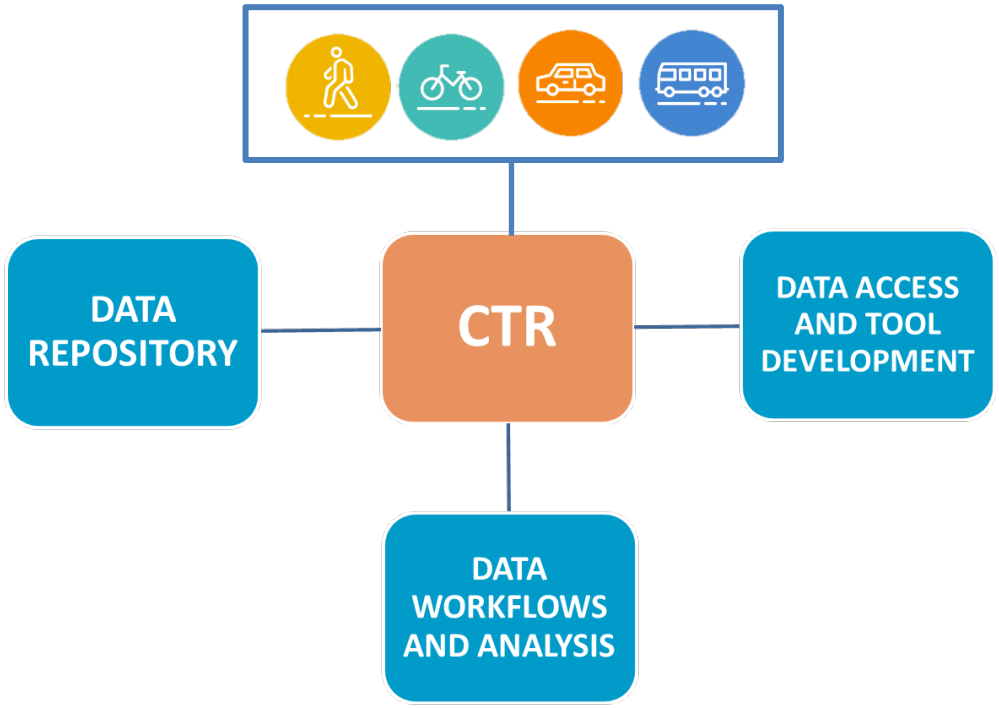


Background

Our Role

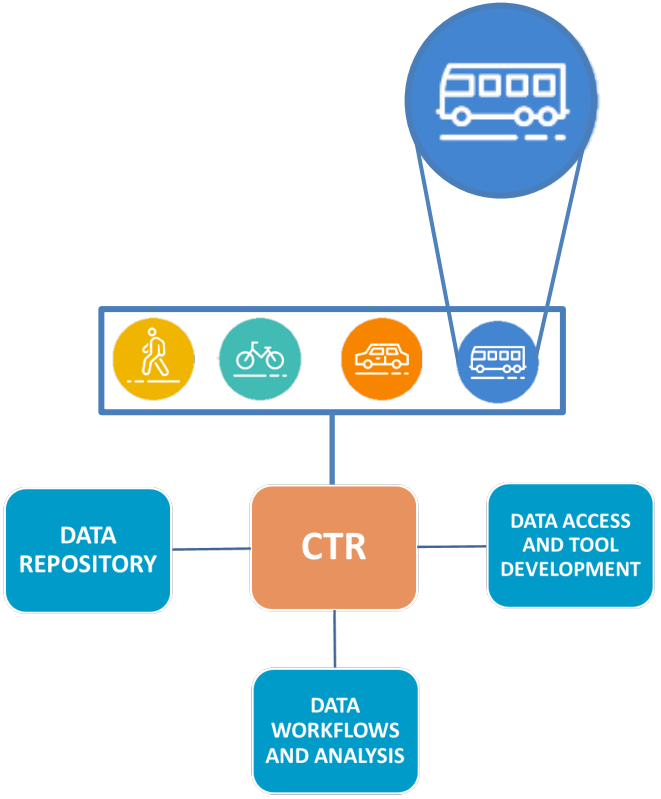
Generate performance metrics for bond corridor evaluation by practitioners

1. Identify current and future data sources
2. Complete back office system architecture capable of ingesting data from multiple sources
3. Develop a tool that uses data from multiple sources to calculate key performance metrics



Introduction

Recent advances in ITS transit data-collection allow evaluation of multiple operational variables.



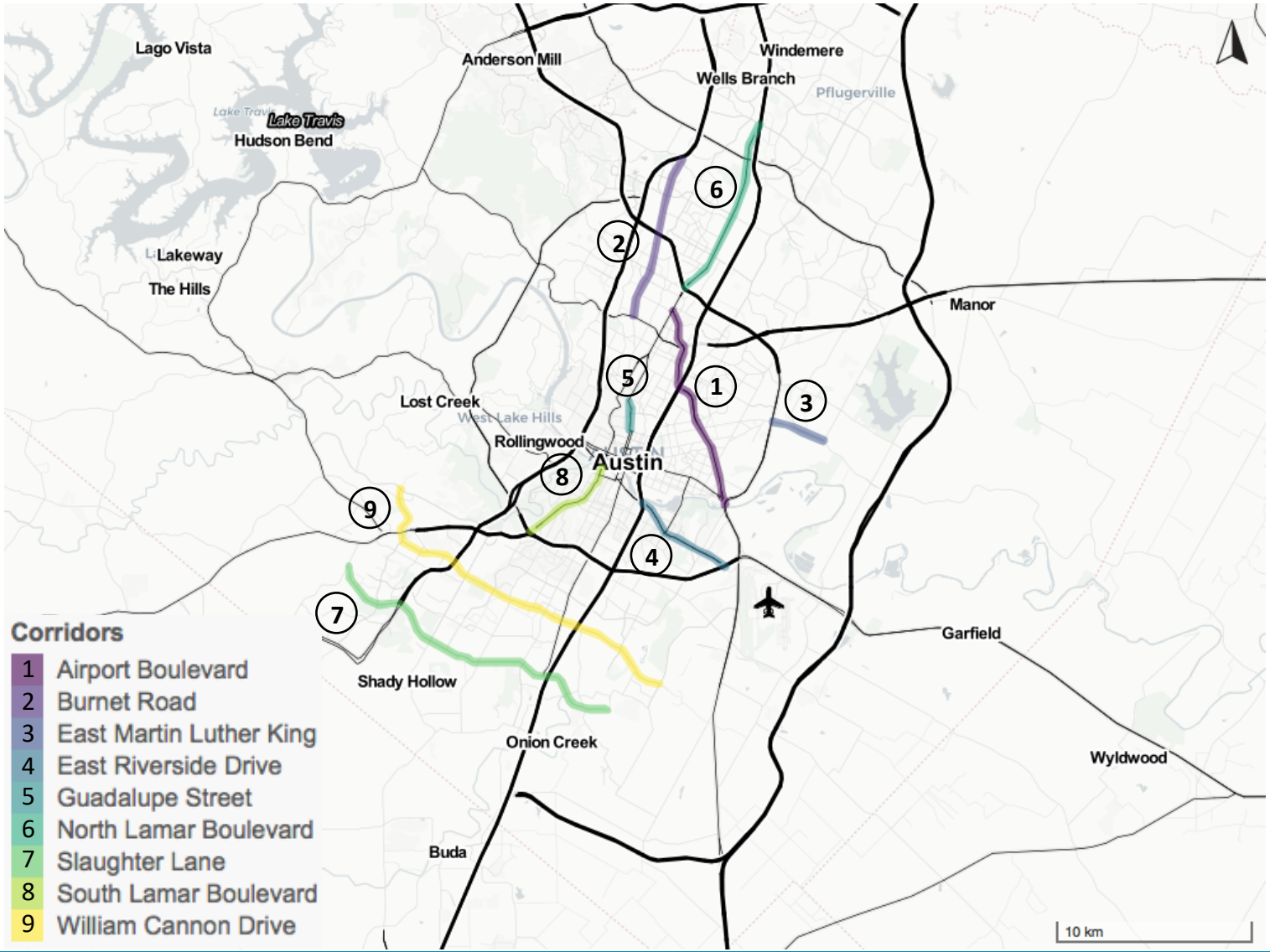
Problem

- Digesting and understanding the large amount of complex data available
- For arterial corridors: the presence of different traffic control systems, multiple transit routes, and multimodal interaction

Objective

Develop an evaluation tool to provide **transit performance and reliability** information for arterial corridors in Austin, Texas.

Case Study


Lago Vista
Anderson Mill
Windemere
Wells Branch
Pflugerville
Lake Travis
Hudson Bend
Lakeway
The Hills
Manor
Lost Creek
West Lake Hills
Rollingwood
Austin
Garfield
Shady Hollow
Onion Creek
Wyldwood
Buda
10 km
Corridors
1 Airport Boulevard
2 Burnet Road
3 East Martin Luther King
4 East Riverside Drive
5 Guadalupe Street
6 North Lamar Boulevard
7 Slaughter Lane
8 South Lamar Boulevard
9 William Cannon Drive

Metrics: Tool Development

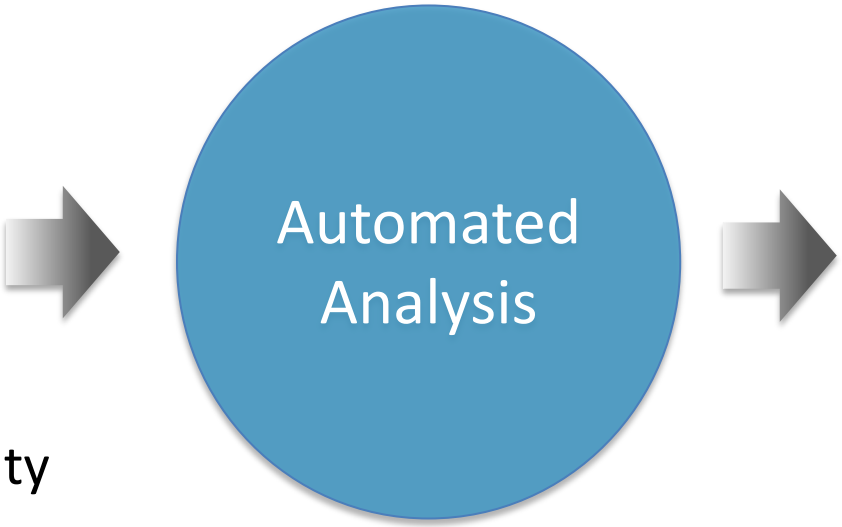
Data Sources

GTFS

AVL

APC

Vehicle Capacity



Measurable Impacts

Transit Speed

Ridership

Occupancy

Dwell Time

Delay

Volume-to-Capacity Ratio

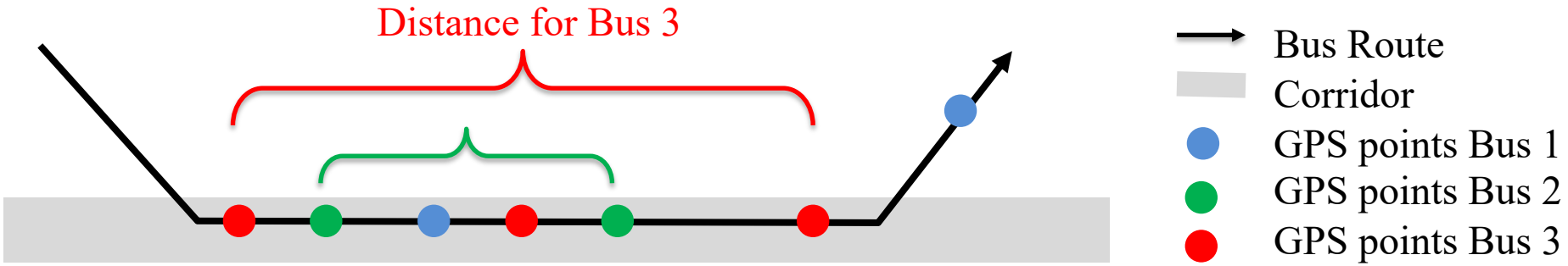
Reliability

Service Coverage

Frequency

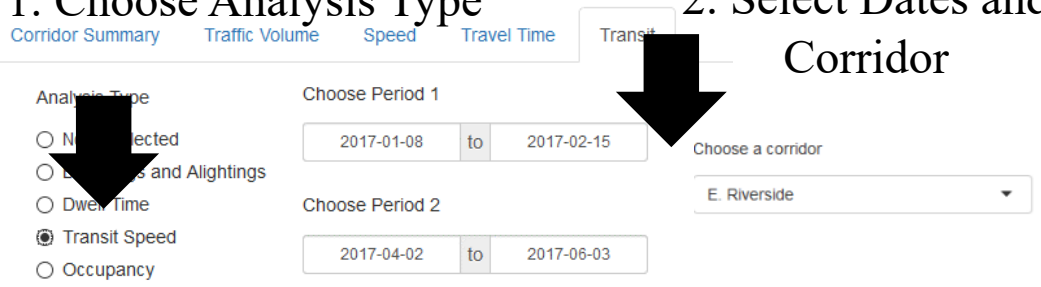
Metrics: Transit Speed on Corridors

- Speed estimated using AVL data
  - GPS points (location & time stamp) for all buses
- Average speed through the corridor
  - Difference in time stamps over distance
  - Distance is corridor length covered by bus trajectory
- Challenges:
  - GPS points are provided every 1-2 minutes
    - The results may not be representative of the entire corridor
  - Different routes cover different corridor segments
  - Dwell times are included in travel time

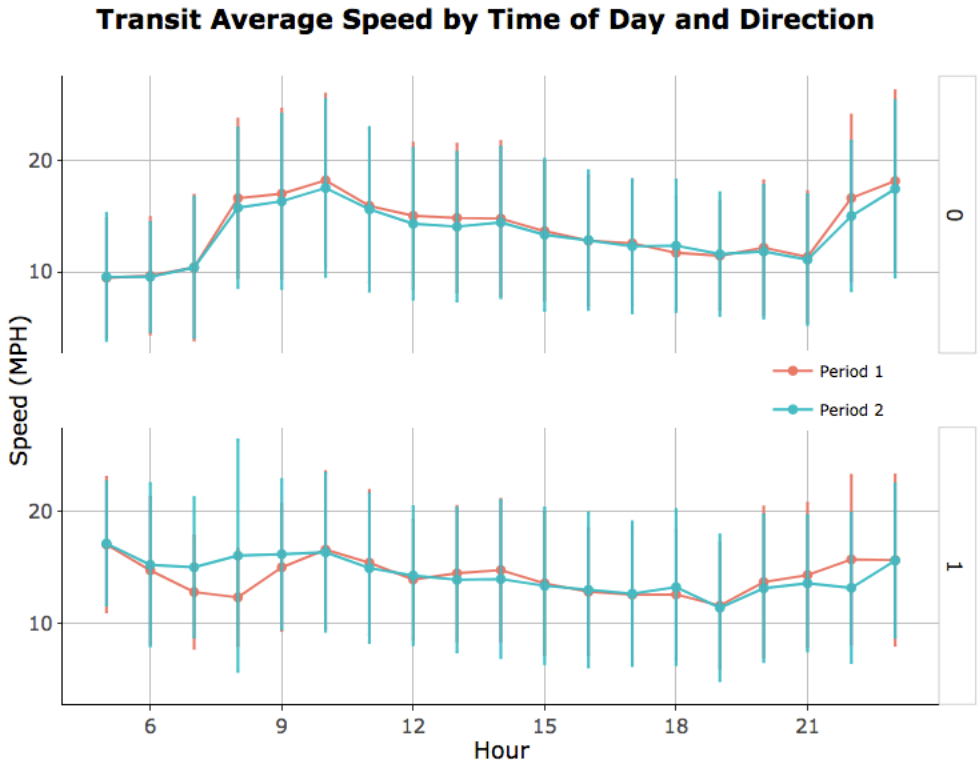


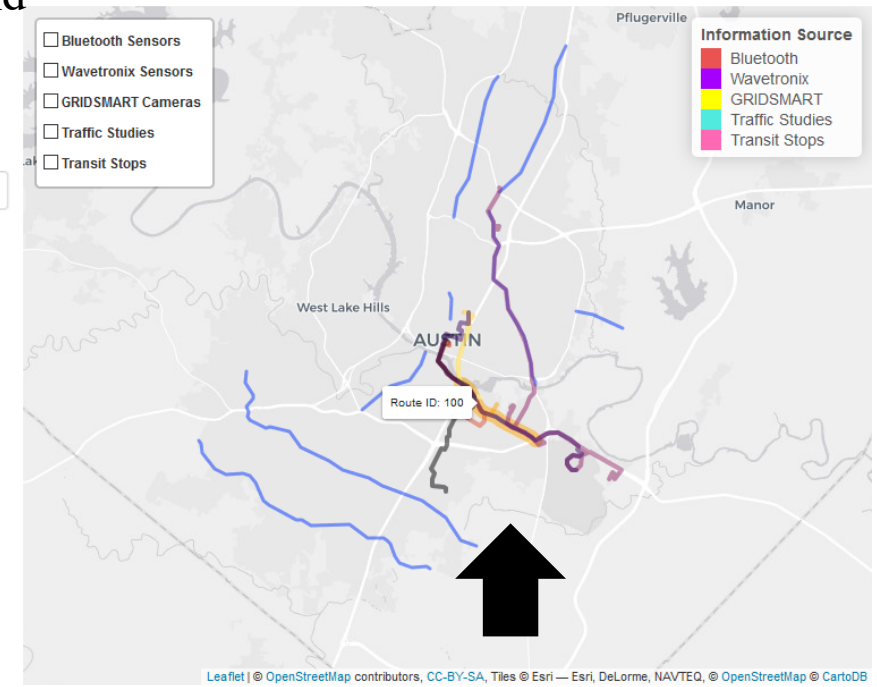
Metrics: Transit Speed on Corridors

1. Choose Analysis Type



2. Select Dates and Corridor





3. Visualize Transit Routes Serving Corridor for Analysis

4. Summarize Transit Speed Estimate by Hour and Direction

Metrics: Occupancy

1. Choose Analysis Type

Corridor Summary | Traffic Volume | Speed | Travel Time | Transit

Analysis Type

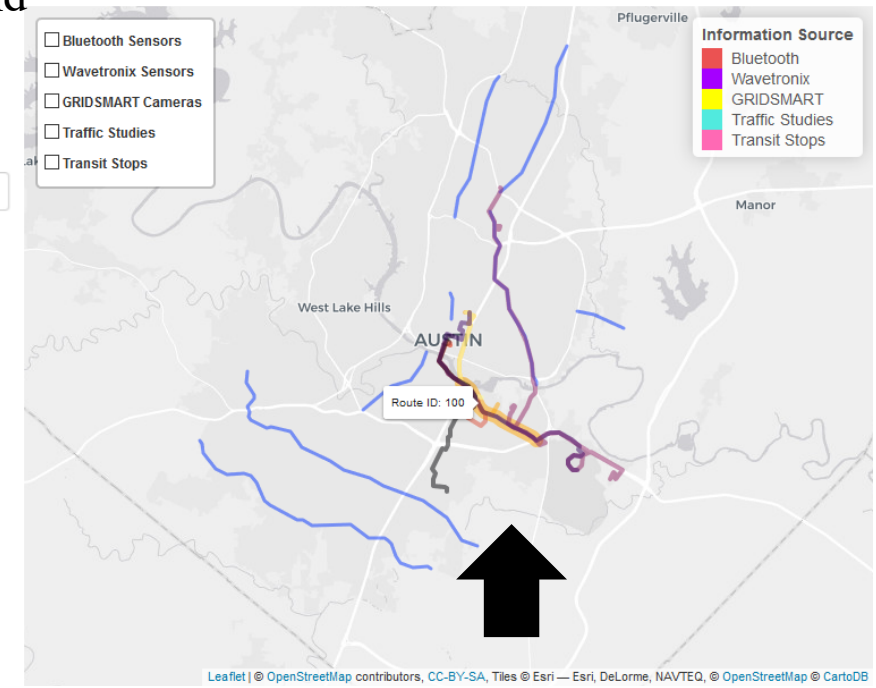
- [ ] Selected
- [ ] gs and Alightings
- [ ] e
- [ ] t Speed
- [x] Occupancy

2. Select Dates and Corridor

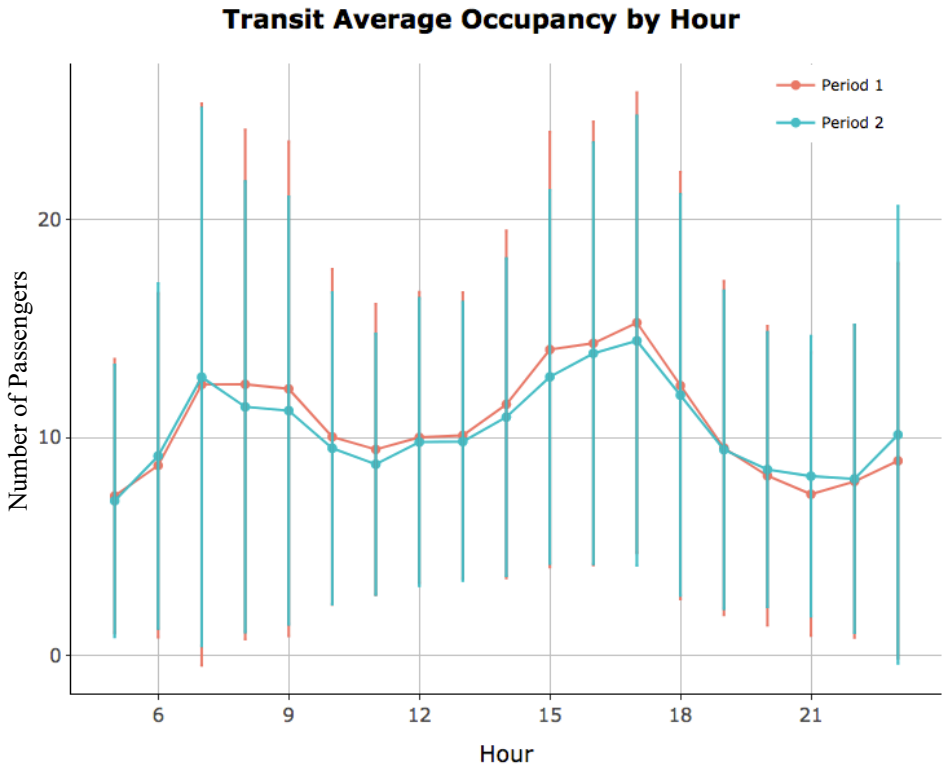
Choose Period 1: 2017-01-08 to 2017-02-15

Choose Period 2: 2017-04-02 to 2017-06-03

Choose a corridor: E. Riverside



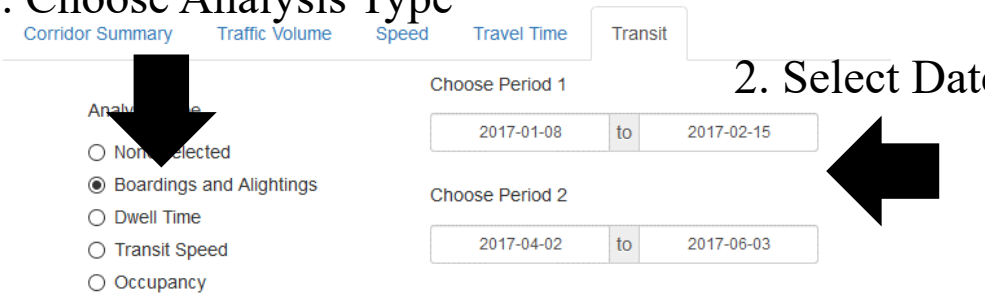
3. Visualize Transit Routes Serving Corridor for Analysis



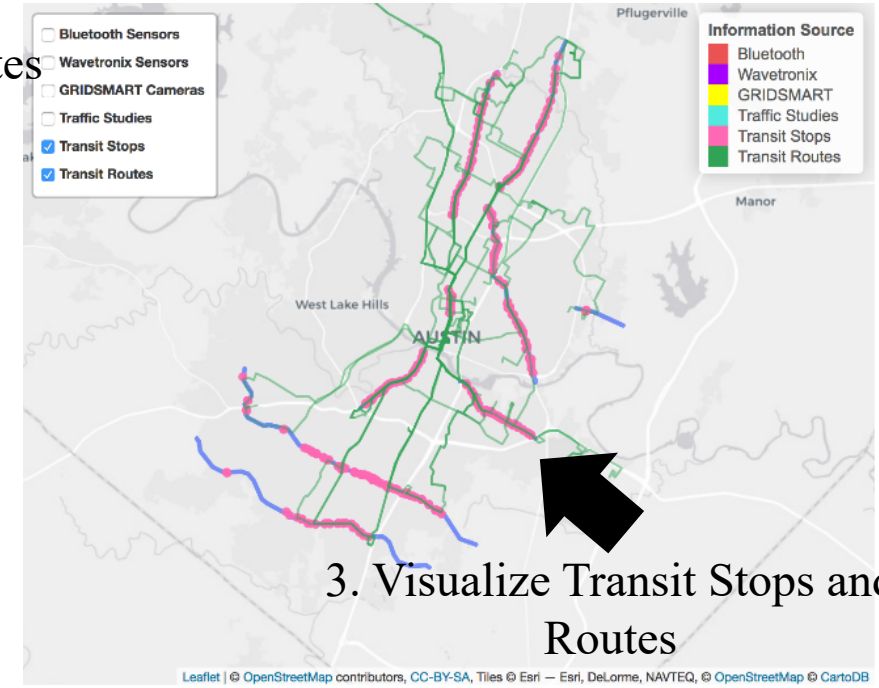
4. Summarize Transit Occupancy by Hour

Metrics: Boardings and Alightings

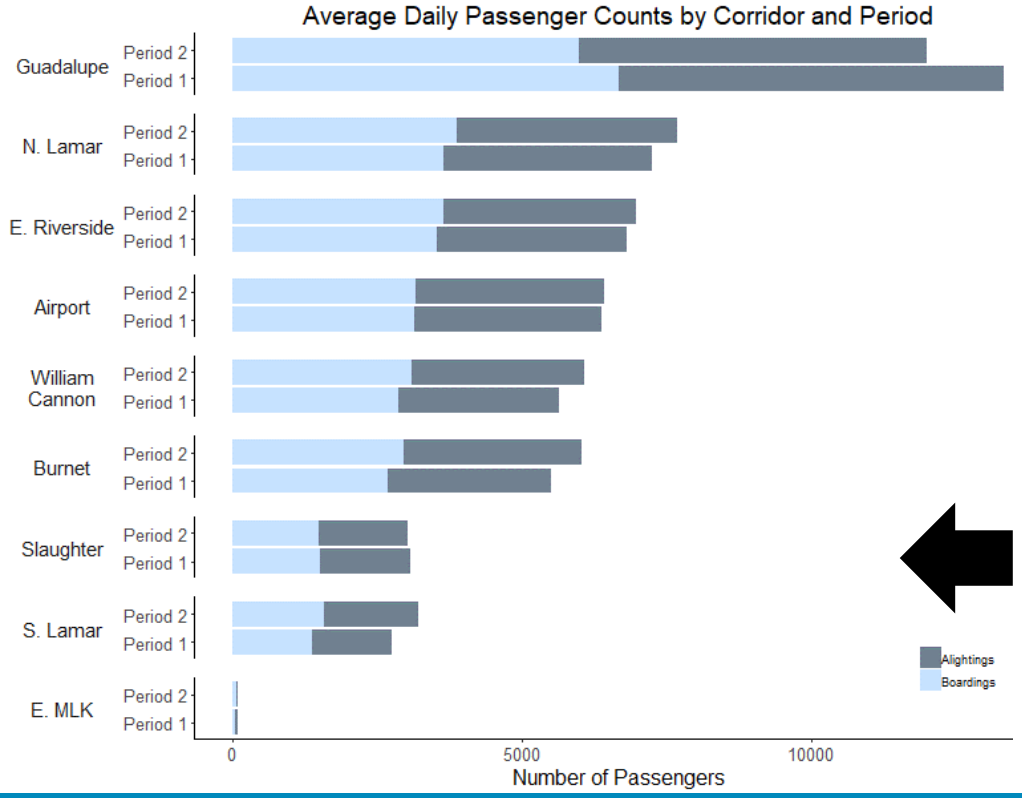
1. Choose Analysis Type



2. Select Dates



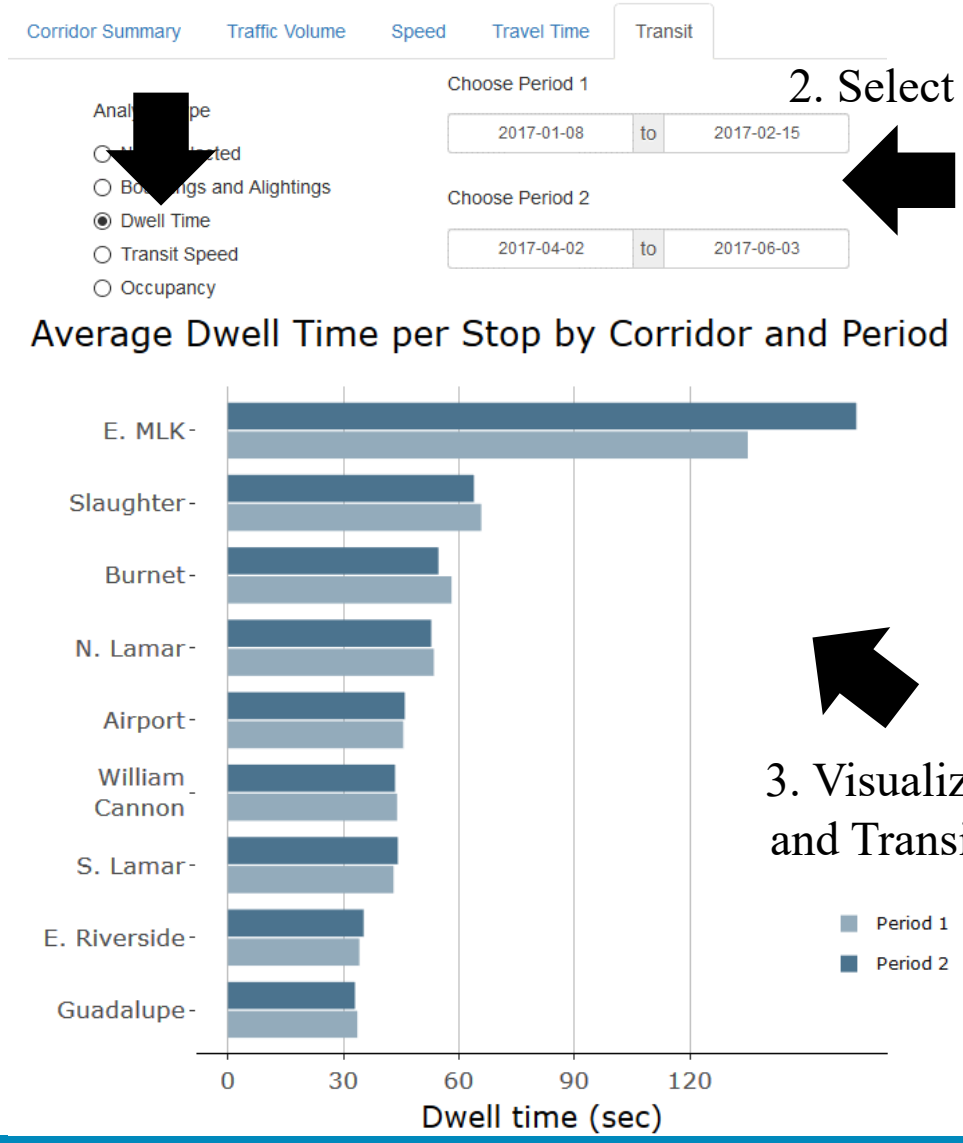
3. Visualize Transit Stops and Routes



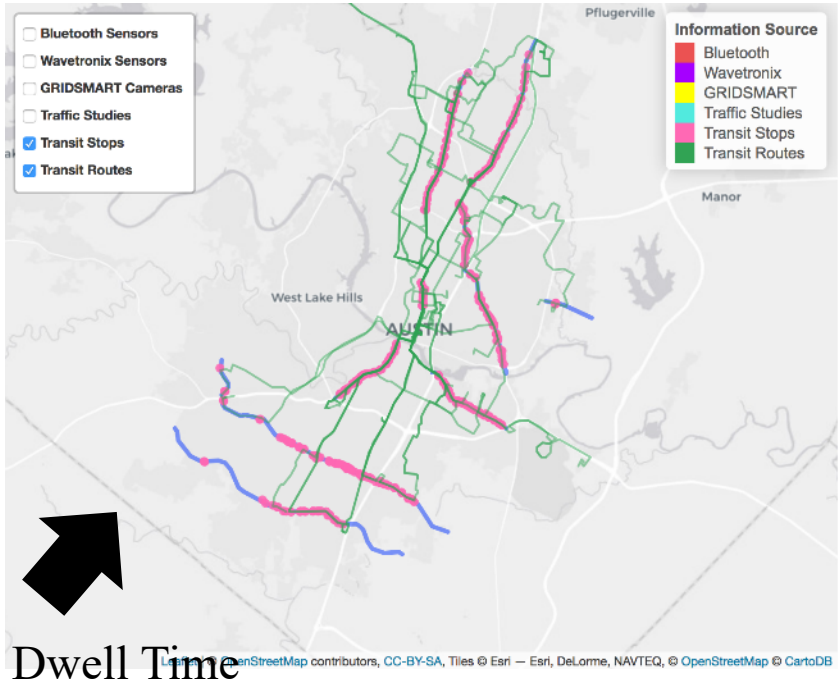
4. Summarize Passenger Counts

(not normalized by number of stops)

Metrics: Dwell Time



2. Select Dates



3. Visualize Dwell Time and Transit Information

Future Work

- Estimate bus trajectory
  - Integrate AVL and APC
  - Update speed estimation
- Estimate bus on-time performance
  - Integrate GTFS and APC

THANKS

Questions or Comments?

nzuniga@utexas.edu