Michael Baker INTERNATIONAL

We Make a Difference

Shared Transportation Services Mobile Application Data Support

NJTPA

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Overview

- Project Background
- General Transit Feed Specification (GTFS)
- North Jersey Transportation Planning Authority (NJTPA)
- Michael Baker Project Development
  - Project Tasks
  - Workflow Process
  - ETL Process
  - Operational Dashboard
  - Unified GTFS Feed

Project Purpose

- To develop a data workflow plan supporting mobile applications that improve access to shared transportation services.

- The plan meets General Transit Feed Specification (GTFS) standards and details an interagency coordination framework for standardizing, exchanging, compiling and maintaining shared services data for use in mobile applications.

What is GTFS?

The General Transit Feed Specification (GTFS) defines a common format for public transportation schedules and associated geographic information. GTFS "feeds" let public transit agencies publish their transit data and developers write applications that consume that data in an interoperable way.

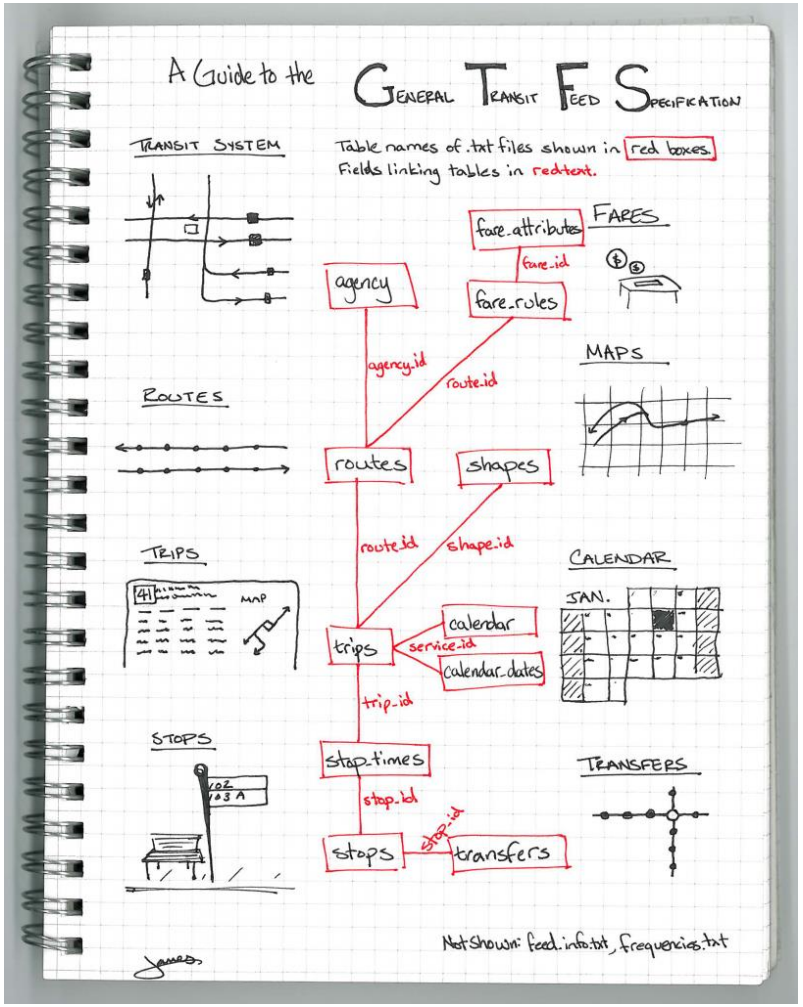
Required:
- *Agency*
- *Stops*
- *Routes*
- *Trips*
- *Stop Times*
- *Calendar*

Optional:
- *Calendar Dates*
- *Fare Attributes*
- *Fare Rules*
- *Shapes*
- *Frequencies*
- *Transfers*
- *Feed Info*

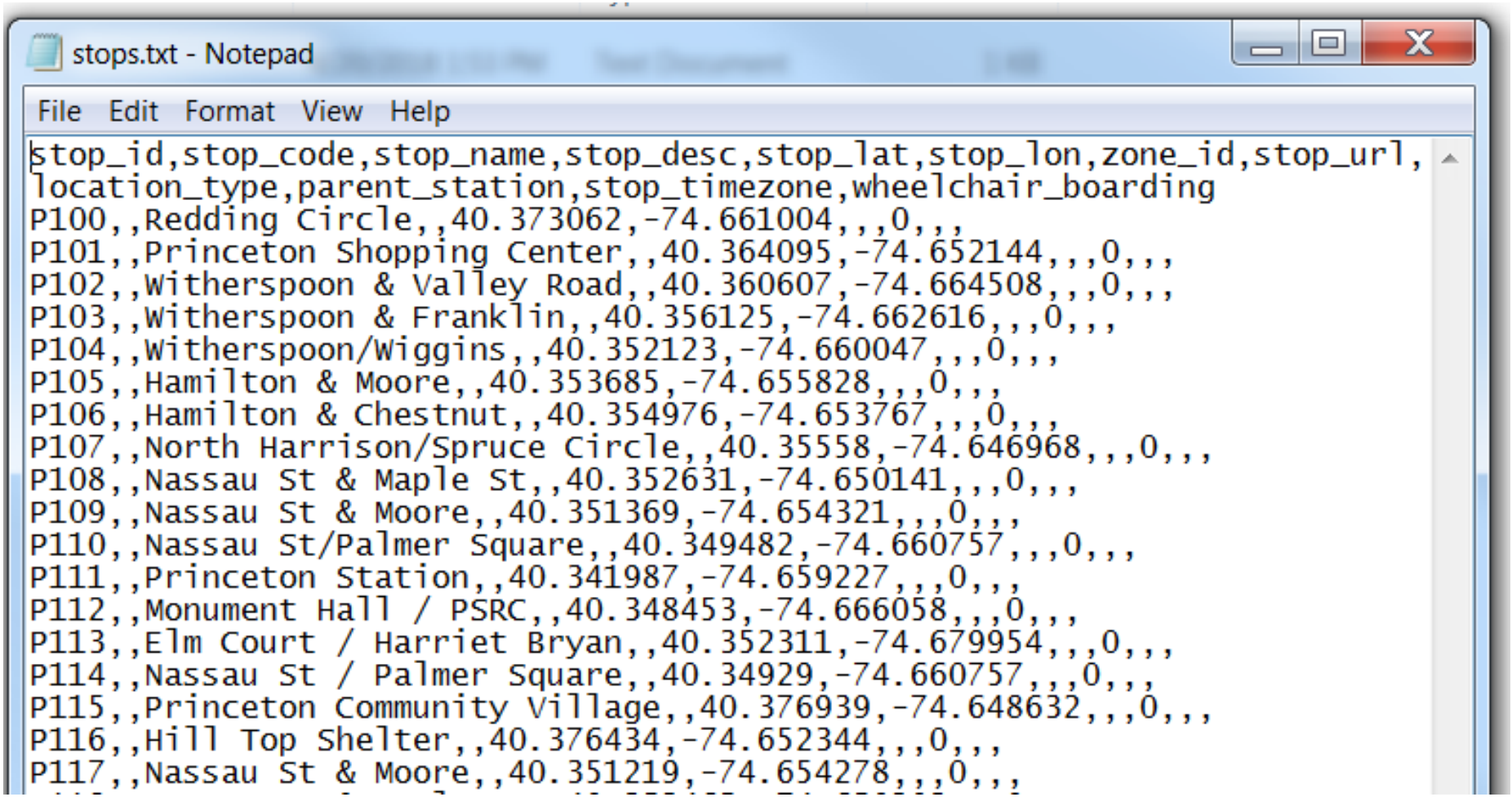
Filename	Required	Defines
agency.txt	**Required**	One or more transit agencies that provide the data in this feed.
stops.txt	**Required**	Individual locations where vehicles pick up or drop off passengers.
routes.txt	**Required**	Transit routes. A route is a group of trips that are displayed to riders as a single service.
trips.txt	**Required**	Trips for each route. A trip is a sequence of two or more stops that occurs at specific time.
stop_times.txt	**Required**	Times that a vehicle arrives at and departs from individual stops for each trip.
calendar.txt	**Required**	Dates for service IDs using a weekly schedule. Specify when service starts and ends, as well as days of the week where service is available.
calendar_dates.txt	Optional	Exceptions for the service IDs defined in the calendar.txt file. If calendar_dates.txt includes ALL dates of service, this file may be specified instead of calendar.txt.
fare_attributes.txt	Optional	Fare information for a transit organization's routes.
fare_rules.txt	Optional	Rules for applying fare information for a transit organization's routes.
shapes.txt	Optional	Rules for drawing lines on a map to represent a transit organization's routes.
frequencies.txt	Optional	Headway (time between trips) for routes with variable frequency of service.
transfers.txt	Optional	Rules for making connections at transfer points between routes.
feed_info.txt	Optional	Additional information about the feed itself, including publisher, version, and expiration information.

GTFS Reference

- Text Files (.txt)
  - 6 Required
  - 7 Optional
- Required & Optional Fields
- File Requirements
  - Comma-delimited
  - Dataset Unique
  - Standard Naming
  - Local Language
  - Case Sensitive
  - Encoded In UTF-8
  - Zipped



Example of GTFS Data


stops.txt - Notepad

File Edit Format View Help

```
stop_id,stop_code,stop_name,stop_desc,stop_lat,stop_lon,zone_id,stop_url,
location_type,parent_station,stop_timezone,wheelchair_boarding
P100,,Redding Circle,,40.373062,-74.661004,,,0,,,
P101,,Princeton Shopping Center,,40.364095,-74.652144,,,0,,,
P102,,Witherspoon & Valley Road,,40.360607,-74.664508,,,0,,,
P103,,Witherspoon & Franklin,,40.356125,-74.662616,,,0,,,
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P107,,North Harrison/Spruce Circle,,40.35558,-74.646968,,,0,,,
P108,,Nassau St & Maple St,,40.352631,-74.650141,,,0,,,
P109,,Nassau St & Moore,,40.351369,-74.654321,,,0,,,
P110,,Nassau St/Palmer Square,,40.349482,-74.660757,,,0,,,
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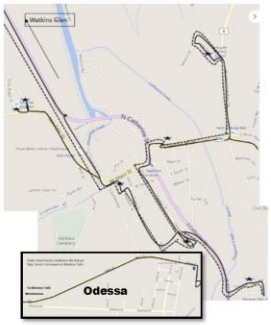
How do you get from this…

Watkins Glen

Montour Falls



KEY:
Bus Stop ★
Bus Route ——
Snow Route ·····

During severe weather, buses may cancel service to some areas. Buses will remain on the "flats" of the villages and service to rural areas may be can-

Schuyler County Transit Schedule

ROUTE 1A (Watkins Glen to Odessa)

STOP	DESTINATION	TIME OF DEPARTURE								
Express Service leaves 12th St. & Porter St. at 7:23AM and arrives at Walmart at 7:30 AM										
2	Wal-Mart	7:30	8:30	9:30	10:30	11:30	1:30	2:30	3:30	4:30
3	Seneca Harbor Prk/ Jeff. Vlg.	7:35	8:35	9:35	10:35	11:35	1:35	2:35	3:35	4:35
4	Decatur & 9th	7:42	8:42	9:42	10:42	11:42	1:42	2:42	3:42	4:42
5	12th St. & Porter St.	7:44	8:44	9:44	10:44	11:44	1:44	2:44	3:44	4:44
6	Tops/CVS	7:49	8:49	9:49	10:49	11:49	1:49	2:49	3:49	4:49
7	Primary Care	7:56	8:56	9:56	10:56	11:56	1:56	2:56	3:56	4:56
8	Schuyler Hospital	8:01	9:01	10:01	11:01	12:01	2:01	3:01	4:01	5:01
9	Main St. & Montour St. - MF	8:04	9:04	10:04	11:04	12:04	2:04	3:04	4:04	5:04
10	Human Services Complex	8:07	9:07	10:07	11:07	12:07	2:07	3:07	4:07	5:07
	Havana Glen	8:11	9:11	10:11	11:11	12:11	2:11	3:11	4:11	5:11
11	Broadway St. - MF	8:16	9:16	10:16	11:16	12:16	2:16	3:16	4:16	5:16
	Rock Cabin Park—MF	8:20	9:20	10:20	11:20	12:20	2:20	3:20	4:20	5:20
12	Odessa Municipal Building	8:30	9:30	10:30	11:30	12:30	2:30	3:30	4:30	5:30
Express Transport leaves Odessa Municipal Building at 5:30PM and arrives at 12th & Porter St. at 5:45PM										

1A - Mid-Day Watkins-Walmart Express

STOP	DESTINATION	TIME
2	Walmart	12:30
5	12th & Porter	12:35
5	12th & Porter	1:20
2	Walmart	1:30

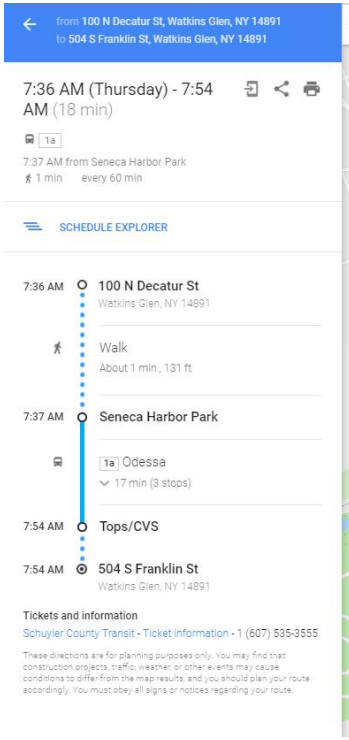
1B - Mid-Day Odessa-Watkins Express

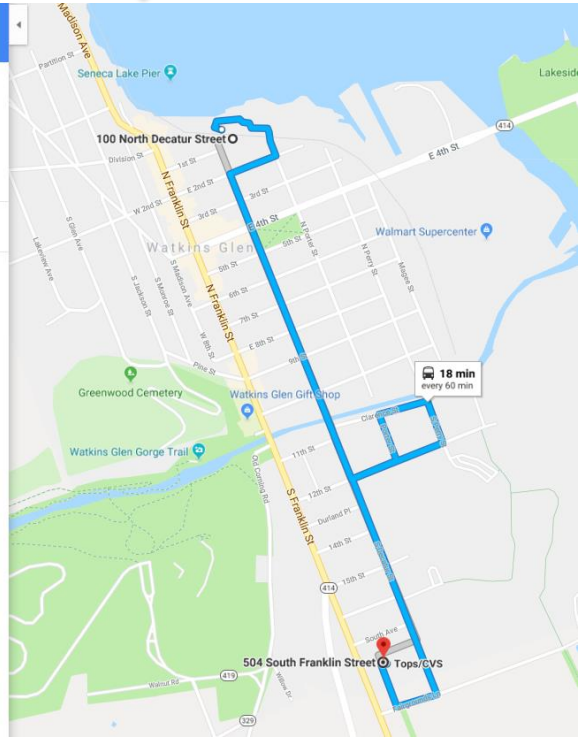
STOP	DESTINATION	TIME
12	Odessa	12:30
5	12th & Porter	12:40
5	12th & Porter	1:20
12	Odessa	1:30

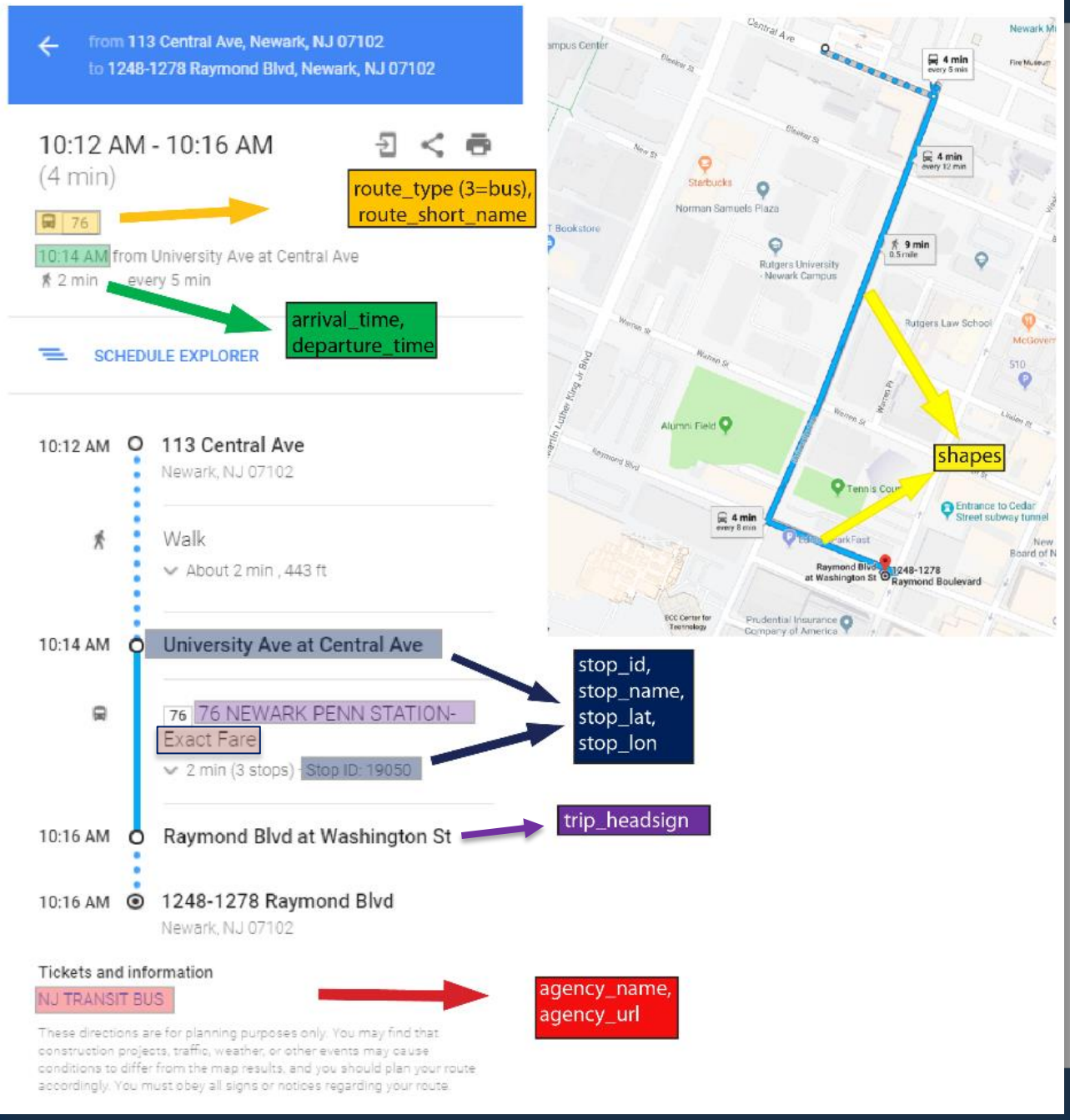
ROUTE 1B (Odessa to Watkins Glen)

STOP	DESTINATION	TIME OF DEPARTURE								
Express service leaves 12th St. & Porter St. at 7:15 AM and arrives at Odessa Municipal Bldg. at 7:30 AM										
12	Odessa Municipal Building	7:30	8:30	9:30	10:30	11:30	1:30	2:30	3:30	4:30
	Rock Cabin Park—MF	7:37	8:37	9:37	10:37	11:37	1:37	2:37	3:37	4:37
11	Broadway St. - MF	7:42	8:42	9:42	10:42	11:42	1:42	2:42	3:42	4:42
10	Human Services Complex	7:46	8:46	9:46	10:46	11:46	1:46	2:46	3:46	4:46
	Havana Glen	7:50	8:50	9:50	10:50	11:50	1:50	2:50	3:50	4:50
9	Main St. & Montour St. - MF	7:53	8:53	9:53	10:53	11:53	1:53	2:53	3:53	4:53
7	Primary Care	7:56	8:56	9:56	10:56	11:56	1:56	2:56	3:56	4:56
8	Schuyler Hospital	8:01	9:01	10:01	11:01	12:01	2:01	3:01	4:01	5:01
6	Tops/CVS	8:08	9:08	10:08	11:08	12:08	2:08	3:08	4:08	5:08
5	12th St. & Porter St.	8:13	9:13	10:13	11:13	12:13	2:13	3:13	4:13	5:13
4	Decatur & 9th	8:18	9:18	10:18	11:18	12:18	2:18	3:18	4:18	5:18
3	Seneca Harbor Prk / Jeff. Vlg.	8:23	9:23	10:23	11:23	12:23	2:23	3:23	4:23	5:23
2	Wal-Mart	8:30	9:30	10:30	11:30	12:30	2:30	3:30	4:30	NS
Express Transport leaves Seneca Harbor Park at 5:20PM and arrives at 12th St. & Porter St. at 5:25 PM										

To this…





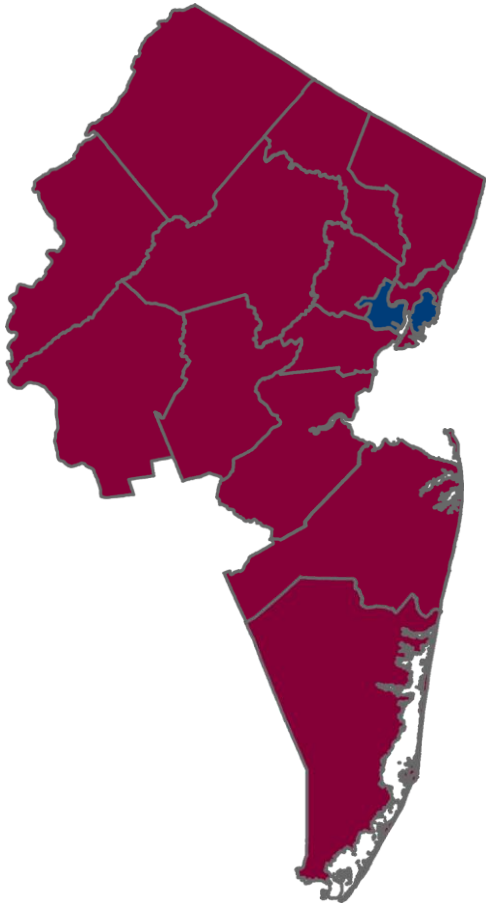

from 113 Central Ave, Newark, NJ 07102
to 1248-1278 Raymond Blvd, Newark, NJ 07102
10:12 AM - 10:16 AM
(4 min)
route_type (3=bus), route_short_name
76
10:14 AM from University Ave at Central Ave
2 min every 5 min
arrival_time, departure_time
SCHEDULE EXPLORER
10:12 AM 113 Central Ave
Newark, NJ 07102
Walk
About 2 min , 443 ft
10:14 AM University Ave at Central Ave
76 76 NEWARK PENN STATION-
Exact Fare
2 min (3 stops) Stop ID: 19050
stop_id, stop_name, stop_lat, stop_lon
10:16 AM Raymond Blvd at Washington St
trip_headsign
10:16 AM 1248-1278 Raymond Blvd
Newark, NJ 07102
Tickets and information
NJ TRANSIT BUS
agency_name, agency_url
These directions are for planning purposes only. You may find that construction projects, traffic, weather, or other events may cause conditions to differ from the map results, and you should plan your route accordingly. You must obey all signs or notices regarding your route.
shapes
Central Ave
Starbucks
Norman Samuels Plaza
Rutgers University - Newark Campus
Rutgers Law School
Alumni Field
Tennis Court
Entrance to Cedar Street subway tunnel
Raymond Blvd at Washington St
1248-1278 Raymond Boulevard
Prudential Insurance Company of America

North Jersey Transportation Planning Authority

The Metropolitan Planning Organization for Northern New Jersey

NJTPA Region

Bergen
Essex
Hudson
Hunterdon
Jersey City
Middlesex
Monmouth
Morris
Newark
Ocean
Passaic
Somerset
Sussex
Union
Warren



North Jersey Transportation Planning Authority

The Metropolitan Planning Organization for Northern New Jersey

STANDING COMMITTEES

Planning & Economic Development Committee

Project Prioritization Committee

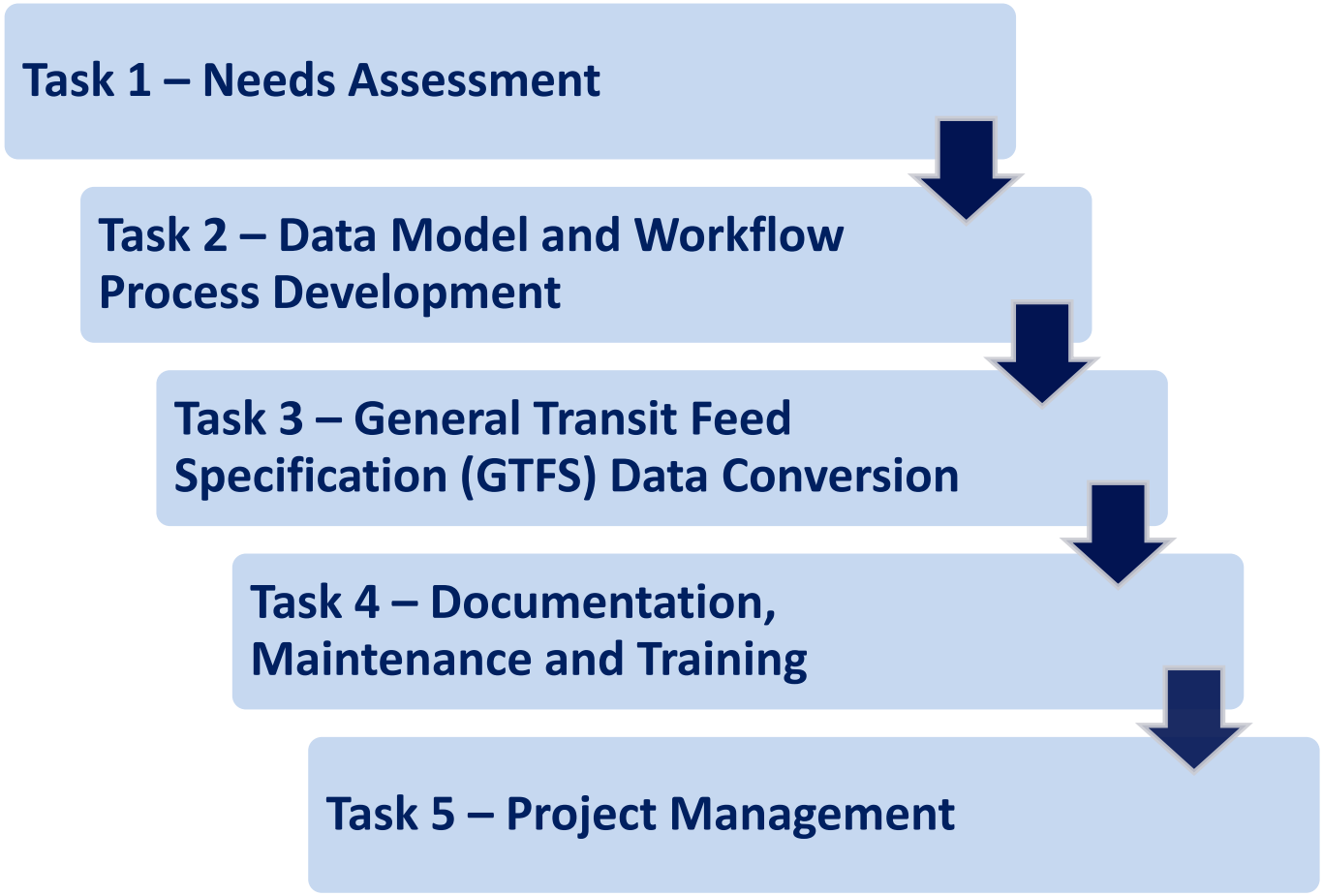
Freight Initiatives Committee

Regional Transportation Advisory Committee

Project Goals

- Develop lines of communication with shared ride agencies for publishing and maintaining shared transportation data
- Establishment of a standardized data template and workflow for data exchange
- Development of a geospatial database of both public and private shared transportation services
- Publication of a standardized GTFS data feed

Project Tasks

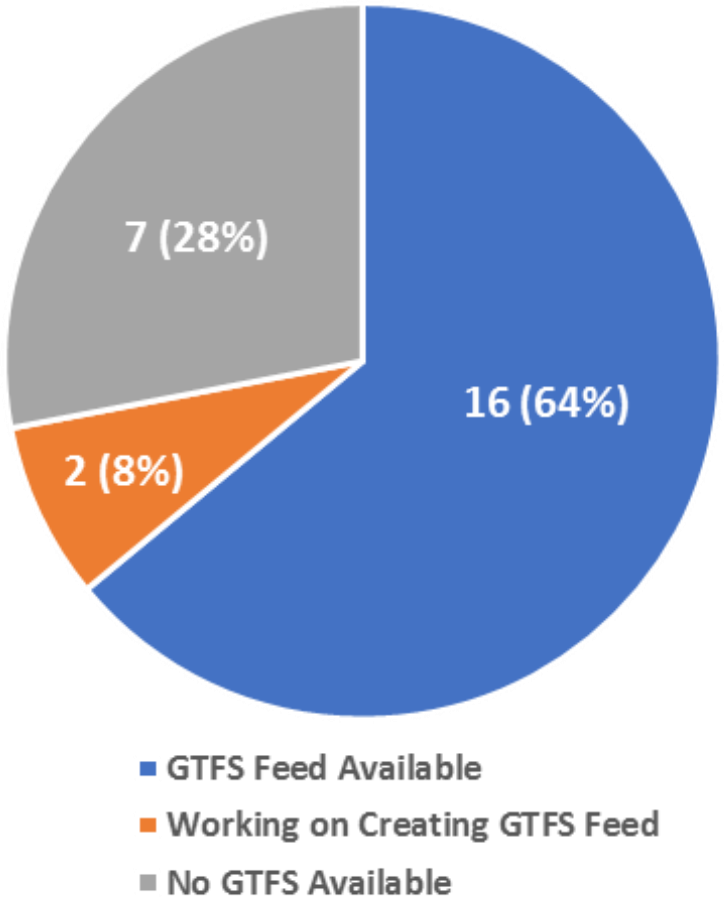


Data Categorization

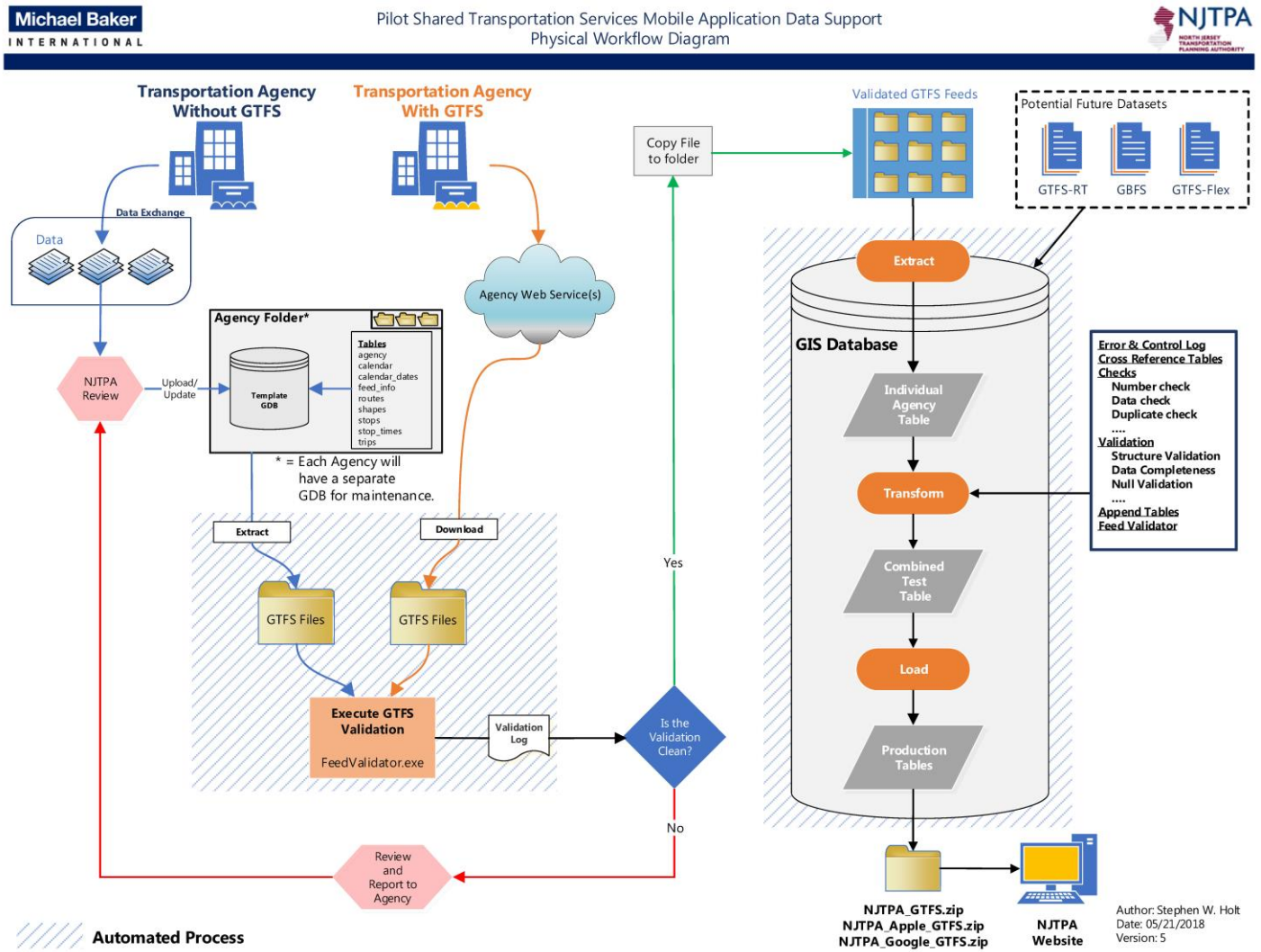
Category	Description	GTFS Data	Online Data	Structured Data
Category 1	GTFS data available	Yes	Yes	Yes
Category 2	Online, structured data	No	Yes	Yes
Category 3	Online, non-structure data	No	Yes	No
Category 4	Offline, structured data	No	No	Yes
Category 5	Offline, non-structured data	No	No	No

Participating Agencies

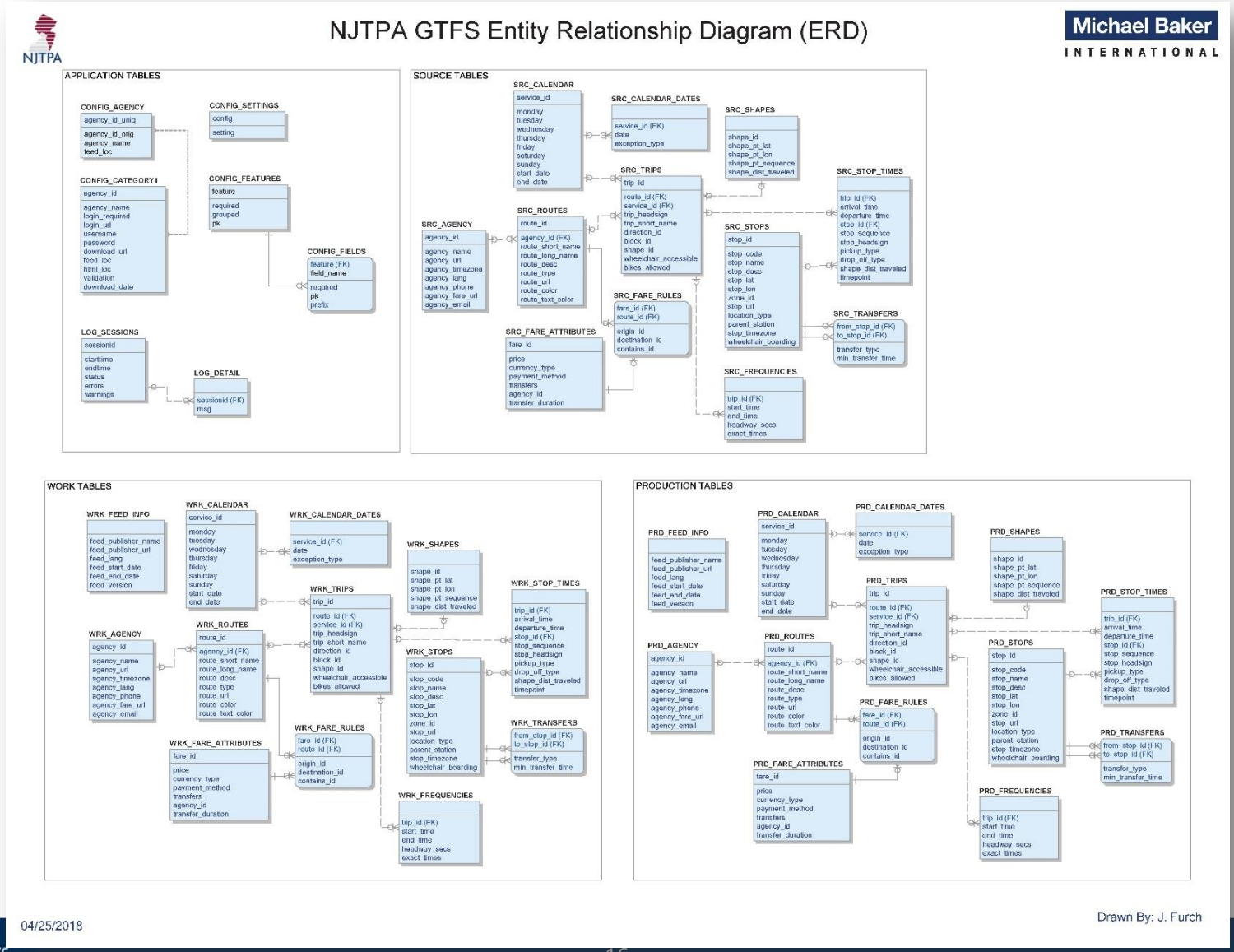
- Bloomfield Township
- Coach USA (x6)
- Cross County Connection TMA (x4)
- EZ Ride
- Greater Mercer TMA (x2)
- Middlesex County Area Transit
- Monroe Township
- New Jersey Transit Corporation (x2)
- Ocean County Transportation
- Our Bus
- Princeton Municipality
- Somerset County
- Sussex County Skylands Ride
- Trans-Bridge
- Warren County



Workflow Diagram

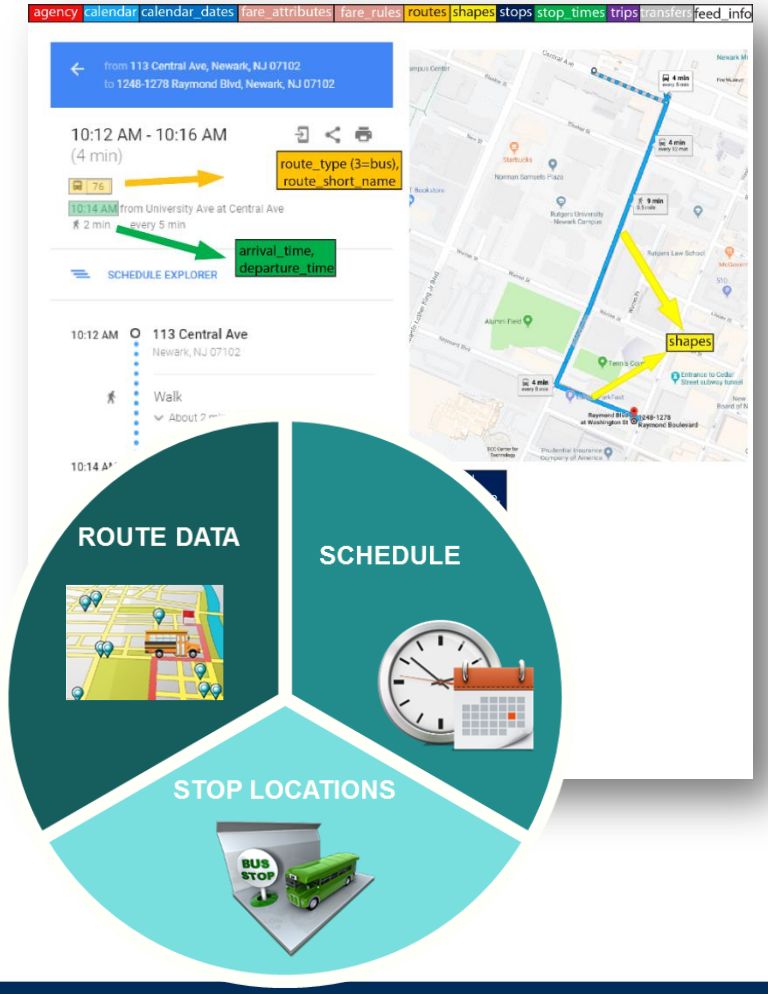


GTFS Entity Relationship Diagram



Data Conversion

- Step 1 – Gather Bus Stop Locations
  - XY coordinates, assign unique stop_id's
- Step 2 – Build Schedules
  - Build the schedules stop-by-stop to generate stop_times and trips.
- Step 3 – Generate Shapes
  - Using GIS, create the physical path the vehicle takes.
- Step 4 – Generate and Validate
  - Fill-in additional data
  - Export and compress data files .zip
  - Feed Validator and Schedule Viewer



GTFS Maintenance

Agency Responsibility

- Maintain GTFS data in specified format
- Provide NJTPA with updated GTFS feed
- Upload to SharePoint
- Provide updates at least two (2) weeks prior to the start of the new feed

NJTPA's Role

- Publish unified GTFS feed to NJTPA's website and third party application on bi-weekly basis
- Maintain data model to adhere to the GTFS standards
- Quarterly email to transit providers

Statewide Unified GTFS feed

NJTPA GTFS (zip file)

An agency outreach plan was developed, with input from the Technical Advisory Committee and participating transit providers. A questionnaire was defined and included in the outreach plan. The questionnaire served as a tool to gather information about existing agency data that could be employed as input to the Pilot Shared Transportation data sets. Once the data was collected a detailed analysis of the participating agencies transit information was conducted.

Based on the data analysis each agency was then classified into one of two categories. Agencies that currently have GTFS data feeds and agencies that do not. These two categories laid the foundation for designing and creating the Agency Data Workflow. This workflow defines how participating agencies will regularly update and maintain their GTFS data. By leveraging existing NJTPA technology and expertise along with industry best practice the Shared Transportation Services Application Data Model was built. As NJTPA receives new and updated data from the agencies it will be uploaded into this data model. The Pilot Shared Transportation Services Mobile Application Database can regularly produce the combined public GTFS feed. This public-facing, free-to-use GTFS feed will ultimately result in improved access to regional transportation options in accord with NJTPA's Goals and Objectives.

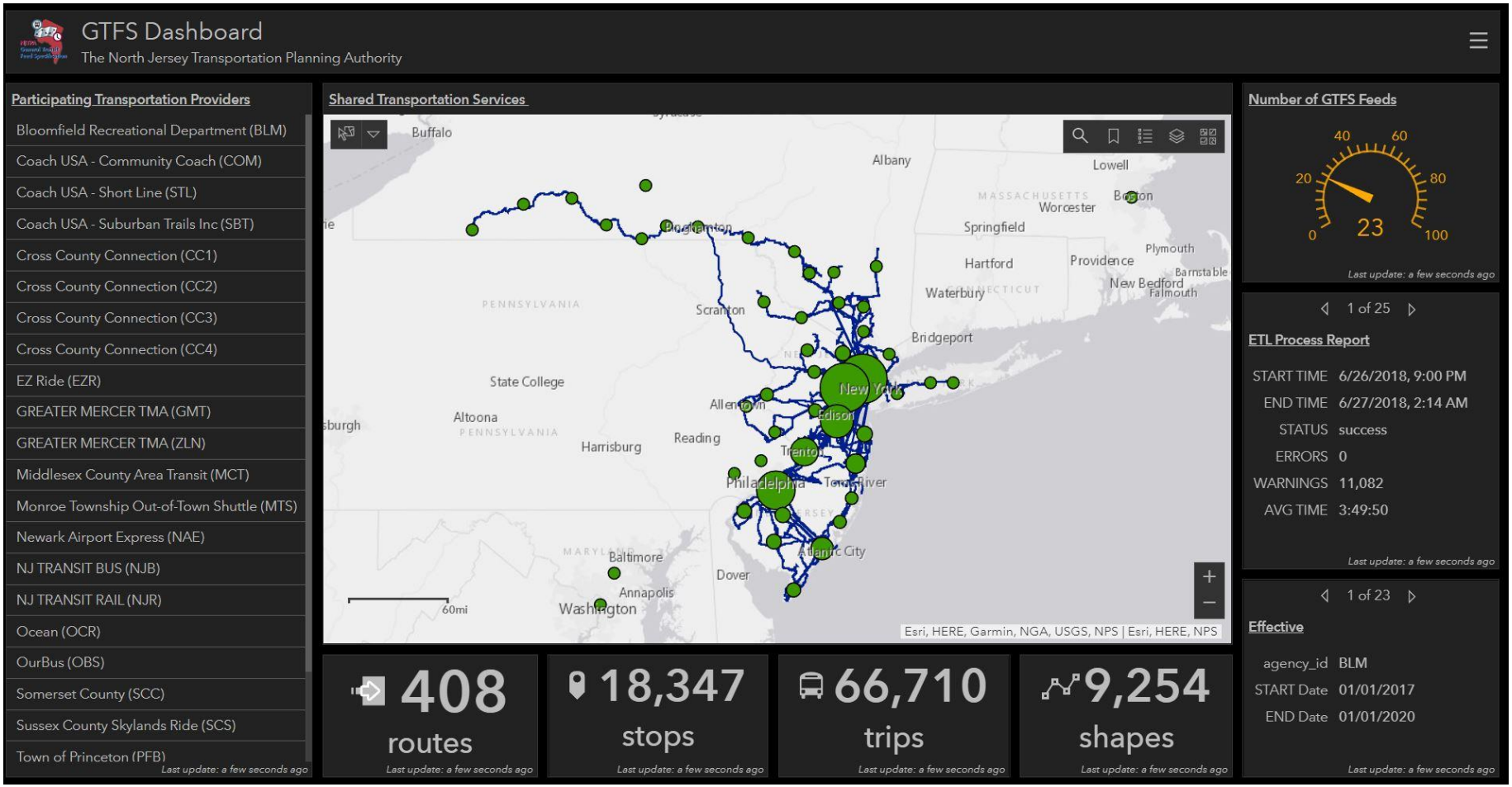
It was found that the largest challenge with managing and maintaining these datasets is participation from each of the share-ride agencies, which includes providing properly formatted data for dissemination. Some options to consider for streamlining this process includes:

- NJTPA providing a standardized website and/or tools for the agencies to maintain these datasets.
- Active participation from the share-ride agencies
- More involvement of the TMAs to gather, manage, and maintain the data.

NJTPA
General Transit
Feed Specification

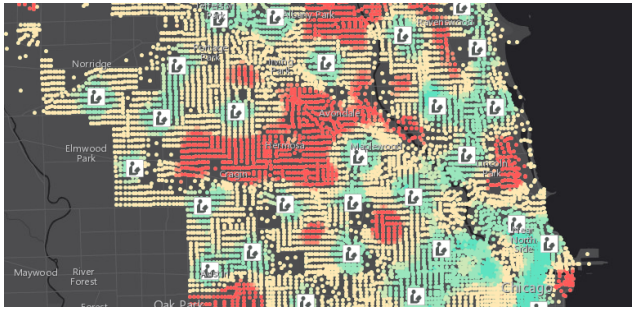
https://www.njtpa.org/data-maps/tools/

GTFS Dashboard



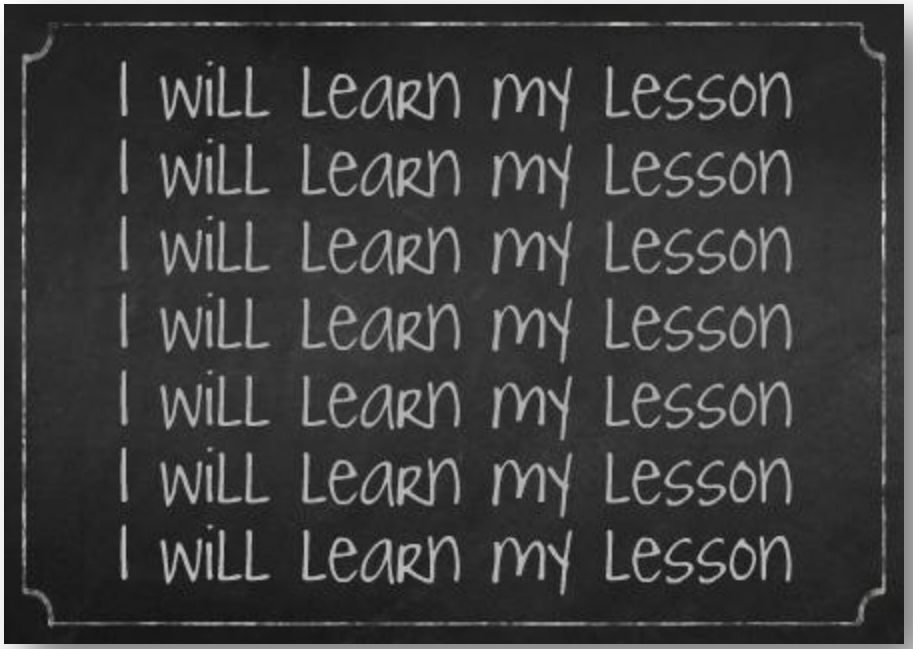
Benefits

- Increased ridership
- Promotes alternative transportation
- Promotes agency's website & services
- Participation is free
- Application use
  - Journey Planning
  - Accessibility Research
  - Comparing Service Levels



Lessons Learned

- Leading edge project
- Gaps in data tools
- Agency participation
  - Designated contact
  - Active involvement
- Agency categorization
- TMA involvement
  - Outreach



Thank You

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Addison Larson
IREG
12/12/18

Mapping with sample error in mind

DELAWARE VALLEY dvrpc REGIONAL PLANNING COMMISSION

Hispanic or Latino Origin, 2016 ACS, Table B03003, 5-Class Quantile, Block Group

Tool demo

https://aplarson.shinyapps.io/MapClassificationAutoreporter/

DELAWARE VALLEY dvrpc REGIONAL PLANNING COMMISSION

1. Geography
2. Number of classes
3. Classification scheme

DELAWARE VALLEY
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REGIONAL
PLANNING COMMISSION

1. Geography
2. Number of classes
3. Classification scheme

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dvrpc
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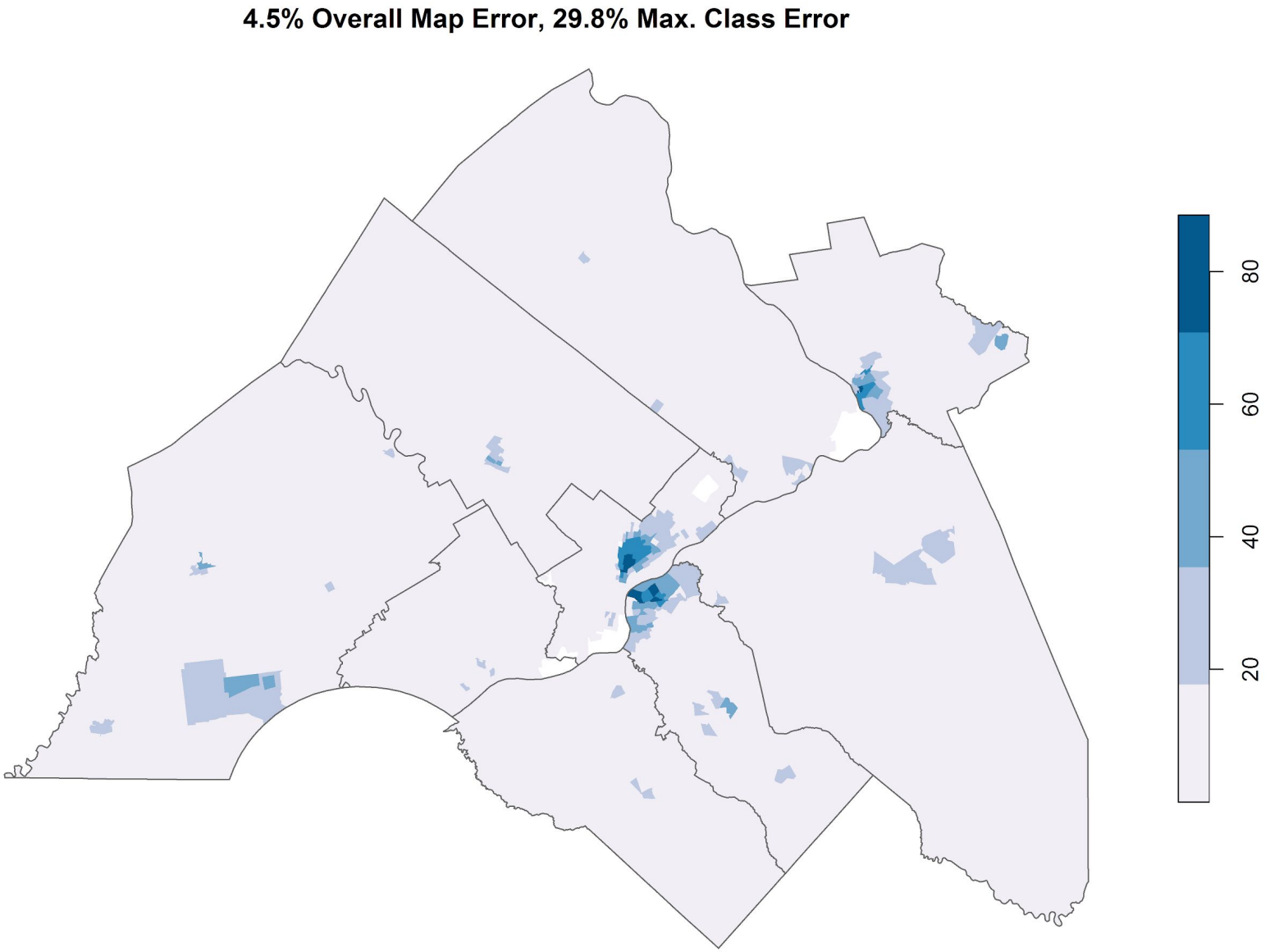
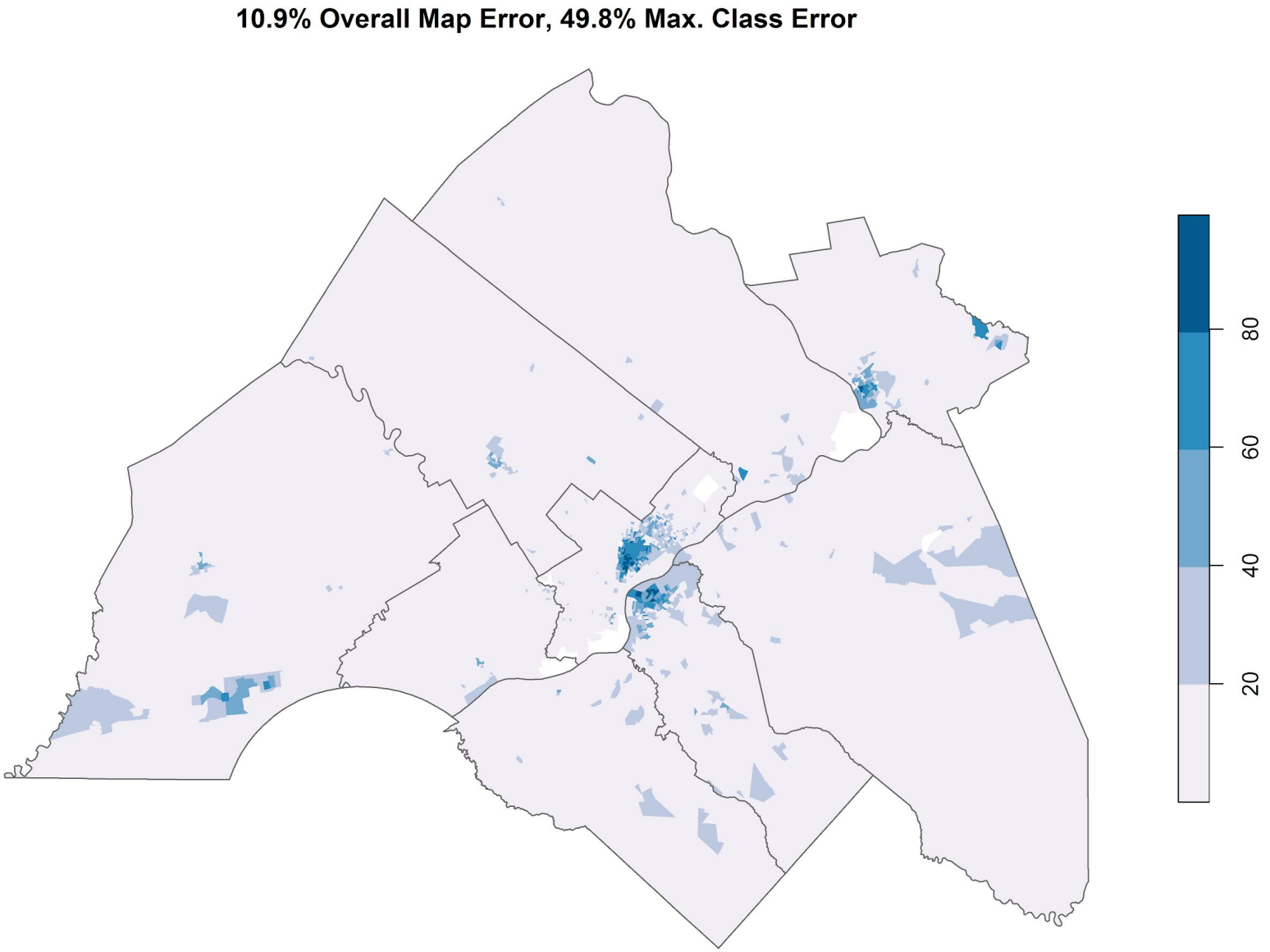
PLANNING COMMISSION

Geography: Tract



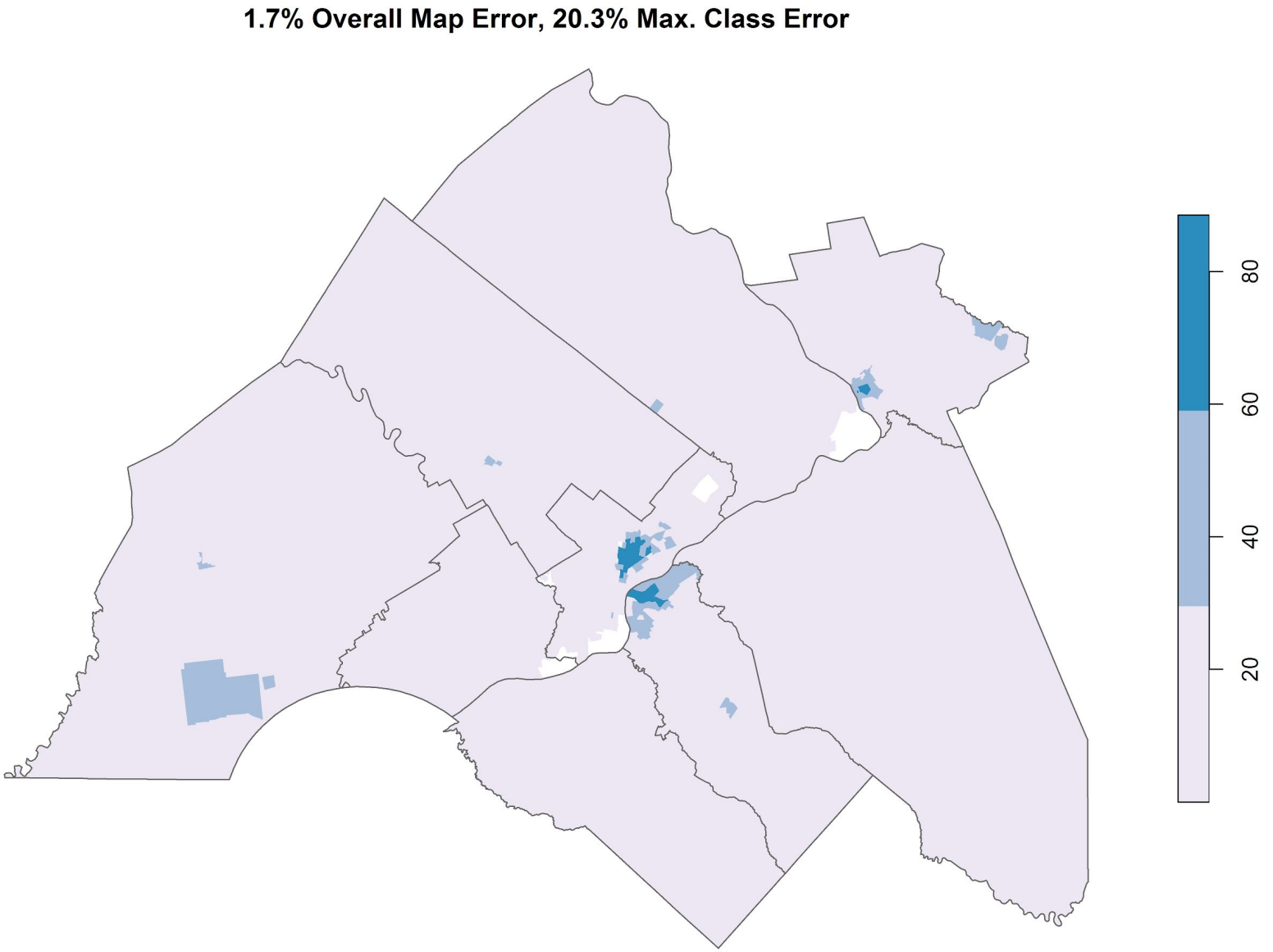
Geography: Block Group



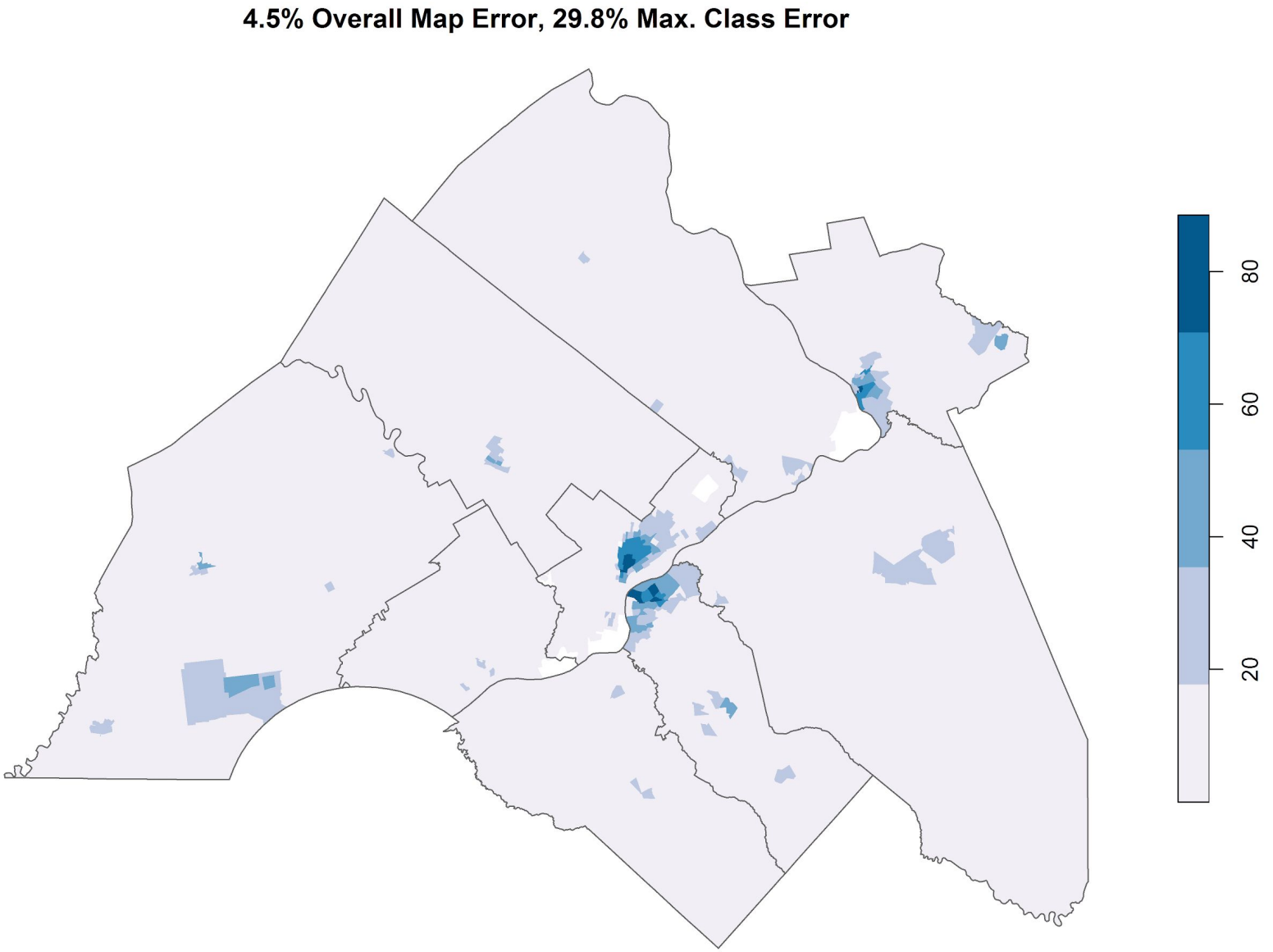
1. Geography
2. Number of classes
3. Classification scheme

DELAWARE VALLEY dvrpc REGIONAL PLANNING COMMISSION

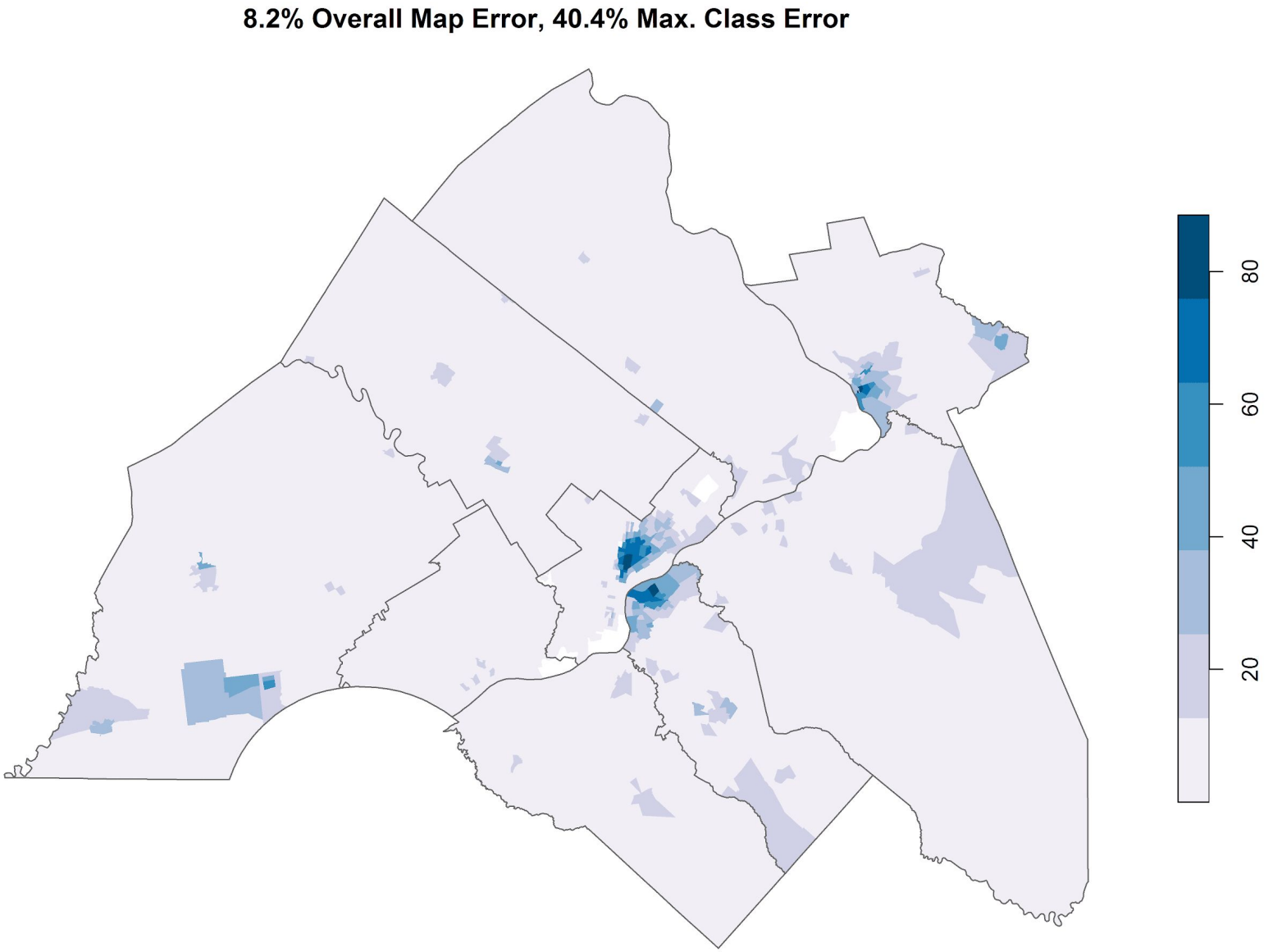
Classes: 3



Classes: 5



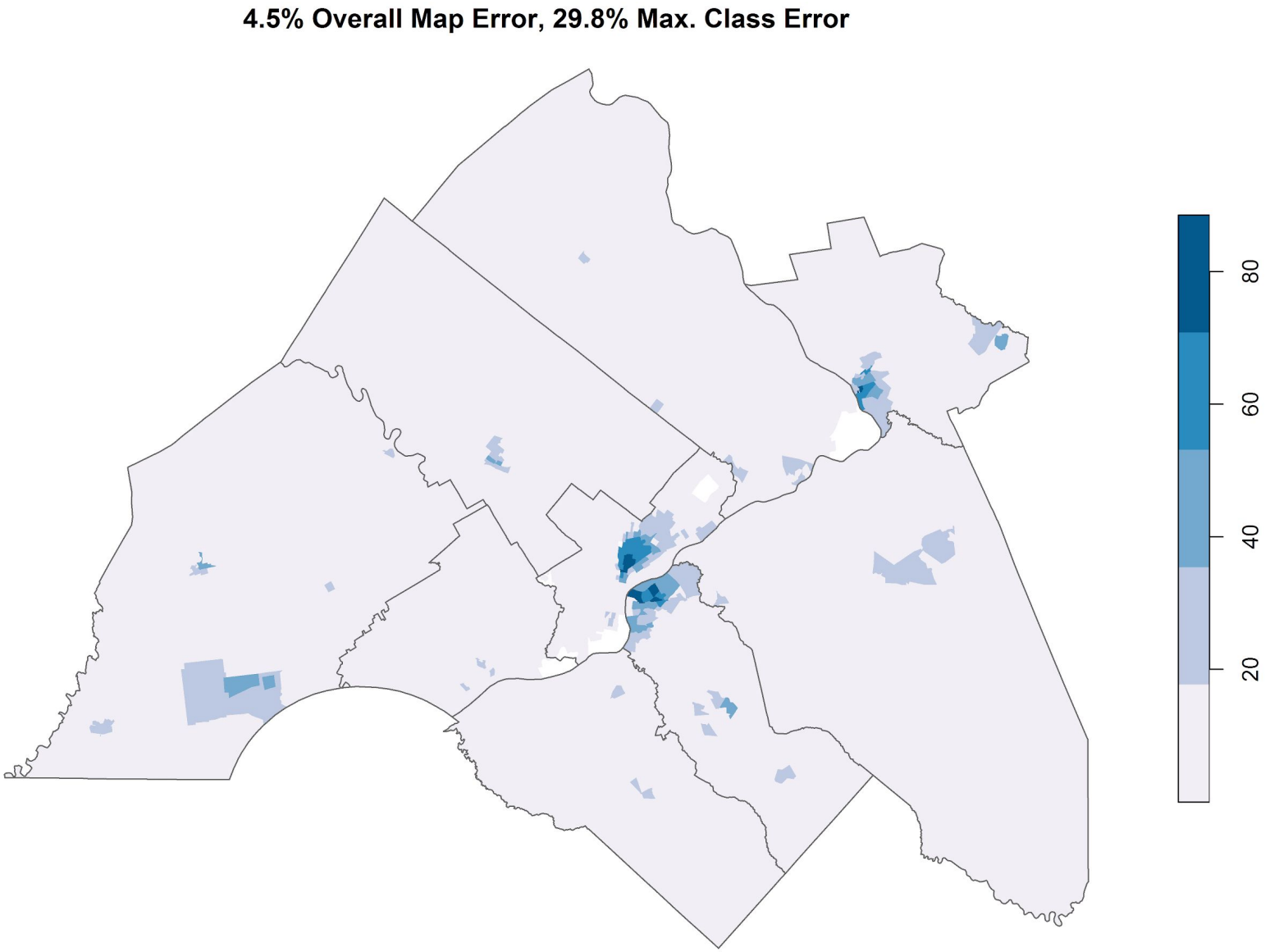
Classes: 7



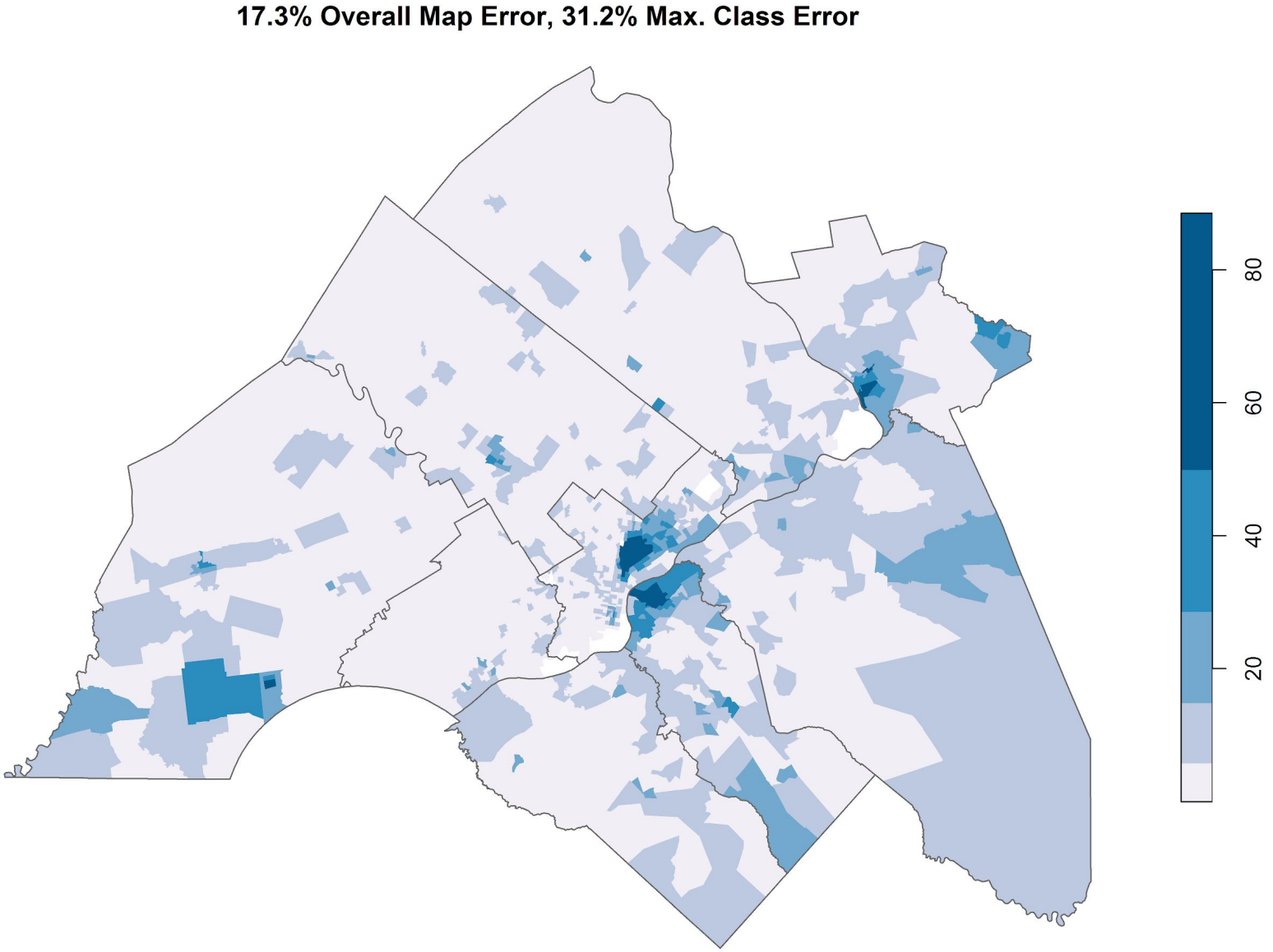
1. Geography
2. Number of classes
3. Classification scheme

DELAWARE VALLEY
dvrpc
REGIONAL
PLANNING COMMISSION

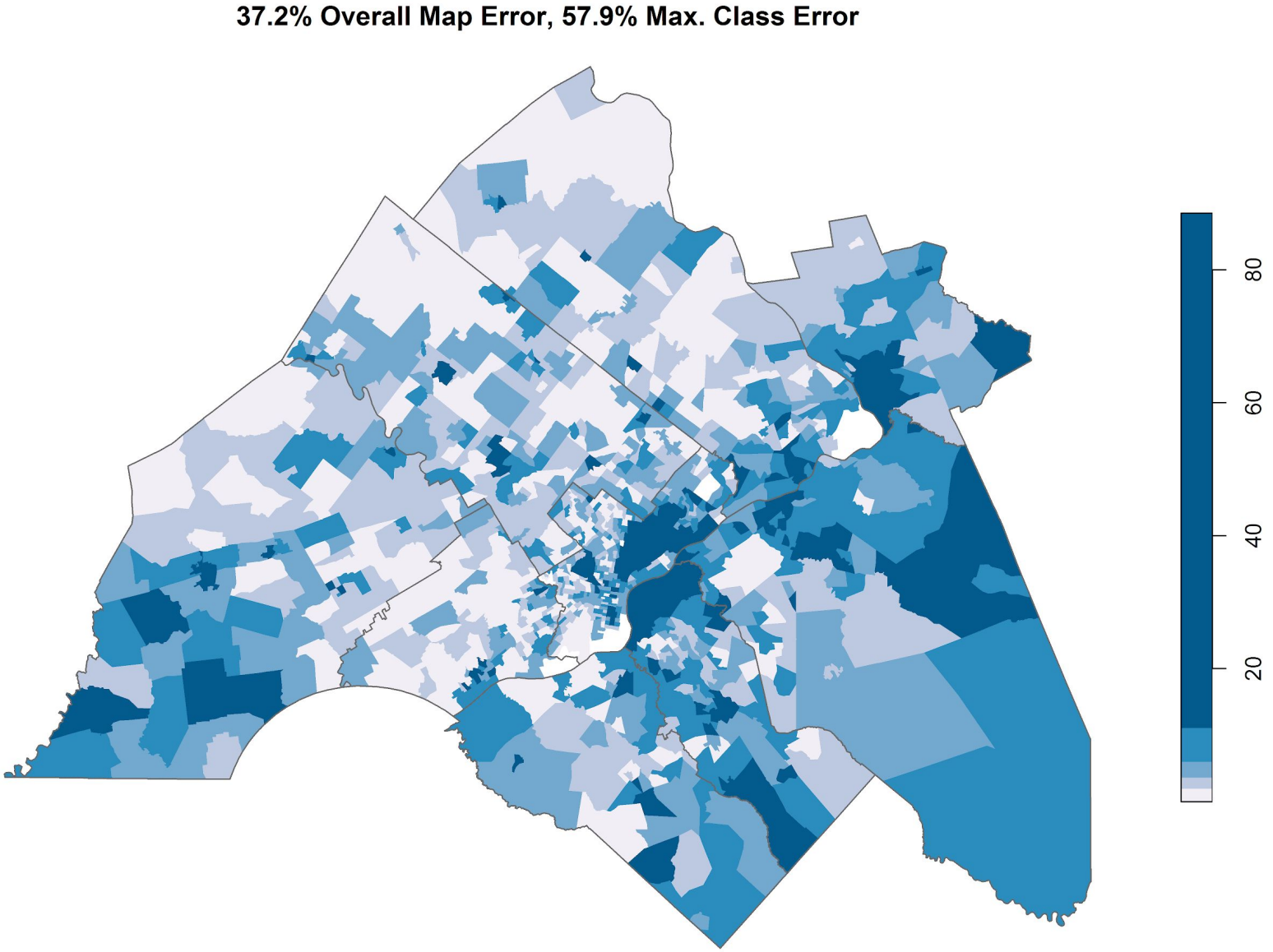
Classification: Equal Interval



Classification: Jenks



Classification: Quantile



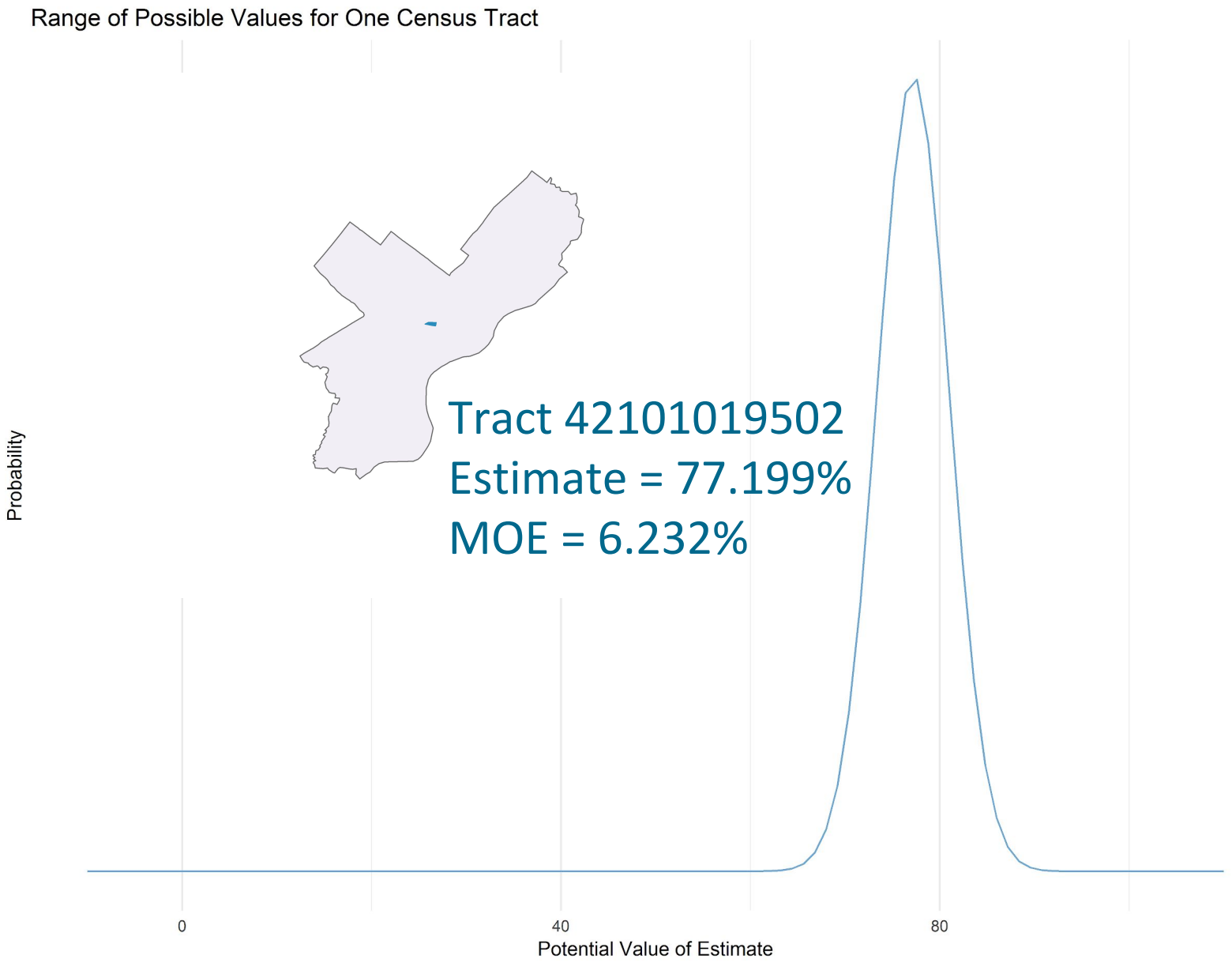
1. Error by tract
2. Error by class
3. Overall error
4. Recap

DELAWARE VALLEY
dvrpc
REGIONAL
PLANNING COMMISSION

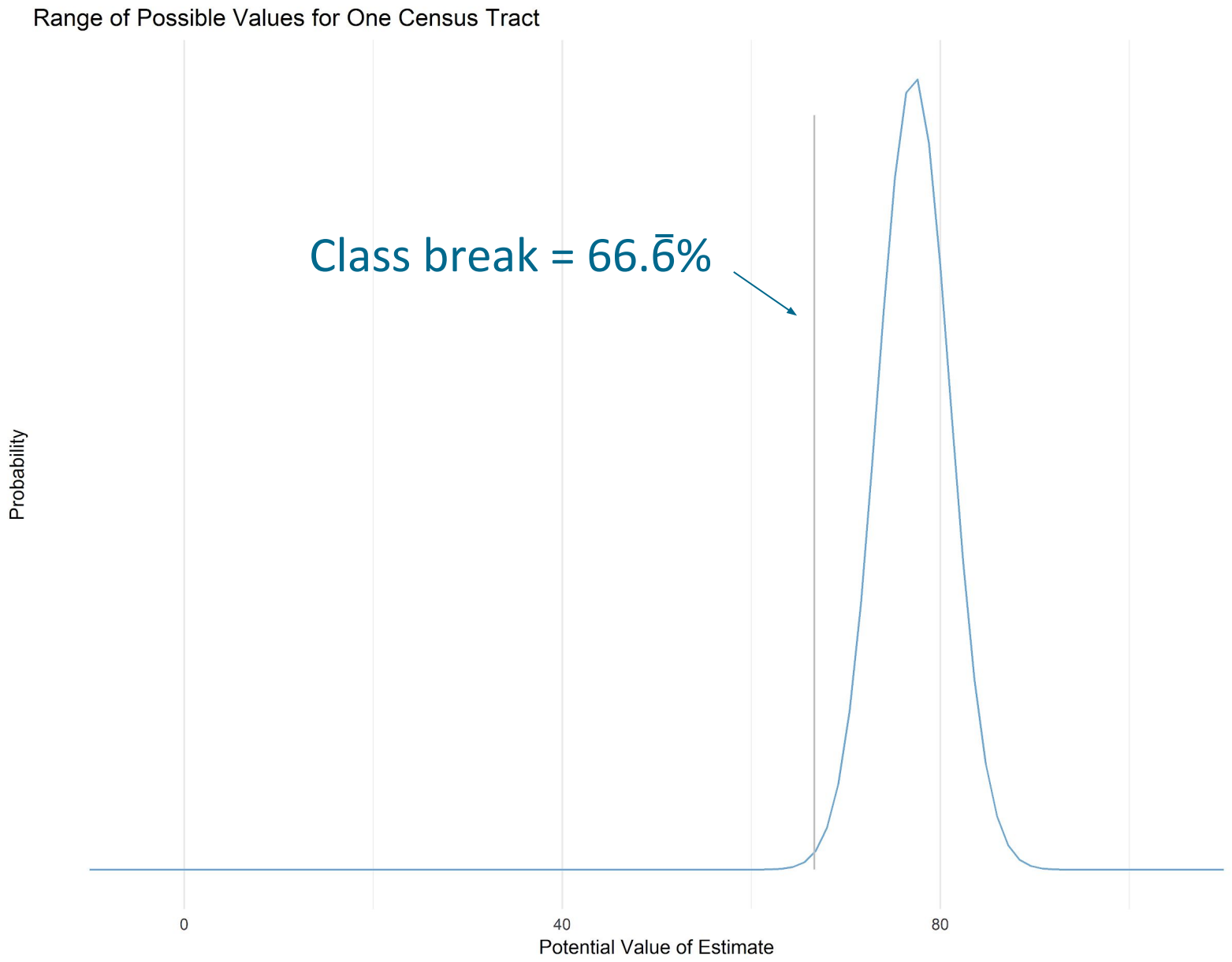
1. Error by tract
2. Error by class
3. Overall error
4. Recap

DELAWARE VALLEY
dvrpc
REGIONAL
PLANNING COMMISSION

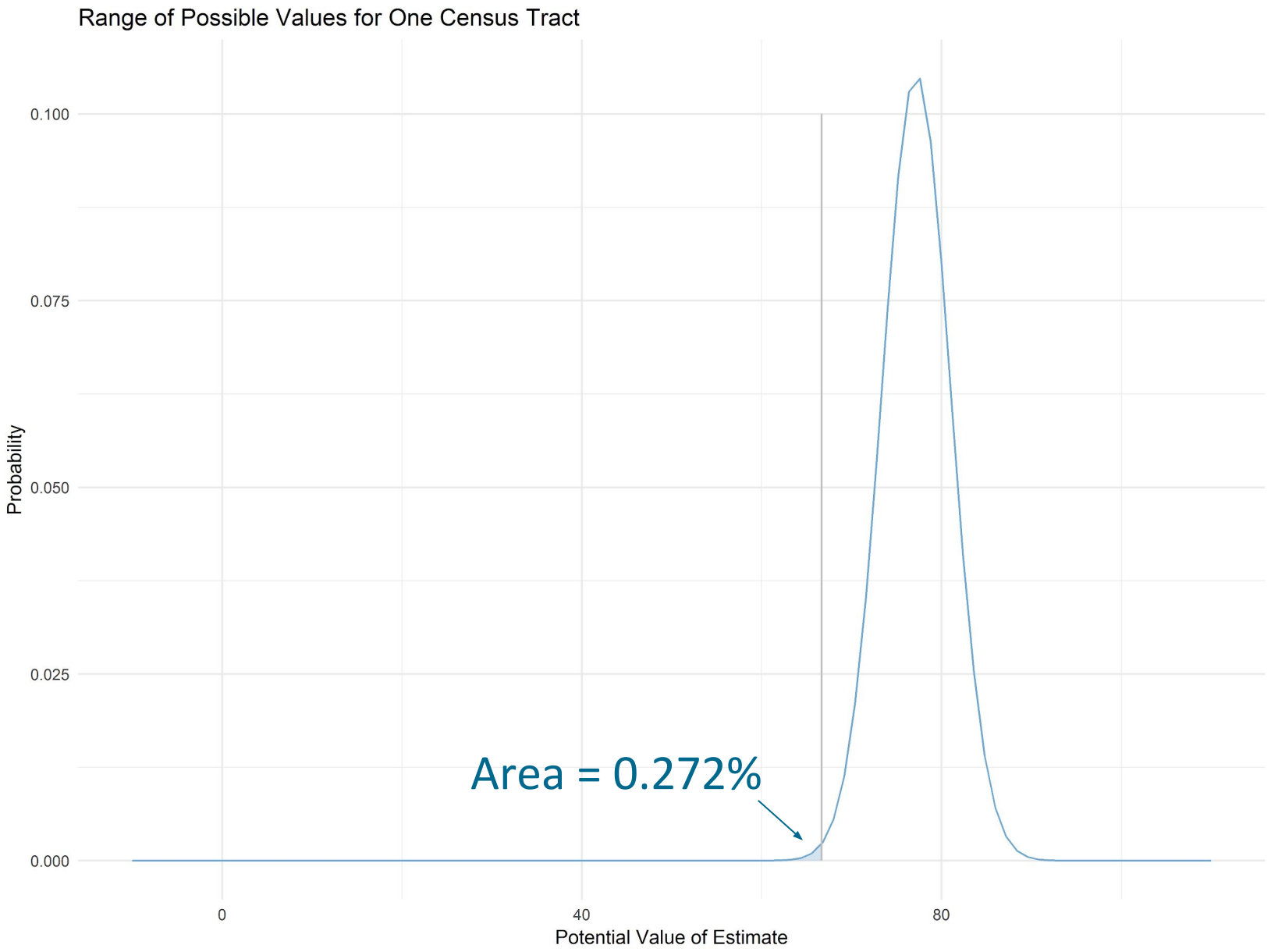
Error by tract



Error by tract



Error by tract



1. Error by tract
2. Error by class
3. Overall error
4. Recap

DELAWARE VALLEY
dvrpc
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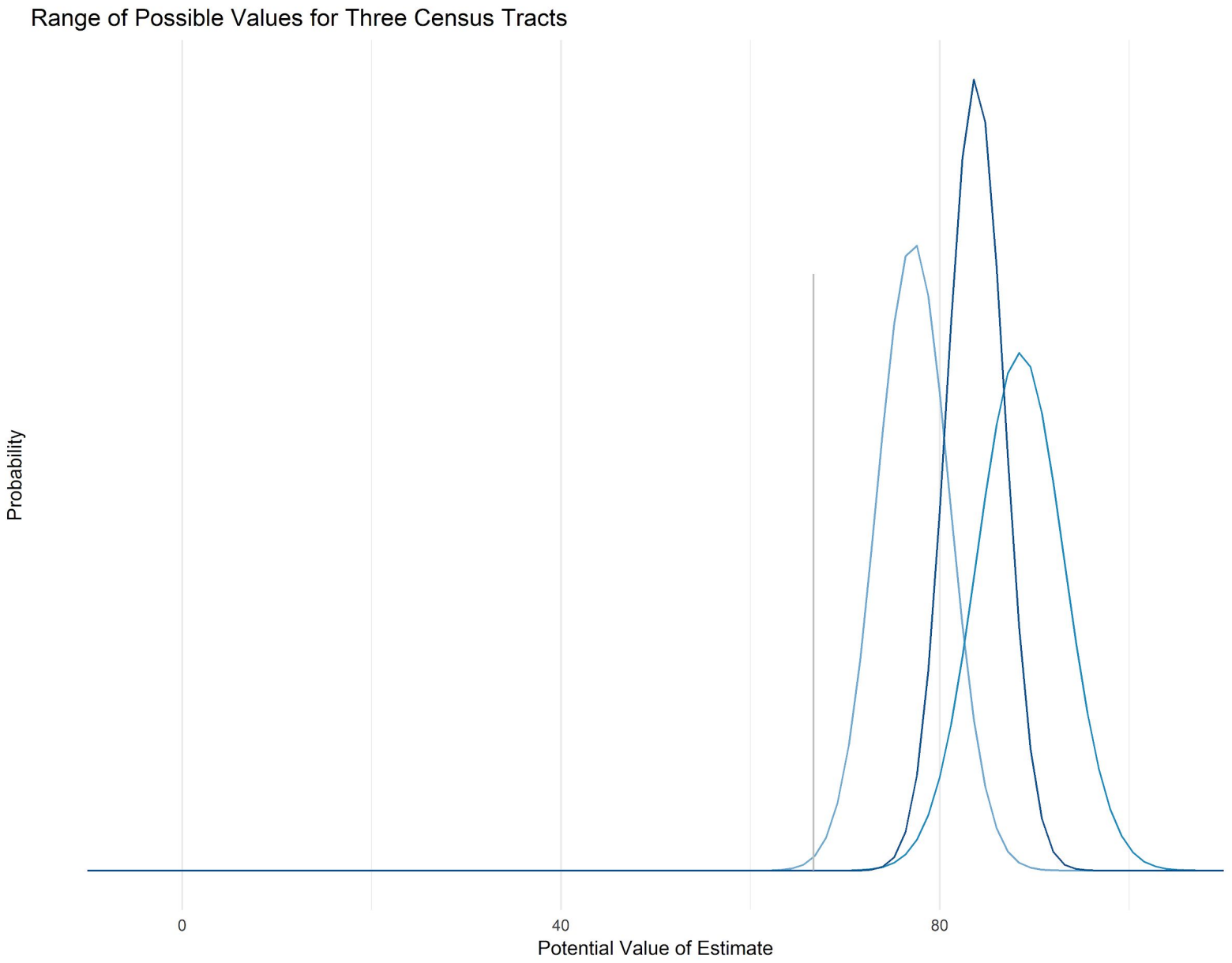
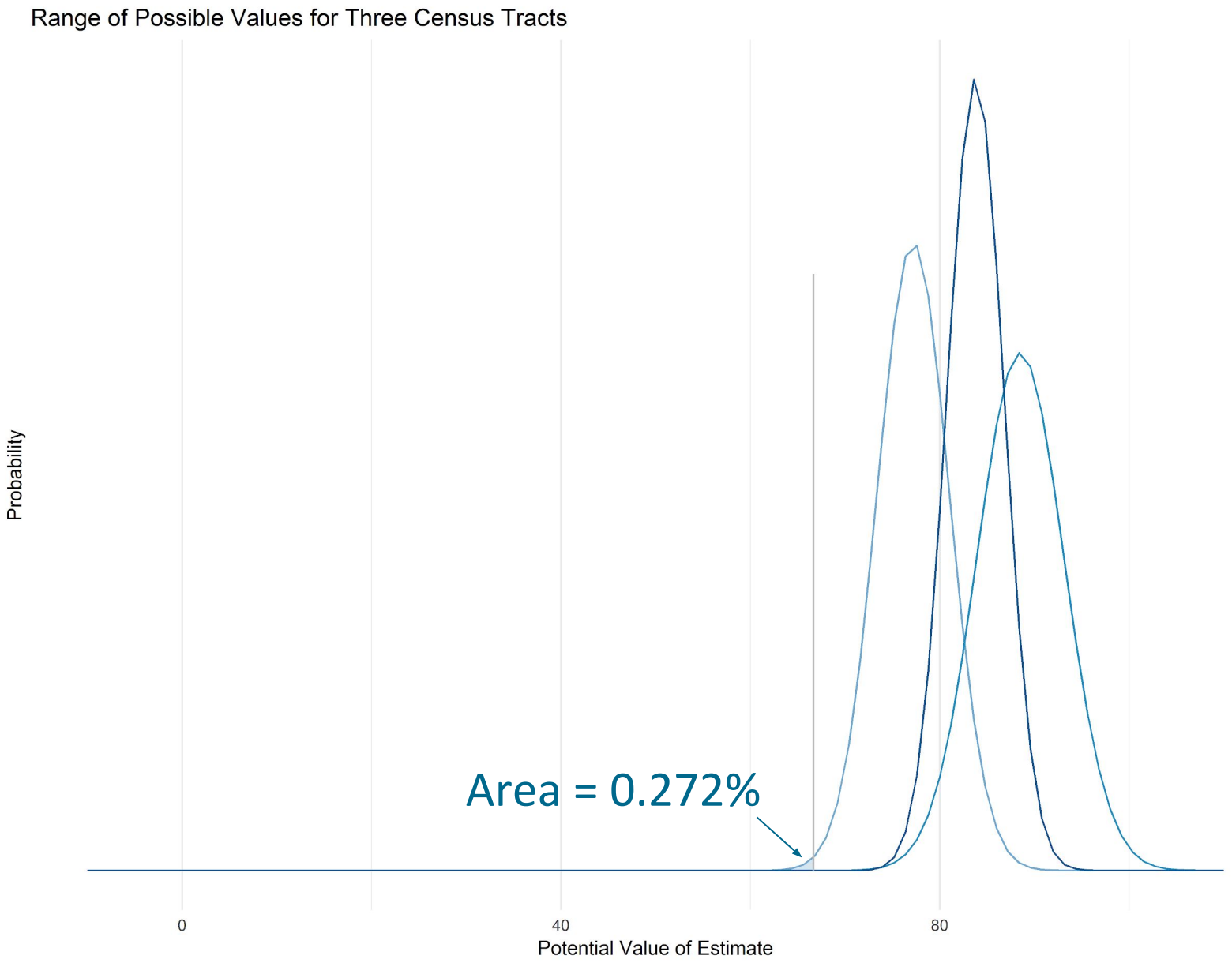
PLANNING COMMISSION

Error by class



Error by class



Error by class

Tract	Est.	MOE	Lower Bound Error	Upper Bound Error	Tot. Error
42101019502	77.2%	6.2%	0.272%	0%	0.272%
42101017601	88.5%	7.6%	0%	0%	0%
42101017602	83.8%	4.9%	0%	0%	0%
				Sum of Errors	0.272%

Class Error = (Sum of Errors / No. of Estimates) = (0.272% / 3) = **0.091%**

1. Error by tract
2. Error by class
3. Overall error
4. Recap

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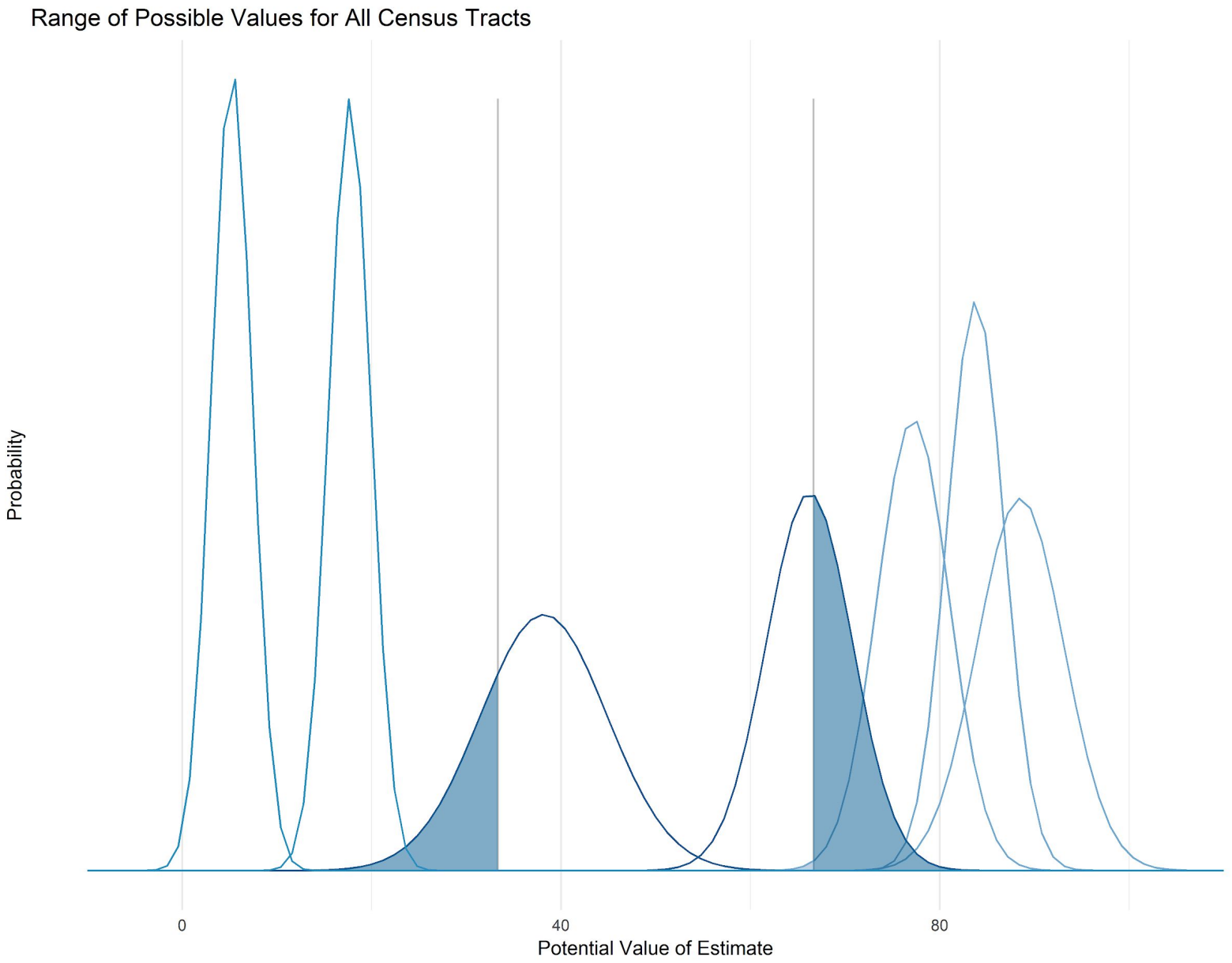
PLANNING COMMISSION

Overall error



Overall error

Class	Est.	MOE	Min. Value	Max. Value
Bottom	17.7%	3.6%	14.1%	21.3%
Bottom	5.2%	3.5%	1.7%	8.7%
Middle	38.2%	11.0%	27.2%	49.2%
Middle	66.2%	7.5%	58.8%	73.7%
Top	77.2%	6.2%	71.0%	83.4%
Top	88.5%	7.6%	81.0%	96.1%
Top	83.8%	4.9%	78.8%	88.7%

Overall error

Class	No. of Estimates	Mean Class Error
Bottom	2	0%
Middle	2	34.837%
Top	3	0.091%
	Overall	**9.994%**

Overall error is the mean class error weighted by the number of observations.

Overall error

Class	No. of Estimates	Mean Class Error
Bottom	2	0%
Middle	2	34.837%
Top	3	0.091%
	Overall	**9.994%**

Maps are considered reliable if no class error exceeds **20%** and the overall error is below **10%**.

Verdict: Overall error is OK, but class error is not.

1. Error by tract
2. Error by class
3. Overall error
4. Recap

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Recap

- Each estimate has expected lower and upper bound classification error
- Class error built from mean of estimate errors
- Overall map error is weighted mean class error
- Reliability cutoffs:
  - 20% by class
  - 10% overall

Tool demo

https://aplarson.shinyapps.io/MapClassificationAutoreporter/

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Future plans

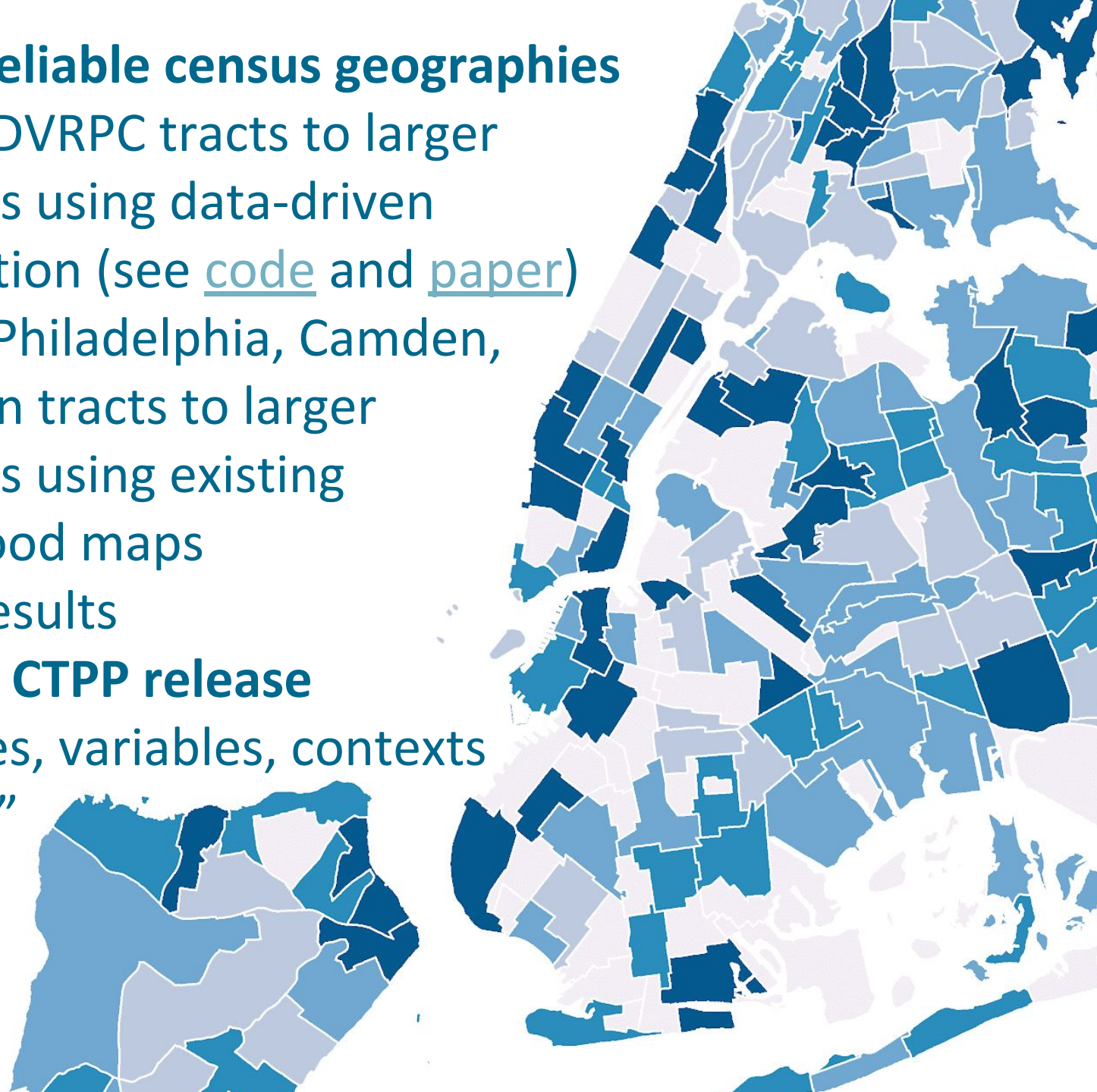
DELAWARE VALLEY
dvrpc
REGIONAL
PLANNING COMMISSION

Create more reliable census geographies

- Aggregate DVRPC tracts to larger geographies using data-driven regionalization (see code and paper)
- Aggregate Philadelphia, Camden, and Trenton tracts to larger geographies using existing neighborhood maps
- Compare results

Evaluate 2016 CTPP release

- Geographies, variables, contexts
- “CV viewer”



DELAWARE VALLEY
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REGIONAL
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Addison Larson
alarson@dvrpc.org
https://github.com/addisonlarson/MapReliabilityTool

CARTO

Fancy CARTO, Made Easy: VL and Airship

bit.ly/ireg-carto-libraries

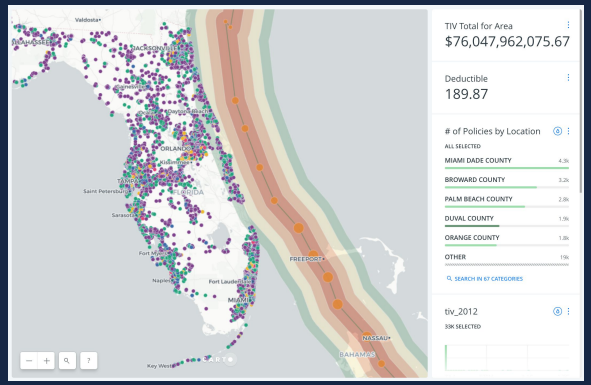
Andrew Thompson

Solutions Engineer

THE CARTO PLATFORM MAKES LOCATION DATA ACTIONABLE FOR ALL USER TYPES

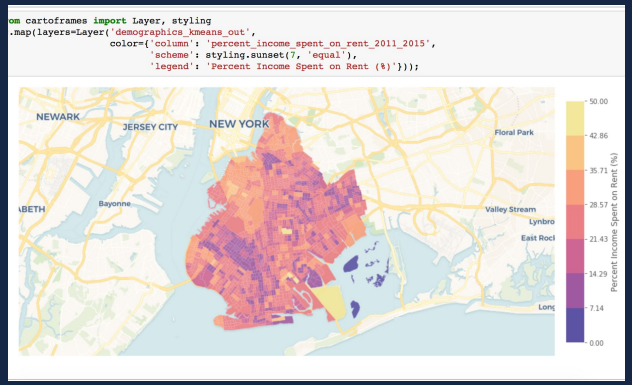
ANALYSTS & BUSINESS USERS

Out of the box location intelligence for analysts to create and use intuitive maps and map-based dashboards.



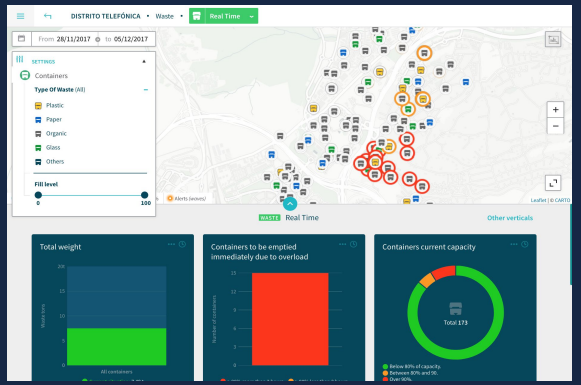
DATA SCIENTISTS

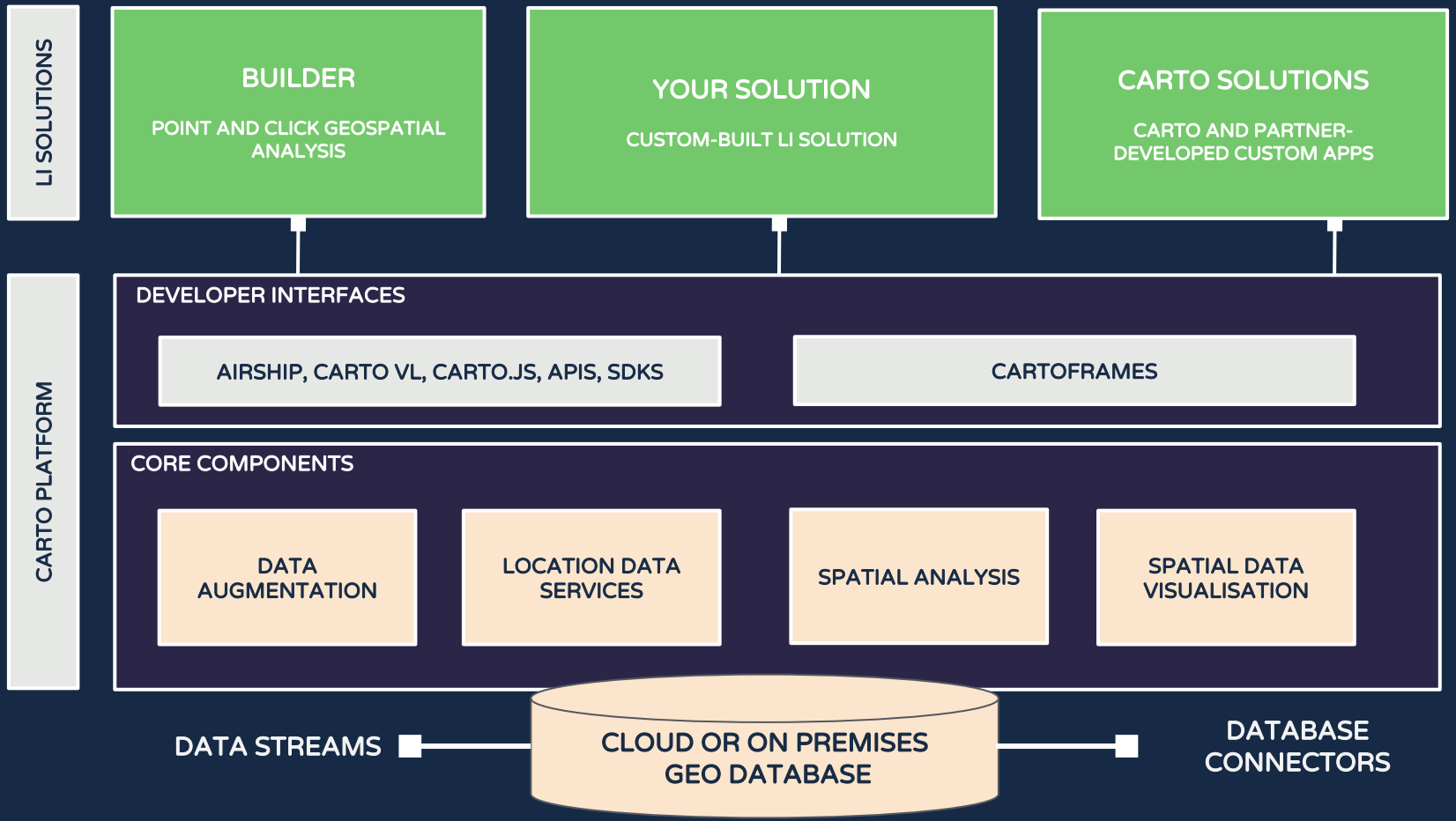
Powerful data science and analysis tools for understanding, predicting, and optimizing.



DEVELOPERS

Industrial grade APIs, SDKs and tools for developers to build world class geospatial apps.




LI SOLUTIONS
BUILDER
POINT AND CLICK GEOSPATIAL ANALYSIS
YOUR SOLUTION
CUSTOM-BUILT LI SOLUTION
CARTO SOLUTIONS
CARTO AND PARTNER-DEVELOPED CUSTOM APPS
CARTO PLATFORM
DEVELOPER INTERFACES
AIRSHIP, CARTO VL, CARTO.JS, APIS, SDKS
CARTOFRAMES
CORE COMPONENTS
DATA AUGMENTATION
LOCATION DATA SERVICES
SPATIAL ANALYSIS
SPATIAL DATA VISUALISATION
DATA STREAMS
CLOUD OR ON PREMISES GEO DATABASE
DATABASE CONNECTORS

SIEMENS

Vehicle Capacity and Vehicle Occupancy

SELECT MODE

BUS | U-BAHN | S-BAHN | TRAM | +3

SELECT LINE SELECT JOURNEY

All Lines Selected

Total Occupancy

-0,3% from last week same time

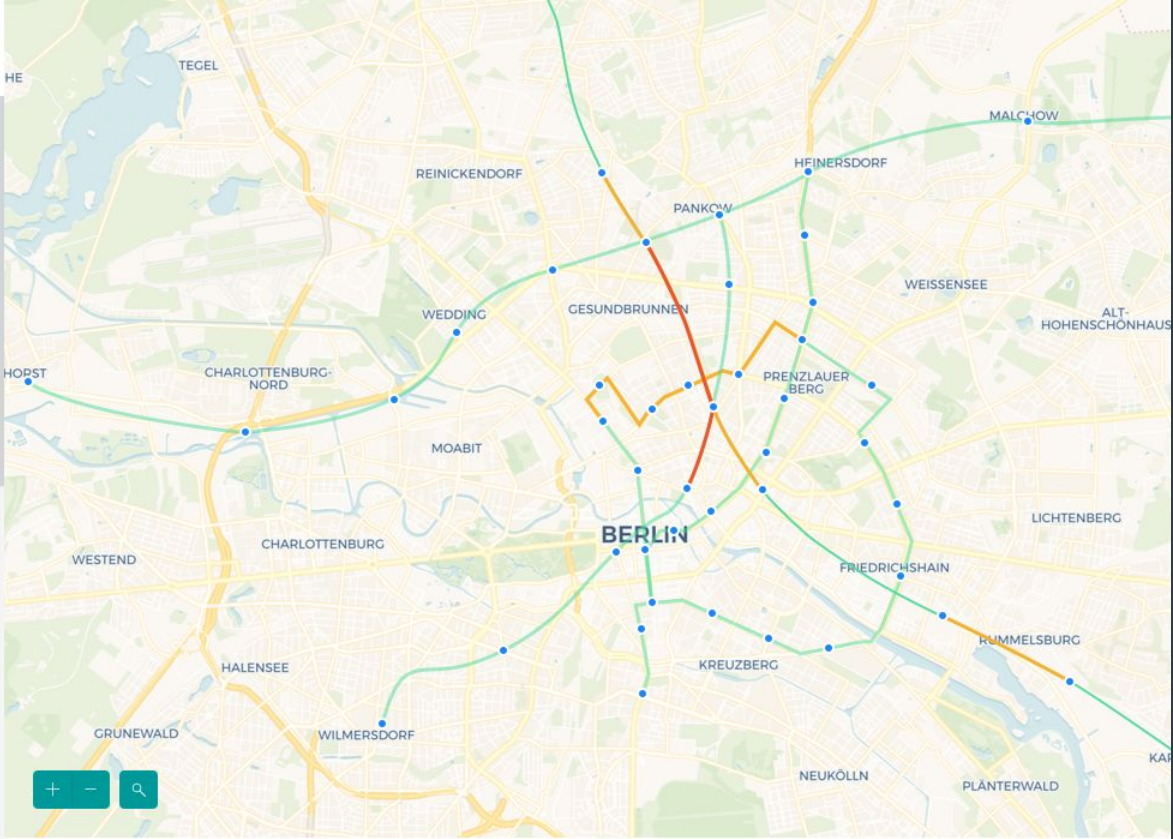
67,350

passengers

Lines Occupancy

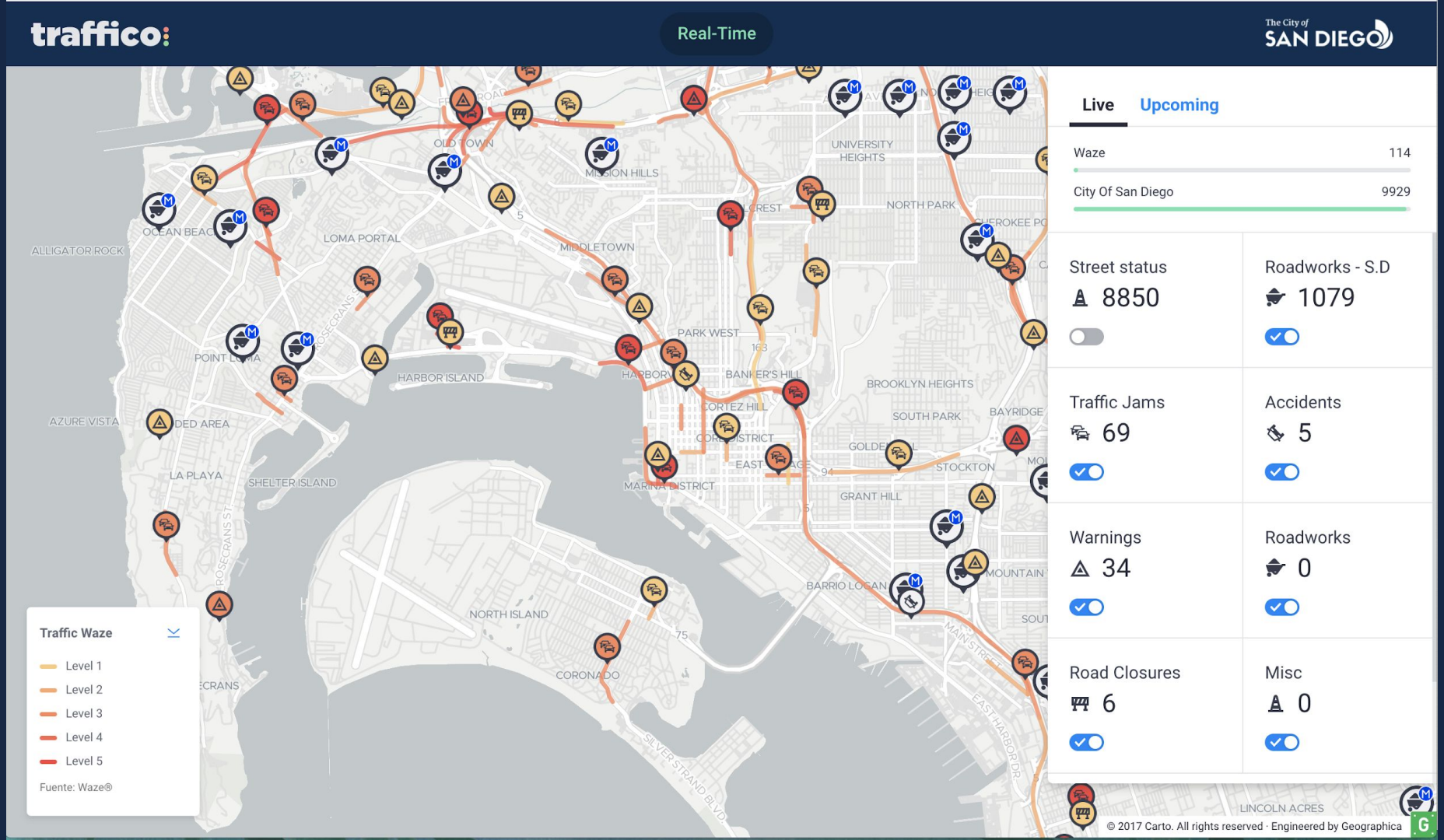
All Transport Modes Selected

S5	99%
3 segments with issues	
U6	90%
2 segments with issues	
TRX	81%
1 segment with issues	
U7	30%
U1	30%
U9	30%
U5	30%
U7	30%
U1	30%



Today, 11th of July at 11:40

Today | Yesterday | Last week | Last month | Same time last year | Select a time frame


traffico:
Real-Time
The City of SAN DIEGO
Live
Upcoming
Waze 114
City Of San Diego 9929
Street status 8850
Roadworks - S.D 1079
Traffic Jams 69
Accidents 5
Warnings 34
Roadworks 0
Road Closures 6
Misc 0
Traffic Waze
Level 1
Level 2
Level 3
Level 4
Level 5
Fuente: Waze®
OLD TOWN
MISSION HILLS
UNIVERSITY HEIGHTS
NORTH PARK
OCEAN BEACH
LOMA PORTAL
MIDDLETOWN
ALLIGATOR ROCK
POINT LOMA
HARBOR ISLAND
PARK WEST
BANKER'S HILL
BROOKLYN HEIGHTS
SOUTH PARK
BAYRIDGE
AZURE VISTA
LA PLAYA
SHELTER ISLAND
CORTEZ HILL
STOCKTON
GRANT HILL
MARINA DISTRICT
BARRIO LOGAN
NORTH ISLAND
CORONADO
LINCOLN ACRES
© 2017 Carto. All rights reserved · Engineered by Geographica

CARTO Javascript Map Libraries

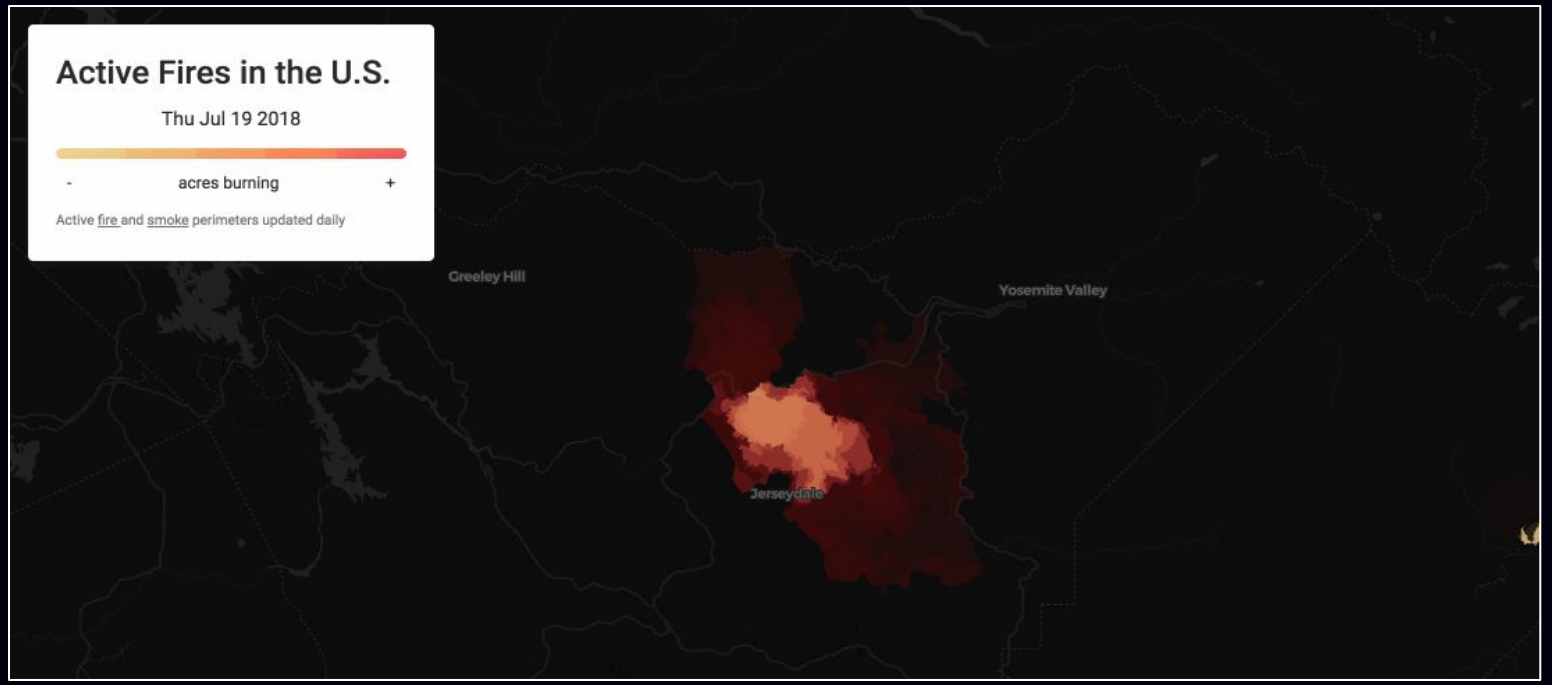
Connect the CARTO platform's geospatial backend to the browser

Use and extend the Auth, Maps, and SQL APIs

CARTO.js for "raster" tiles with Leaflet/GMaps and SQL/CartoCSS

CARTO VL for "vector" tiles with MapboxGL and SQL/VL-Style

➔ **CARTO VL** is a javascript library to build location intelligence applications using the power of **vector rendering technology.**

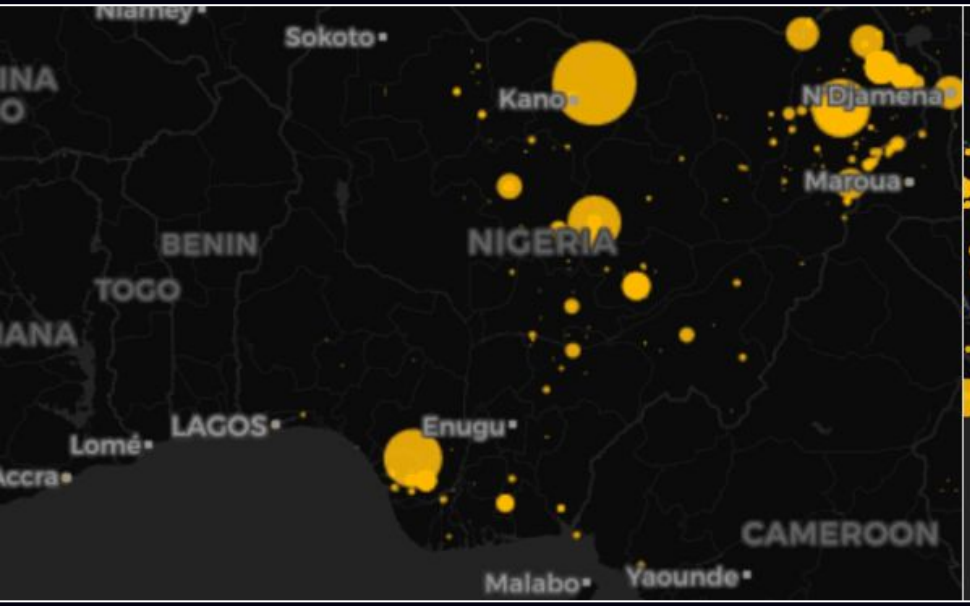


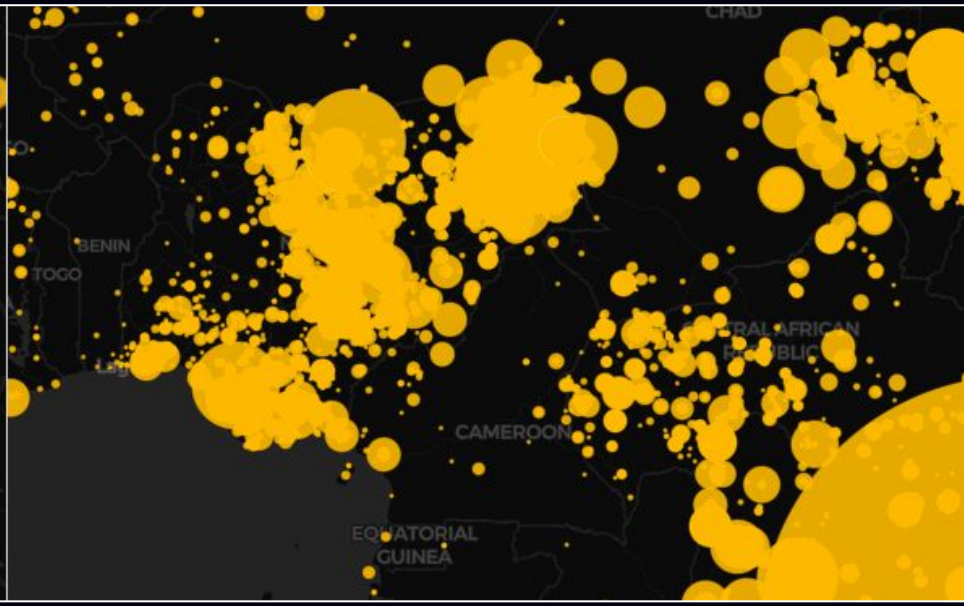
Raster (CARTO.js):
> Image tiles (PNG) rendered on remote server

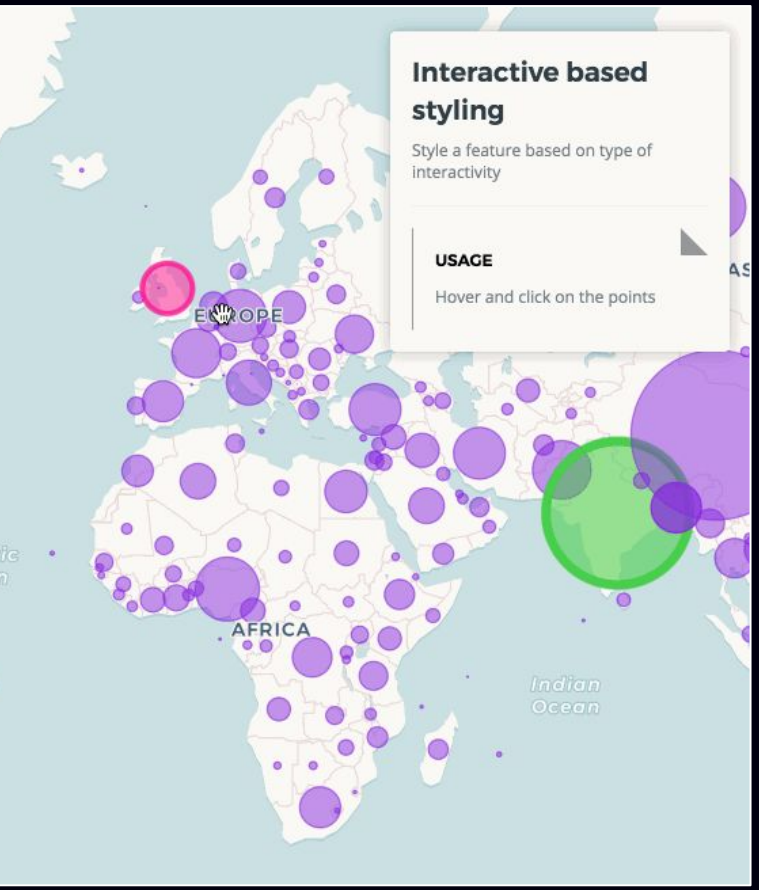
Database query processed through Mapnik and CartoCSS styling language, returns images to browser

Vector (CARTO VL):
> Data tiles (MVT) rendered in your browser

Database query returned straight to browser as MVT format data tile, viz and styling happens on your GPU



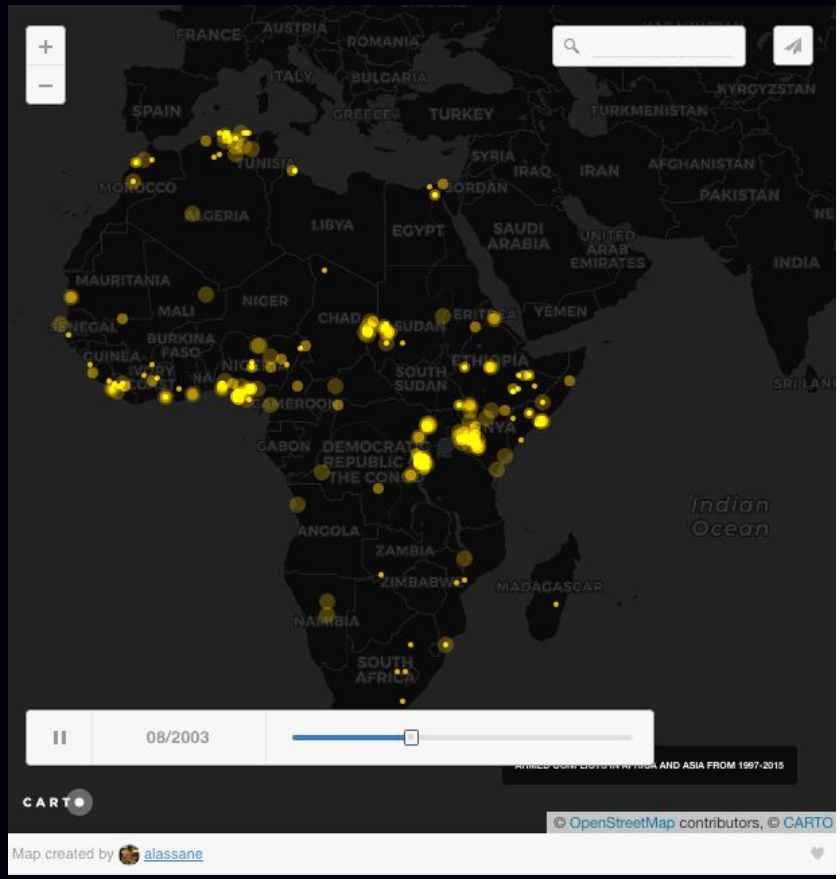




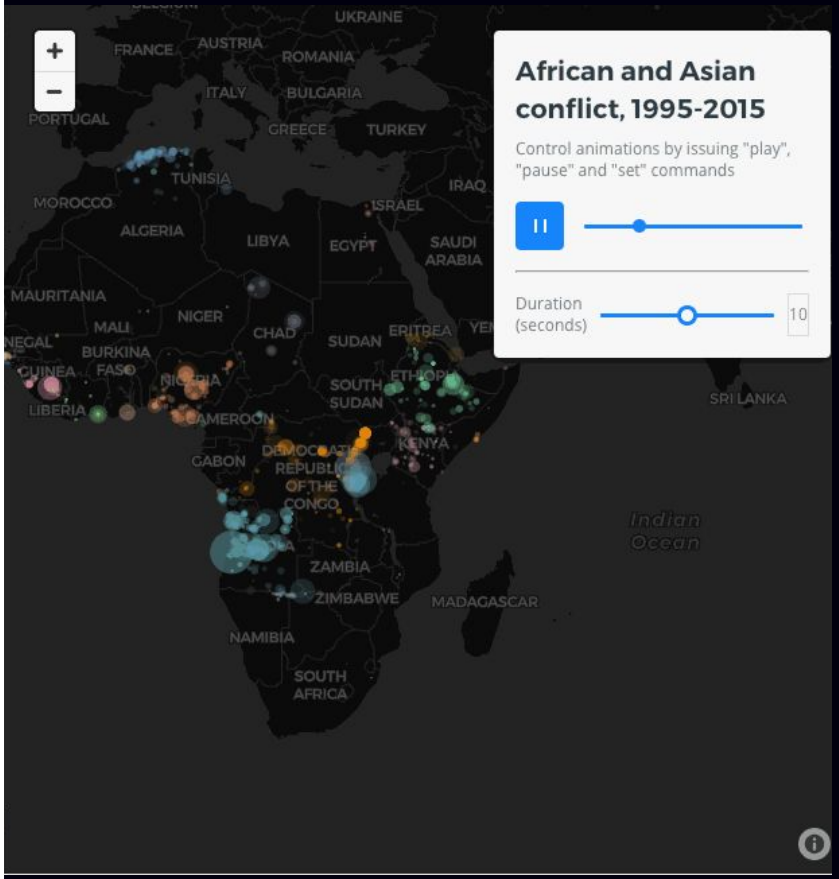
The Power of CARTO VL:

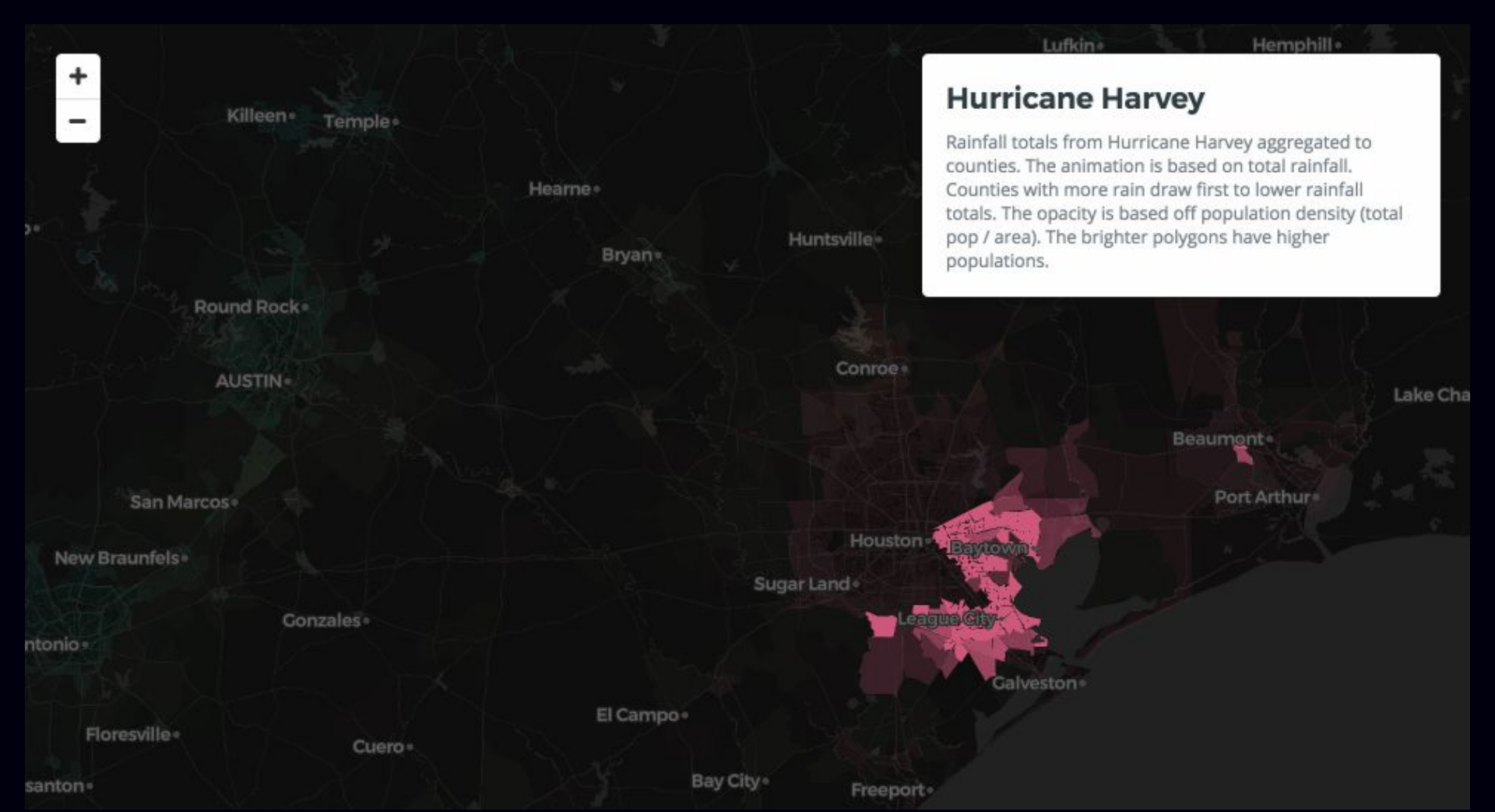
- ➔ **Things just happen faster**
  - Smooth, fractional zooms
  - Quicker transitions
  - Faster load and render times thanks to Smart Aggregation
- ➔ **Direct access to the data layer**
  - Data-driven styling with functions and math on data attributes
  - Define styling variables and use them in your UI
  - Summarize data at the Viewport or Global levels
- ➔ **New Animation and Interactivity Possibilities**

Torque



CARTO VL




Hurricane Harvey
Rainfall totals from Hurricane Harvey aggregated to counties. The animation is based on total rainfall. Counties with more rain draw first to lower rainfall totals. The opacity is based off population density (total pop / area). The brighter polygons have higher populations.
Lufkin
Hemphill
Killeen
Temple
Hearne
Bryan
Huntsville
Round Rock
AUSTIN
Conroe
Lake Cha
Beaumont
Port Arthur
San Marcos
New Braunfels
Houston
Baytown
Sugar Land
League City
Gonzales
Galveston
El Campo
Floresville
Cuero
Bay City
Freeport

CARTOCSS
(CARTO.JS V4.1)

```
const viz = new carto.Viz(`
     marker-fill-opacity: 0.9;
     marker-line-color: #fff
     marker-line-width: 0;
     marker-line-opacity: 1;
     marker-placement: point;
     marker-type: ellipse;
     marker-width: 3;
     marker-fill: ramp([amount],
cartocolor(Emrld), jenks());
     [zoom = 4] {marker-width: 6;}
     [zoom = 5] {marker-width:12;}
     [zoom = 5] {marker-width:16;}
`);
```

CARTO VL
(String and JS APIs)

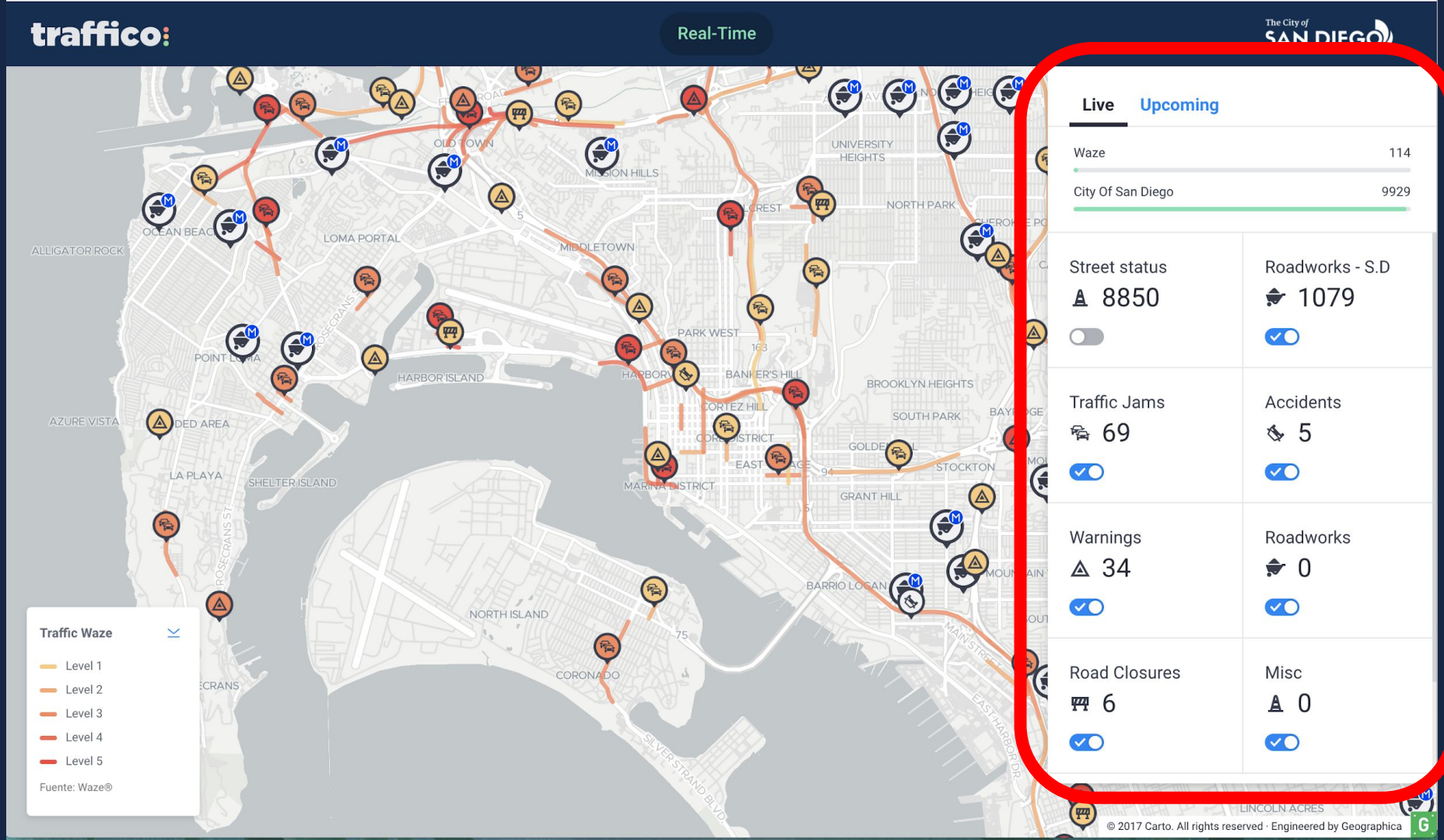
```
const viz = new carto.Viz(`
     width: blend(1, sqrt($amount), linear(zoom(), 10, 14))
     color: ramp(linear($amount, 10, 1000), emrld)
     strokeWidth: 0
`);

const s = carto.expressions;
const viz = new carto.Viz({
     width: s.blend(3, s.sqrt(s.prop('amount')),
                    s.linear(s.zoom(), 10, 14)),
     color: s.ramp(s.linear(s.prop('amount'), 10, 1000),
                   s.palettes.EMRLD),
     strokeWidth: 0
});
```

VL is Fancy!

Airship is Easy!

CARTO


traffico:
Real-Time
The City of SAN DIEGO
Live
Upcoming
Waze 114
City Of San Diego 9929
Street status 8850
Roadworks - S.D 1079
Traffic Jams 69
Accidents 5
Warnings 34
Roadworks 0
Road Closures 6
Misc 0
Traffic Waze
Level 1
Level 2
Level 3
Level 4
Level 5
Fuente: Waze®
OCEAN BEACH
LOMA PORTAL
MIDDLETOWN
MISSION HILLS
UNIVERSITY HEIGHTS
NORTH PARK
POINT LOMA
HARBOR ISLAND
PARK WEST
BANKER'S HILL
BROOKLYN HEIGHTS
SOUTH PARK
CORTEZ HILL
LA PLAYA
SHELTER ISLAND
MARINA DISTRICT
GRANT HILL
STOCKTON
BARRIO LOGAN
NORTH ISLAND
CORONADO
LINCOLN ACRES
© 2017 Carto. All rights reserved · Engineered by Geographica

Background

Embedding CARTO maps in custom apps with JS has always been integral to our developer platform

After years of working with customers using CARTO.js to make custom interfaces, we identified common UI components

Our award-winning design team took these learnings and created Airship to reduce the level of effort to make apps

Airship Mission

Airship is a library of layouts, basic patterns, templates, CSS classes, components, and widgets that is meant to make the development of custom location intelligence apps fast and efficient with CARTO.

Airship is...

Airship is fully responsive out of the box!

Airship is completely flexible for styles and colors!

Airship has built in functionality for widgets!

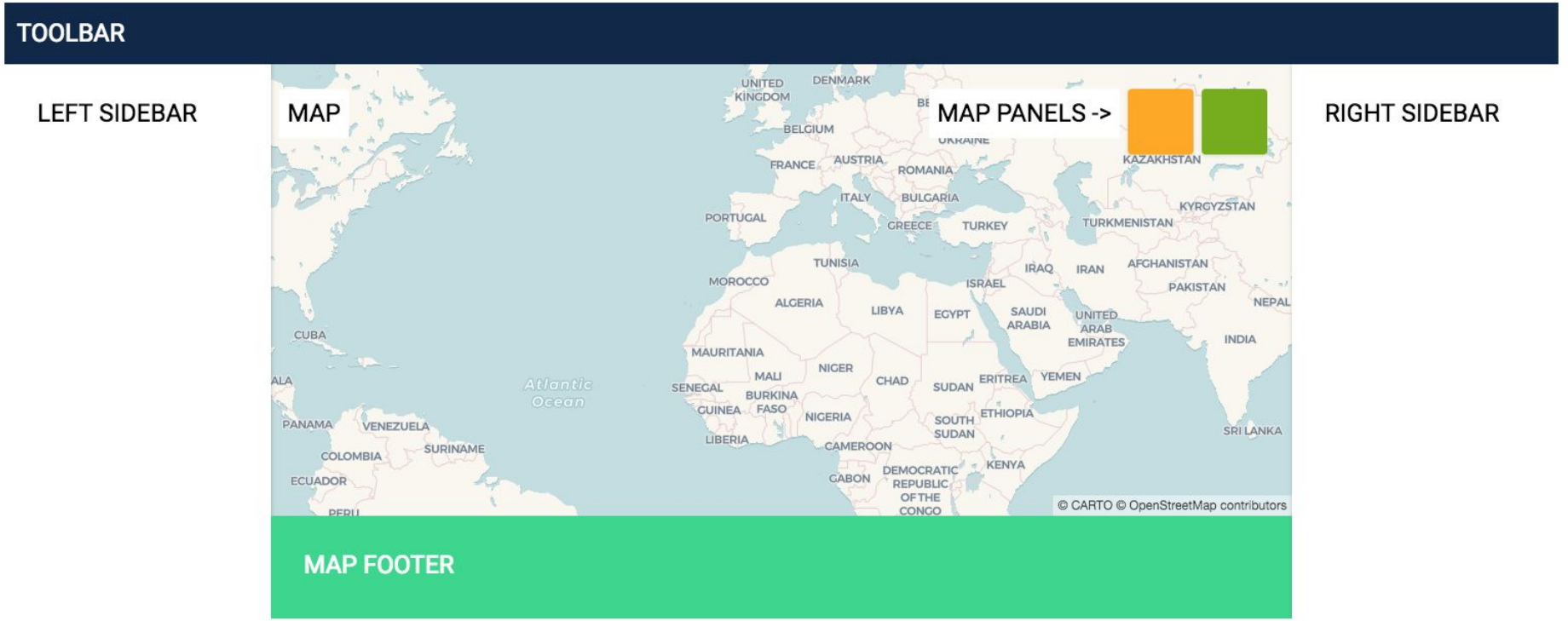
~~Airship is not..~~

Airship is not frontend framework dependent (Vanilla JS, React, Angular, Ember, Vue all work!)

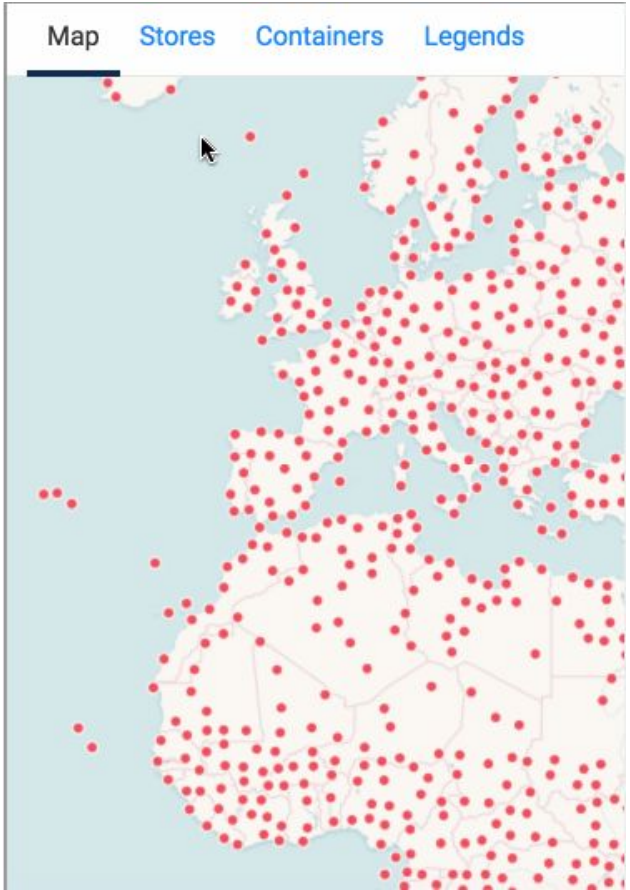
Airship is not just HTML/CSS, it includes full web components and handles design and layout for you

Airship is not hard to install and use

Airship Layout



Airship Mobile Responsive Layout



Components

Components use W3C Web Components and Javascript functions to work and pass data back through CARTO.js/VL

Designed to work with CARTO VL Style Variables, or CARTO.js Dataviews and Filters

Category Widget

```
<body>
  <as-category-widget
    class="as-p--16"
    heading="Business Volume"
    description="Description"></as-category-widget>

  <script>
    const categoryWidget = document.querySelector('as-category-widget');
    categoryWidget.showClearButton = true;
    categoryWidget.categories = [
      { name: 'Bars & Restaurants', value: 1000 },
      { name: 'Fashion', value: 900 },
      { name: 'Grocery', value: 800 },
      { name: 'Health', value: 400 },
      { name: 'Shopping mall', value: 250 },
      { name: 'Transportation', value: 1000 },
      { name: 'Leisure', value: 760 }
    ];
  </script>
</body>
```

Styles

Styles are either simple HTML elements with styling types or web components.

I'm a regular button

```
<button class="as-btn"> I'm a regular button</button>
```

I'm a regular button

```
<button class="as-btn as-btn--primary"> I'm a regular button</button>
```

Default

With placeholder

Hello there

With value

Hello there

```
<p>
  <span class="as-caption">Default</span>
  <input class="as-input" type="text">
</p>
<p>
  <span class="as-caption">With placeholder</span>
  <input class="as-input" type="text" placeholder="Hello there">
</p>
<p>
  <span class="as-caption">With value</span>
  <input class="as-input" type="text" value="Hello there">
</p>
```

Tooltip top

```
<span role="tooltip" class="as-tooltip as-tooltip--top">Tooltip top</span>
```

Success badge Error badge Primary badge Secondary badge

```
<span class="as-badge as-bg--success as-color--type-04">Success badge</span>
<span class="as-badge as-bg--error as-color--type-04">Error badge</span>
<span class="as-badge as-bg--primary as-color--type-04">Primary badge</span>
<span class="as-badge as-bg--secondary as-color--type-04">Secondary badge</span>
```

Resources and Links!

bit.ly/ireg-carto-libraries

Developer Center Docs
https://carto.com/developers

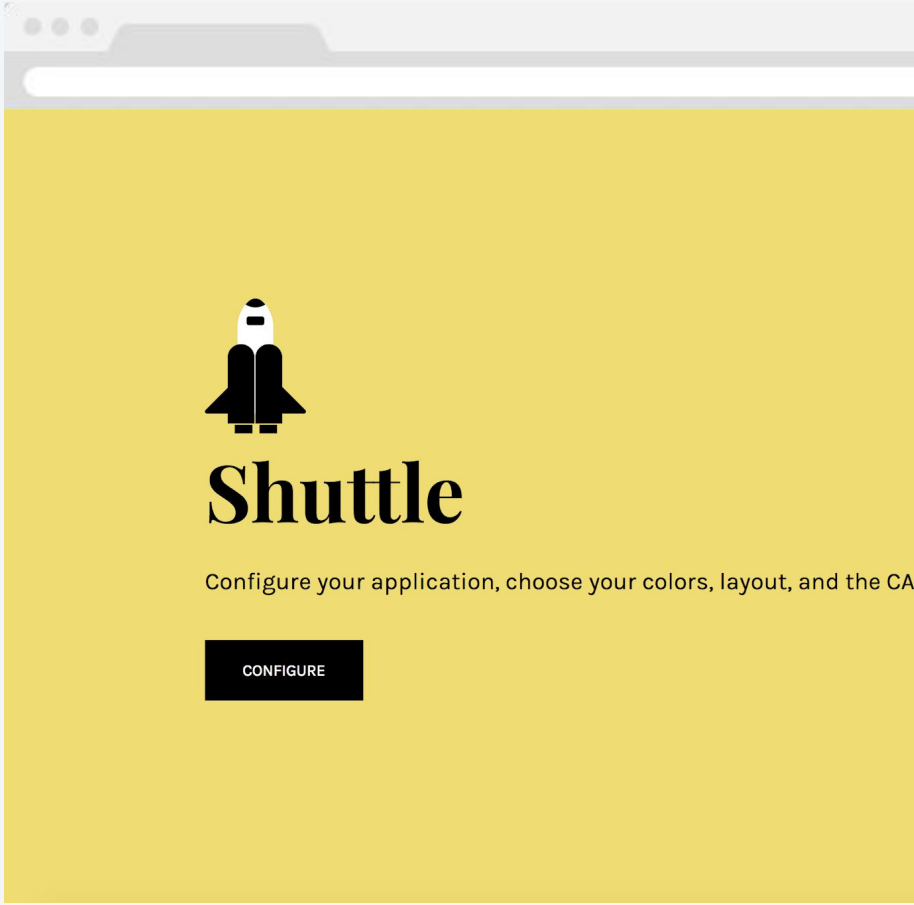
CARTO VL Training-thru-Examples
https://github.com/CartoDB/carto-vl-training

CARTO Airship Training-thru-Examples
https://github.com/cartodb/airship-training

Easy DIY via Glitch!
https://glitch.com/@andrewbt/carto-airship-trainings

One more thing...

https://cartodb.github.io/shuttle/



Thank You!

athompson@CARTO.COM

CARTO