Comprehensive Travel Insights
A New Reality

• Today’s Information
  • Volumes
• New from Streetlytics
  • Hourly Day Parting
  • Seasonal Variation
  • Demographics
  • Market Segmentation
  • Origins/Destinations
  • Select Link
• Trip Purpose
  • Commuting/Education/Other
Assigning Data to the Transportation System

- Traffic Counts
- Mobile Data
- Demographics
- Confidence Metrics
- Congested Speed Routes
- Future Data Sources
At the heart of the Fusion Engine is a Data Assimilation Process that serves to bring together all available data sets that contribute to the “full story”

- Allows each data set to be leveraged only for its strengths
- Each data set is enhanced by the next
- Allows flexibility to add, update, change or remove any one source of data
(4D-var Data Assimilation) Minimizes squared deviations of observations
  • Disparate data sources

Weighted by accuracy of observations
  • Proprietary confidence assignment process

Validation

This has the effect of making sure that the analysis does not drift too far away from any one observation.
TRAFFIC COUNTS

SOURCED TRAFFIC COUNT DATA
- All identifiable sources
- Any type of count
- Collected since 2012

COUNT NORMALIZATION
- Count analyst teams
- Duplicate independent entry and verification

FLOW CONSISTENCY CHECKS
- Count directionality
- Reasonable values
- Flow consistency

SOURCED TRAFFIC COUNT DATA
- Certification of source counts
- Certification of roadway attributes

COUNT NORMALIZATION
- Certified directional counts
“Count Team” of 60 Traffic Analysts for support

4x Verified Count Collection and Dispute Resolution Methodology and Management system

Any available counts will be used as inputs for each mode
MOBILE DATA

Airsage Observed Trip Matrices
- # of Trips/Day
- Trip Patterns
- Home Locations

Land-Use Information
- Housing Units
- Points of Interest
- Employment

Demographic Data
- Population
- Household Characteristics

Mode Identification
- Driving
- Walking/Biking
- Public Transport

Origin-Destination Trips
- By Mode
- By Resident/Visitor
- By Time of Day
• Leverages key insights (Persistence! – Always “On”):
  • Activity Pattern Data
  • Trip Chaining (what is a trip?)
  • Home Locations
  • Mode Flags

• Minimizes
  • Locations understood at a neighborhood level
  • Noise correction with Demographics, Employment, POIs
  • Mode Expectations by Market Segment and Trip Characteristics
• ESRI Updated Demographics and Employment
  • Available to us through our relationship with ESRI/investment in Citilabs
  • Improves accuracy by using variety of sources includes
    • IRS County to County Migration
    • Building Permits
    • Housing Starts
    • Residential Postal Delivery Volumes
    • County Level Census Forecast
    • Infogroup Business Data
Tapestry

67 Distinct Segments based on socioeconomic and demographic composition

- Grouped into 14 LifeMode groups
- Grouped into 6 Urbanization groups
GPS Probe Data

- Route Choice
- Speed
- Time of Day
- Travel Times

Validation

Hourly Speed
• App/Ad Exchange Data
  • Reason: Enhanced Segmentation/Calibration
• Additional Segmentation/ Syndicated Audience Profiles (Experian, Acxiom)
  • Expendable Income
  • Purchase Intent
• Point of Interest Data
  • Reason: Granular Trip Purpose
  • Expand Coverage of Audience Insights (Venues, Etc)
• Sensor Data
  • Beacon Data BLE, Computer Vision (Camera Counting) & Wifi
  • Reason: Direct Feed, Data Calibration
• Transaction (Credit Card)
  • Reason: Intent & Calibration
  • Enhanced Audience Profiles
  • Value/Output
• New Sources yet to be identified
Streetlytics Transit and Pedestrian Insights

- **Methodology**
  - Trips are Assigned to Transit and Pedestrian Networks Nationwide

- **Data Inputs**
  - Pedestrian Counts
  - Transit Routes
  - Transit Schedules
  - Ridership Information
  - Mobile Data
  - Demographic Information
Streetlytics Provides

Answers to...
• How many?
• Where?
• When?
• Who?
• Why?

http://www.streetlytics.com/app
Past & Future Proof Solutions

• Initial Solution Builds off of Current Data
  • Allows control how quickly we transition from one source to another

• Solution is flexible
  • Built to add new data as available
  • If one source goes away there is minimal disruption and the solution can control how quickly, if at all, changes are seen through the industry

• More Data Less Model
  • Allows controlled levels to shift to more data/ground truth less analysis whereby modeling is used only as the glue to bring together disparate data

• Leveraging Data Management Partners
  • Leverages vendor support infrastructure, experience around privacy protection and compliance as well as inherent separation from PII
Thank you!

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AirSage Core Competencies
THE POWER OF WHERE AND WHEN

Carrier, GPS, Credit Card Transactional Data Access
- Access to Carrier Individual Device Data
- Solutions inside Carrier Datacenters to Harvest Data
- Access to Aggregated GPS and Transactional Data
- Solutions inside AirSage Datacenters to Generalize ANY Location Data
  - Plug and play ready to leverage Ad Exchange, beacon, etc.
  - Solutions to meet privacy and Service Level Requirements

Operational BIG Data Processing
- Fault tolerant systems to scale the processing of High Volume/High Velocity Data
- Custom scheduling to prioritize data processing and normalize workloads
- Patented throttling and filtering to differentiate desirable data
- Proprietary Data storage processes for cost reduction/value retaining
- Support and infrastructure for an “always on” system
  - Meets 99.999% SLAs

Software Methods for Analyzing BIG Data
- Device Activity Pattern Identification Considering 100s of Millions of Devices and Trillions of Locations
- Identification of Trip End vs. Transient Locations
- Flexible processing to calculate trips versus tours
- Processes to synthesize missing data and account for locations and trips that were not directly observed
  - 15 years of research
- Identification and filtering of devices and sightings that do not represent person movements
- Dynamic Methods to expand samples to full population movements
  - Movement Data (trip matrix extrapolation) 5 years research
  - Point Present Data (target location data extrapolation) 3 years research
- Long distance trip identification
Citilabs Core Competencies

TRANSPORTATION & LAND-USE SOLUTIONS
MODEL. ANALYZE. VISUALIZE.

Software Methods for Modeling
- 40 years of predictive modeling software development
- Software for modeling populations and households’ daily activities
- Software for modeling destination, mode, and route choices
- Software for modeling freight and service vehicle movements (taxis, uber, delivery, and construction)
- Software for distributed computing of complex problems.
- Experience using and providing Amazon AWS and Esri solutions
- Provider of Software as a Service platforms for scalable hosting of the most complicated models
- Provider of hosted mapping, visualization and REST APIs for data delivery and collaboration

Services group staffed with experts in:
- Geospatial Data Science, Analytics, Storage, and Hardware Solutions
- Travel Demand Modeling
- Activity-Based Modeling
- Freight and Commodity Flow Modeling
- Land-Use Modeling
- Accessibility and Bike/Ped Modeling and Scoring
- Software Development
- Computational Mathematics and Distributed Computing

Data Collection and Quality Assurance
- Scalable Team of Traffic Analysts to collect data and results

Global Customer Footprint
- Solving problems in 3500 Cities Worldwide