THE POWER OF WHERE AND WHEN
Utilization of Mobile Device Data for Model Validation and Development

Transportation Research Board
Innovations in Travel Modeling Conference

William (Bill) H. King III, P.E.
Sr. Director of Business Development

AirSage Location Data Solutions

Combining our patented data collection and WiSE analysis technology engine, we extract actionable information from the geo-location of mobile devices, leveraging the largest base of high-quality location data in the transportation industry

PROVEN ✓

ACCURATE ✓

PRECISE ✓

SCALE ✓

TRUSTED ✓

PERSISTENT ✓

ANONYMOUS ✓

MOBILITY DATA ✓

Improve Mobility Intelligence

Generate Better Insights

Enhance Revenue Forecasting

Understand User Base
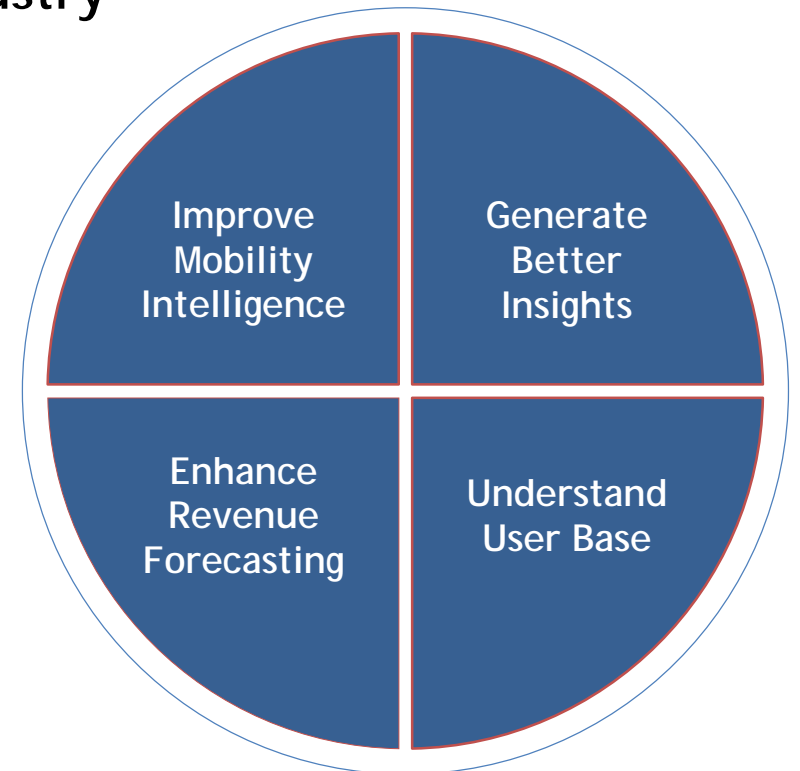
Geo-Location Data Processing Solutions

Industry leader in source agnostic high-volume, high-velocity, high-quality, geo-location data processing solutions

Providing mobility intelligence and analytics to customers in transportation, media, travel & tourism, retail, research and many other verticals

Understanding US population movement at scale and providing answers to the most complex and demanding geo-location questions

Solutions include:

◎ Trip Matrix (Origin-Destination)

◎ Target Location Analysis (Point-of-Interest)

◎ Activity Density (Population)

◎ Audience Insights

◎ Event-Based Research

◎ Custom Insights

Geo-Location Data

- ✓ Process 1st party geo-location data on over 100 million unique mobile devices per month

- ✓ Compile and convert trillions of geo-location events into useful information about mobility activity

- ✓ Diverse panel assembled from pre-qualified high-quality sources including: Wireless Carriers, Smartphone App SDKs, Bluetooth Beacons, Fleet and Navigation Systems, and Connected Car

- ✓ Ongoing evaluation of new data types and providers to ensure we have the best solution resources available

- ✓ Archival historical data from prior months and years available to track trends

- ✓ Patented WiSE technology anonymizes data to ensure user privacy and performs a multi-stage analysis to monitor and validate the location and movement of mobile devices

- ✓ Providing unprecedented visibility into where groups of people are, where they were, where they are likely to be, and how they move from one area to another

Geo-Location Data Evaluation Framework

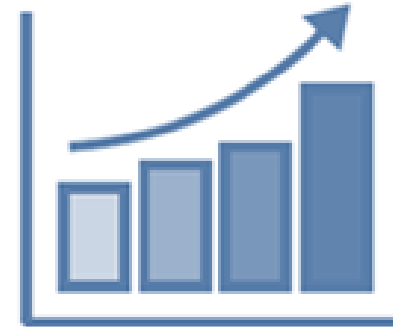◎ **The primary attributes we evaluate for and consistently measure against:**

Precision

How precise is the location the dataset provides?

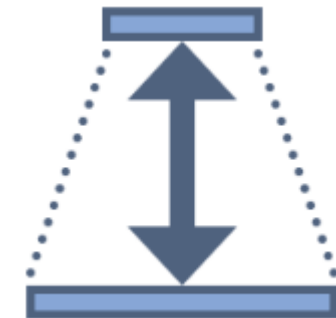Will we be able to know the individual's exact location?

Frequency

How consistently is the dataset captured?

How frequently are events captured?

Scale

Is the dataset scalable?

Can the dataset reliably identify a large enough number events to deliver the required insights?
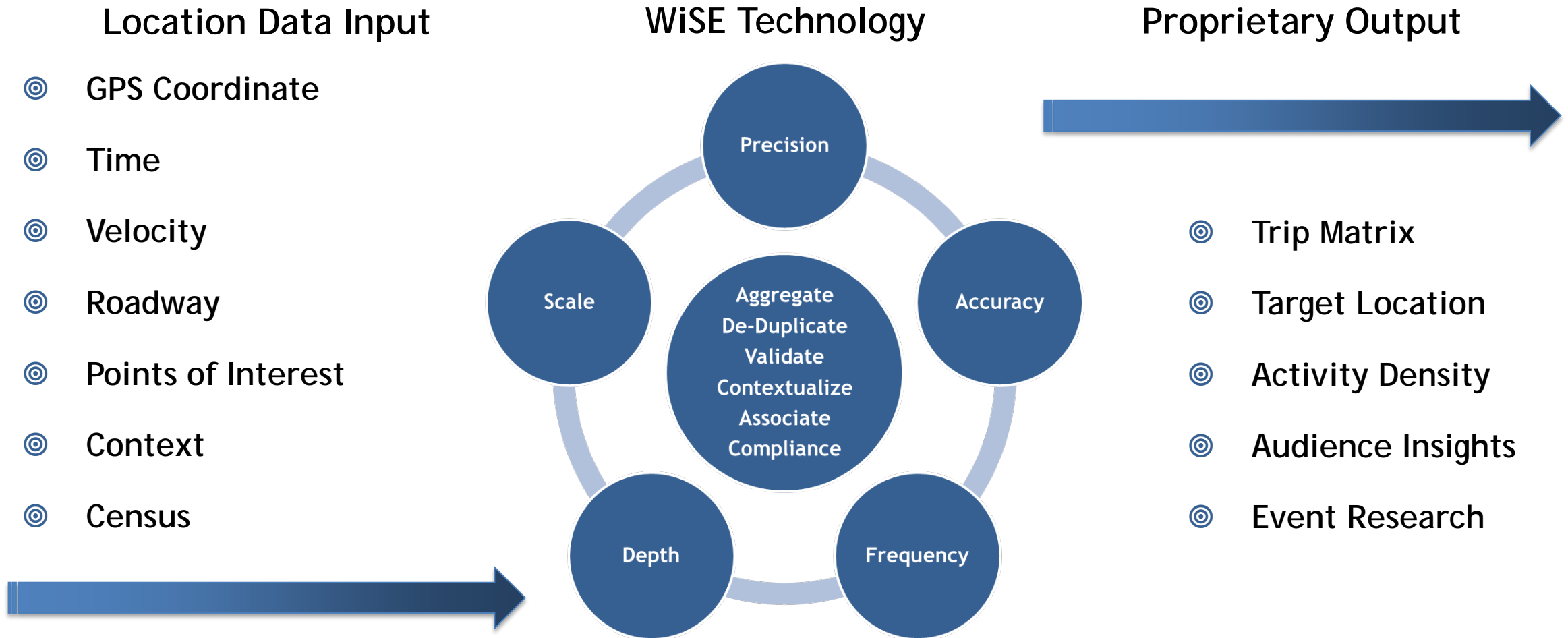
Depth

How many events per device per day does the dataset capture?

How many hours per day is the device seen?

Geo-Location Data Processing

Location Data Input

◎ GPS Coordinate

◎ Time

◎ Velocity

◎ Roadway

◎ Points of Interest

◎ Context

◎ Census

WiSE Technology

Precision

Scale

Accuracy

Aggregate
De-Duplicate
Validate
Contextualize
Associate
Compliance

Depth

Frequency

Proprietary Output

◎ Trip Matrix

◎ Target Location

◎ Activity Density

◎ Audience Insights

◎ Event Research

Trip Matrix

Leveraging a massive amount of source data and patented algorithms to understand the movement of population and trips from origin to destination for the entire country

We know the where and when of more than a billion trips made every day in the US

Trip Matrix attributes include:

◎ Study Period

◎ Origin & Destinations

◎ Time-of-Day / Day-Part Segmentation

◎ Resident / Visitor Classification

◎ Trip Purpose Classification

◎ Weekly Aggregation

◎ External / Internal

◎ Long Distance Trip Filters

◎ Home / Work Block Group Designation

◎ Demographics

Trip Matrix

Trip Matrix product has wide ranging utility

Through advanced pattern recognition algorithms, AirSage understands all travel in the United States from a national down to a local level

Observing more than a third of the trips being in made in the country allows AirSage to provide valuable information for travel demand modeling, scenario planning and many other applications within and outside the transportation realm
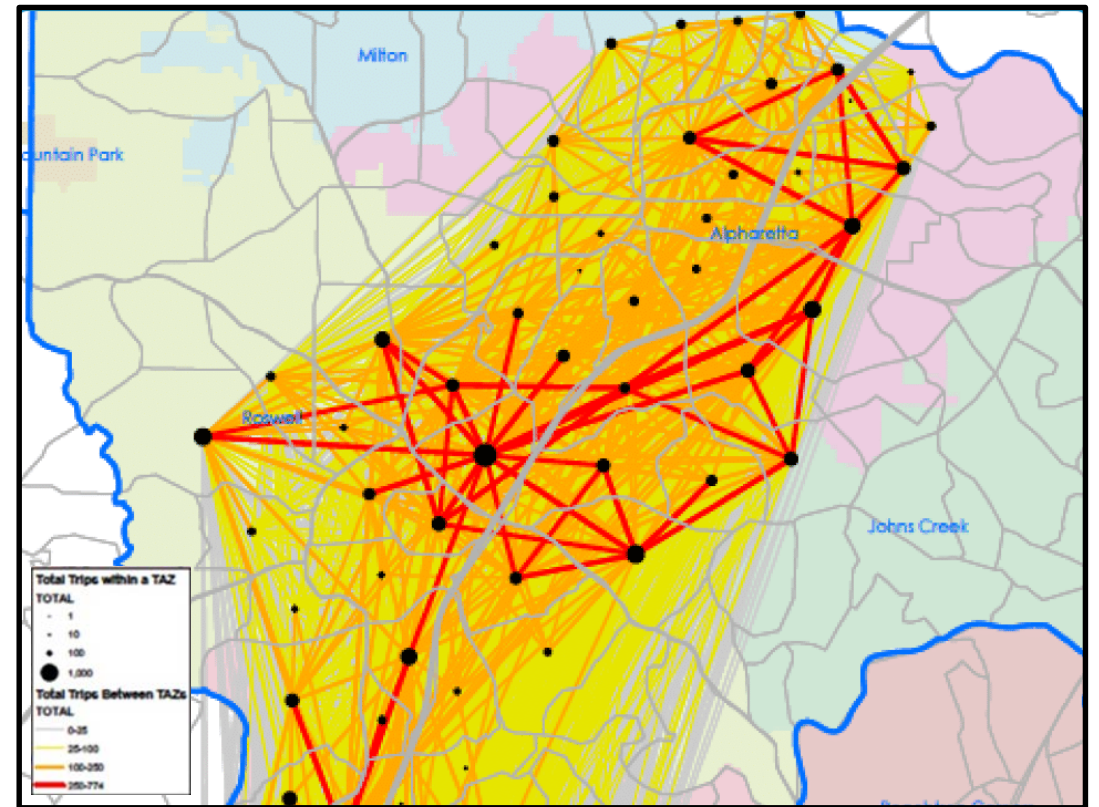
Trip Matrix Study Methodology

Modular, multi-step methodology to derive useful information and analytics from GPS data

Data collection, processing, and delivery

Core components:

- ◎ Activity Pattern Analysis
- ◎ Activity Point Generation
- ◎ Penetration Analysis
- ◎ Population Synthesis
- ◎ Trip Analysis and Classification
- ◎ Data Aggregation and Packaging

Optional components:

- ◎ Resident Classification
- ◎ Trip Purpose
- ◎ Time of Day
- ◎ Day of Week
- ◎ External Analysis
- ◎ Long Distance Filtering

Trip Matrix

Output Example:

The origins / destinations between zonal pairs of all devices seen within the predetermined study area will be assigned with the appropriate fields and attributes

The zonal structure (zips, tracts, blocks, grid, etc.) is determined by the consulting parties in coordination with AirSage

Data provided in a CSV file that is Excel- and Tableau-friendly and can be easily input into a number of geo-analytic or statistical software platforms for evaluation and visualization

Origin	Destination	Homezone	Aggregation	Purpose	Daytime	Count
4013319401	4013216831	4013105004	Mon_Tue_Wed_Thu	OO	H11:H12	2.2771
4013216831	4013216831	4013216831	Sat	OO	H17:H18	8.1537
4013216831	4013216816	4013216847	Fri	OO	H17:H18	10.6697
4013216831	4013104802	4013104802	Mon_Tue_Wed_Thu	OH	H17:H18	4.3822
4013115200	4013216831	4013216830	Mon_Tue_Wed_Thu	OH	H15:H16	3.8632
4013216831	4013103303	4013103303	Mon_Tue_Wed_Thu	OH	H16:H17	9.192
4013116204	4013216831	4013216831	Fri	OO	H16:H17	10.2307
4013104215	4013216831	4013217002	Mon_Tue_Wed_Thu	OO	H15:H16	2.4812
4013216831	4013216826	4013216826	Sun	WH	H19:H20	12.9768

Daily Trip Volume
100-150
150-200
200-300
300-400
400-500
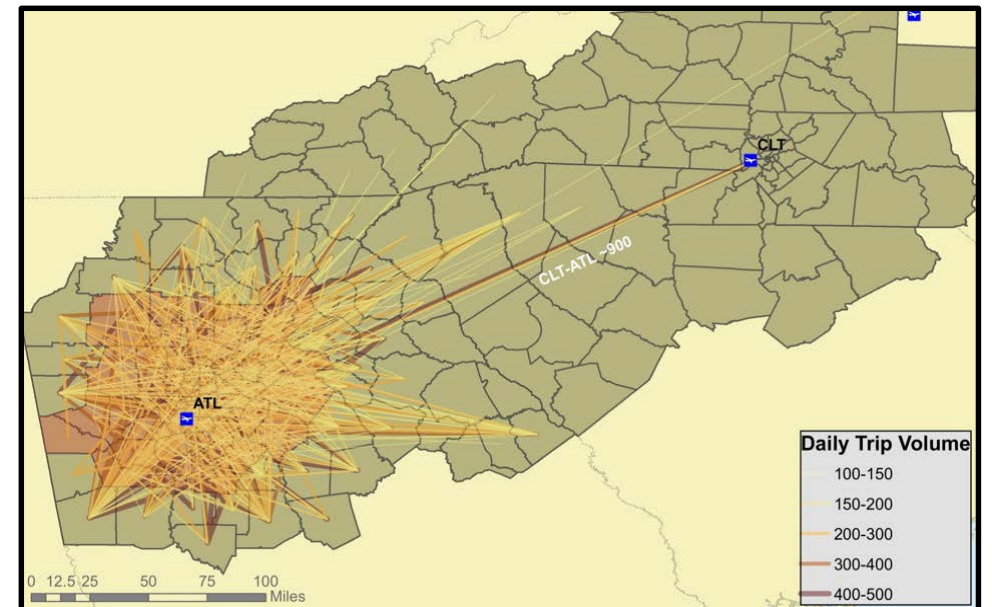
Trip Matrix

Source Data Examples: 1/8 of a Day, Tampa, FL
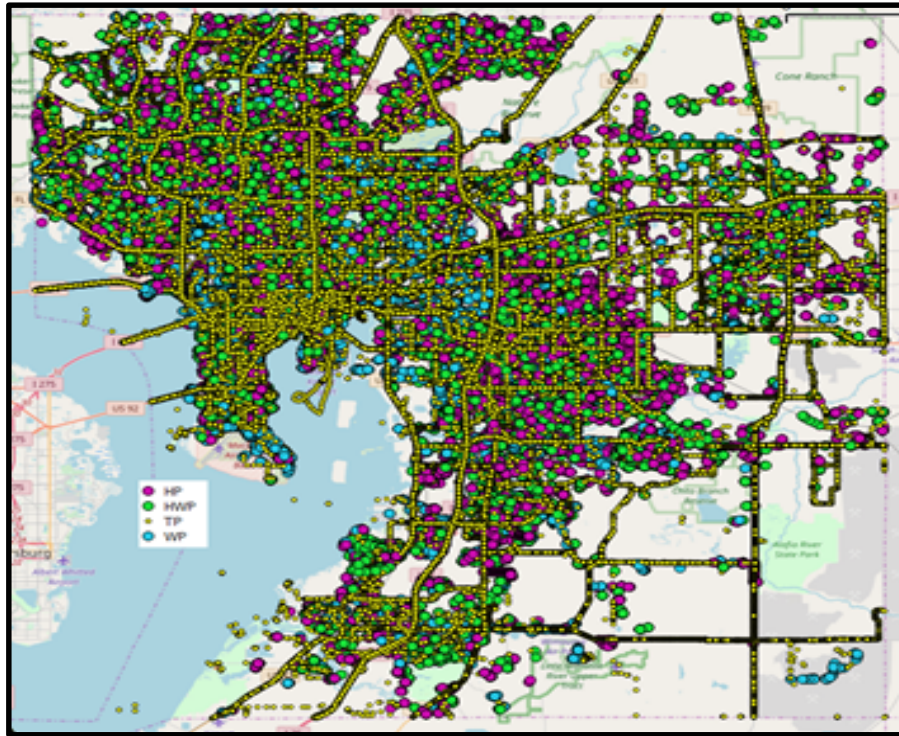
Purple = "Home" | Blue = "Work" | Green = "Home and Work" same location
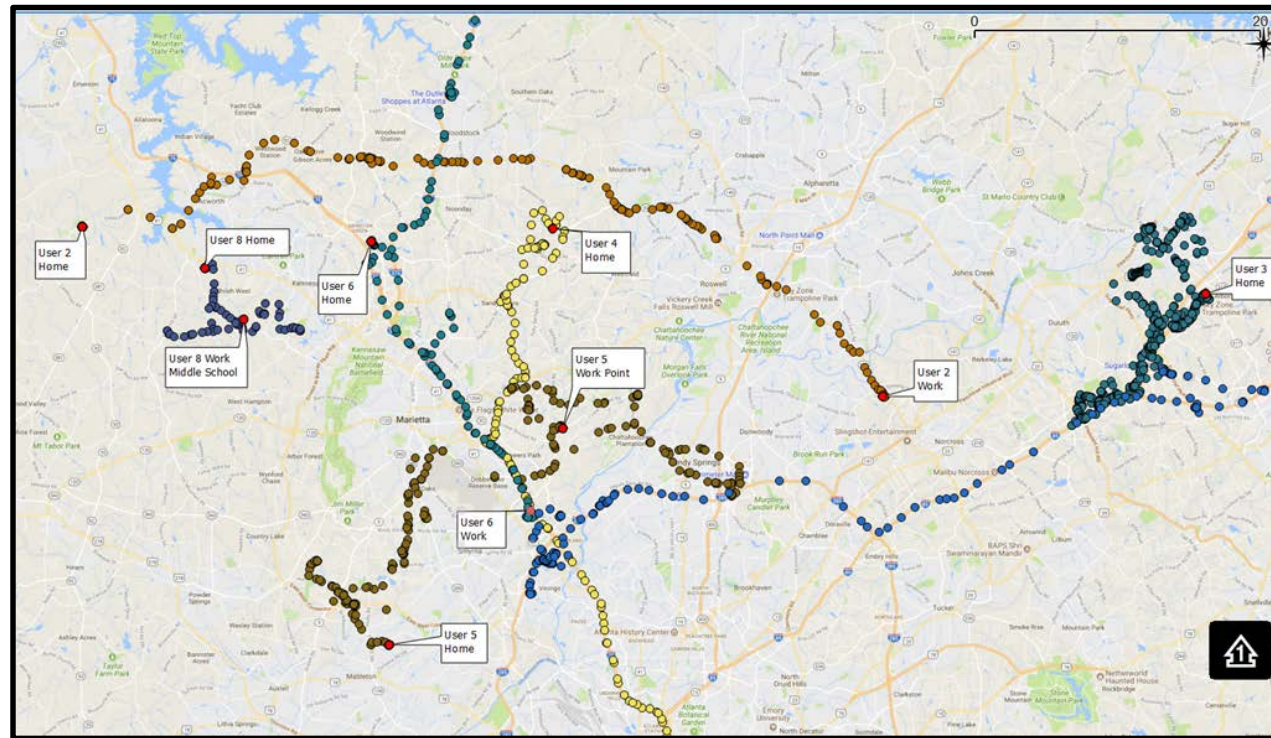
Source Data Examples: Atlanta, GA

One Day | 1 Location

Trip Matrix

Source Data Examples: Atlanta, GA

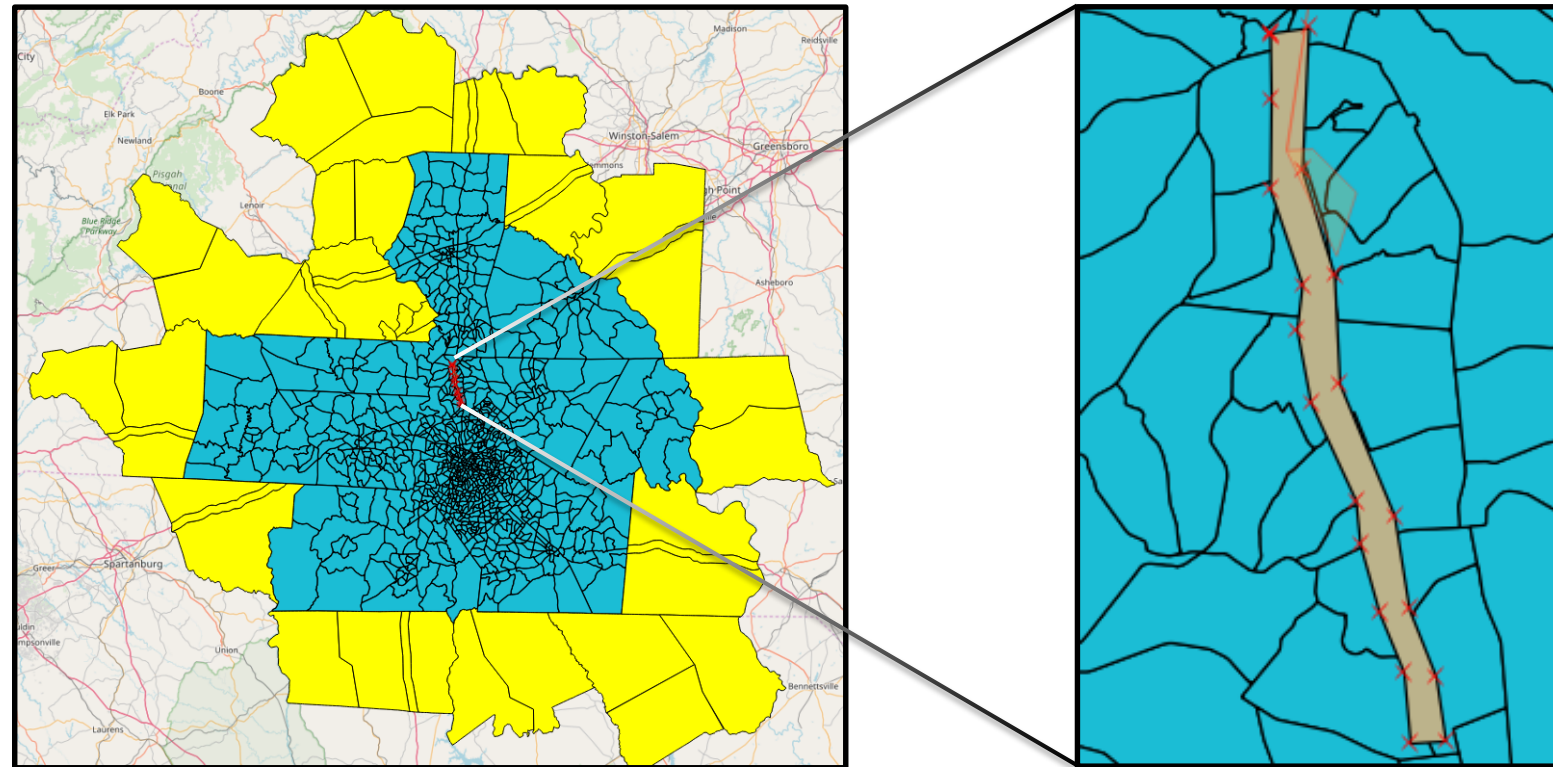**One Day | 10 Unique Mobile Devices | Activity Points**
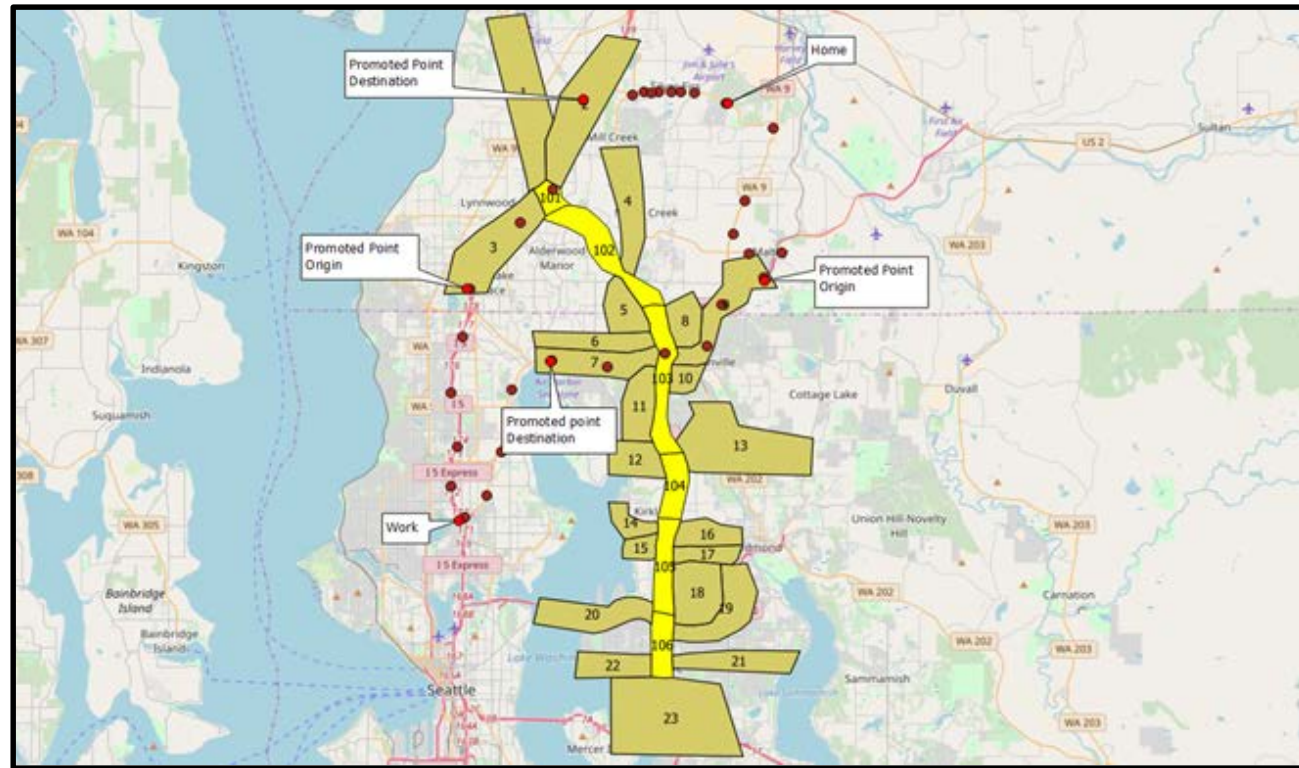
External / Internal Example: Charlotte, NC

Zone and Sub-Zone Structure for Regional Analysis

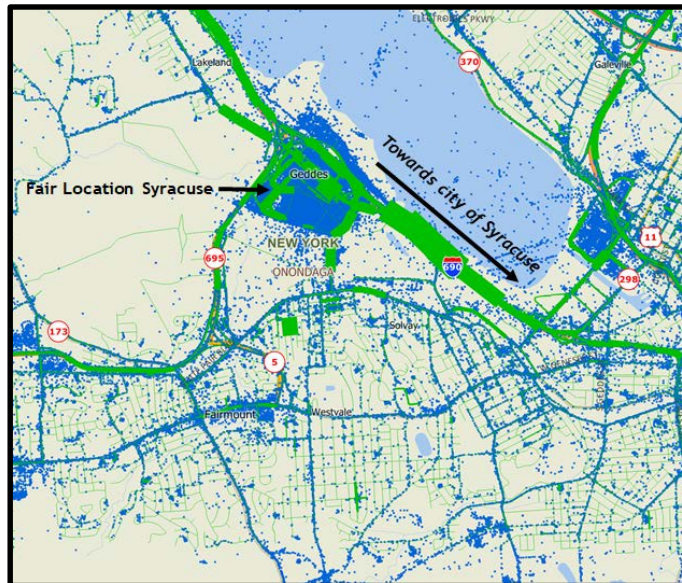## External / Internal Example: Seattle, WA

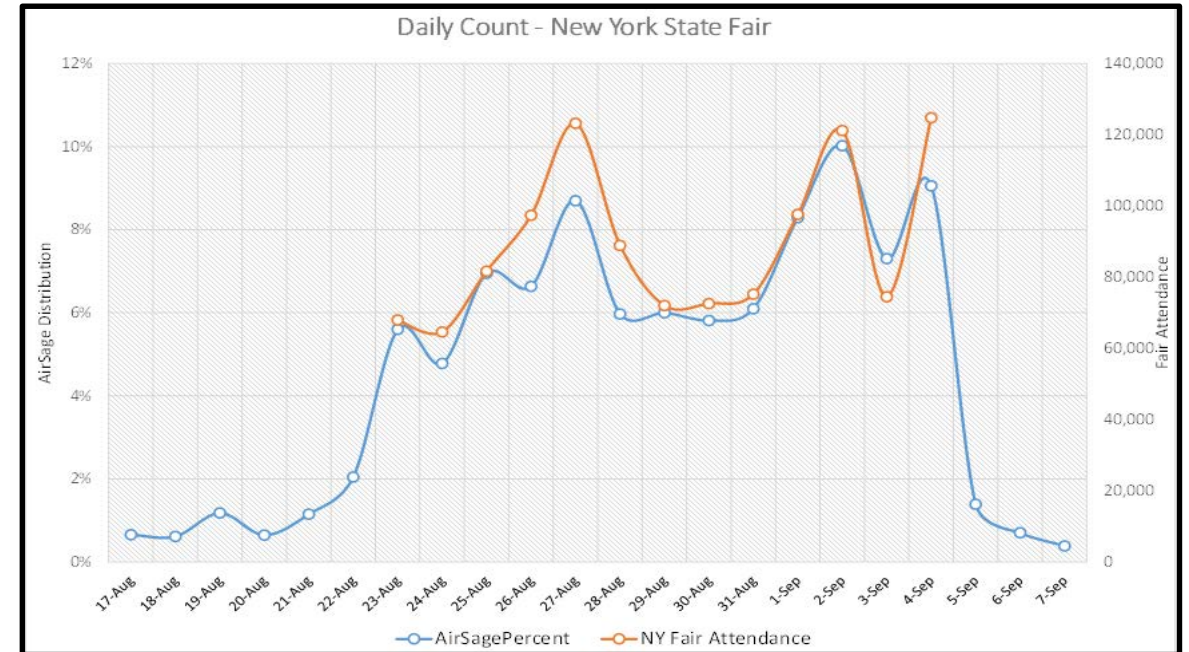**Zone Structure for Corridor Analysis**

Data Validation

New York State Fair – Syracuse

- ◎ Green Line = roadway density (10M of center)
- ◎ Dots = activities or where people that were seen at the fair went elsewhere around the city
- ◎ Every device has a home location assignment

- ◎ State Fair reported attendance (right axis) and AirSage data distribution (left axis) by day (x-axis)
- ◎ AirSage data closely correlates to the NY State Fair daily reported attendance distribution

Feedback

Kevin Harrison
Director, Transportation Planning at South Alabama Regional Planning Commission

By using AirSage's data, MPO's can actually check or 'calibrate' their origin-destination matrix to a level of confidence never seen before. It nullifies the word 'assumption' in the validation of the travel demand forecast model. Their services provide the most accurate technology available today.

Andrew Tang
Principal Planner at San Francisco Bay Area Rapid Transit District

While we could get some understanding from other data sources, AirSage seemed to be able to do it far better, in a way we would presume is much more accurate. AirSage data was used to help design the most effective bus feeder system we could. We're going to use that tool, but to make it more accurate, we're going to incorporate the AirSage data into the model.

Andrew Rohne
Transportation Modeling Manager at OKI Regional Council of Government

The AirSage data helps validate findings, which is very valuable. If we mess up and the model says it should take 2 lanes and it really needed 4, the cost of getting it wrong could be 10-20 years of people sitting in traffic.

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THE LEADER IN SOURCE AGNOSTIC HIGH VOLUME, HIGH-VELOCITY GEO-LOCATION DATA PROCESSING SOLUTIONS

FOR MORE THAN A DECADE, WE'VE BEEN THE LEADING PROVIDER OF MOBILITY INTELLIGENCE AND ANALYTICS TO CUSTOMERS IN THE TRANSPORTATION, MEDIA, TRAVEL & TOURISM, RETAIL, RESEARCH AND A HOST OF OTHER VERTICALS

WE UNDERSTAND POPULATION MOVEMENT AT SCALE IN THE US AND ARE ABLE TO ANSWER THE MOST COMPLEX AND DEMANDING QUESTIONS YOU HAVE

Trip Matrix

Pricing Calculator Variables:

◎ Number of Zones

◎ Number of Months

◎ Number of Reports

◎ Population

◎ Long Distance Trip Filter

◎ Internal & External Zones Options

◎ Day Aggregation Options

◎ Day Part Aggregation Options

◎ Trip Purpose Attributes

◎ Residence Class Attributes

◎ Demographic Attributes

◎ Home-Work Matrix Report

◎ Home Location Report

◎ Work Location Report