

Big Data for Transportation by StreetLight Data

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Director South Central Region

Why use Big Data for Transportation?



Conventional Data Collection and Models No Longer Meet the Needs of Transportation Professionals



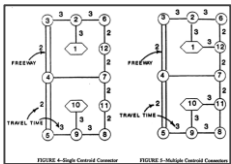
Household & Intercept Surveys



Aerial Photos & Videos



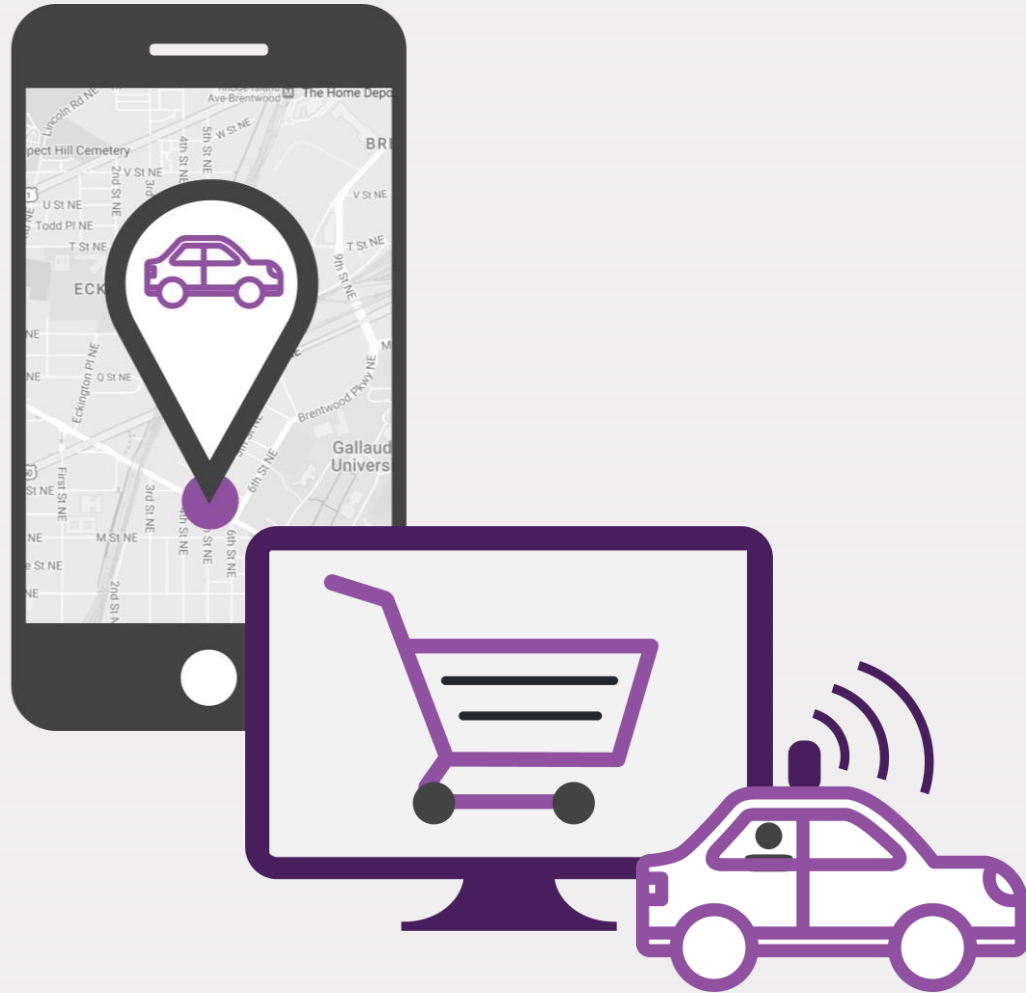
Bluetooth & Other Sensors



Assumption-Based Modeled Data

- Expensive
- Time-Consuming
- Conducted Rarely
- Small Sample Sizes
- Incomplete Information
- Cumbersome Data Integration

Transportation Behavior Today Is Changing Rapidly



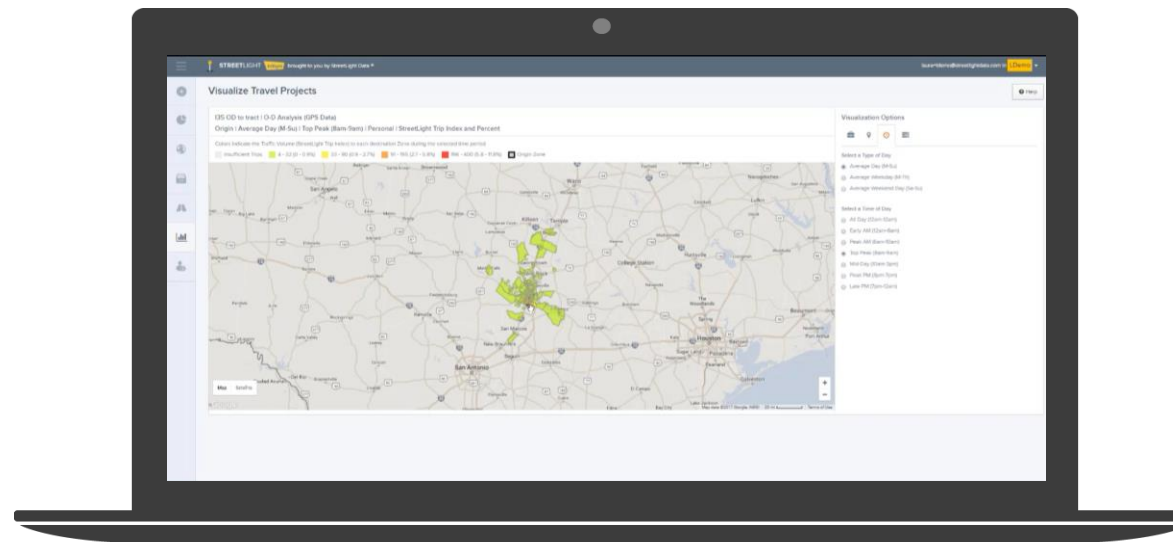
To Keep Up with Fast-Changing Travel Behavior, We Need Data That:

- 1 Describes Current Behavior
- 2 Measures Change Over Time
- 3 Is Diagnostic & Predictive

Introduction to StreetLight Data

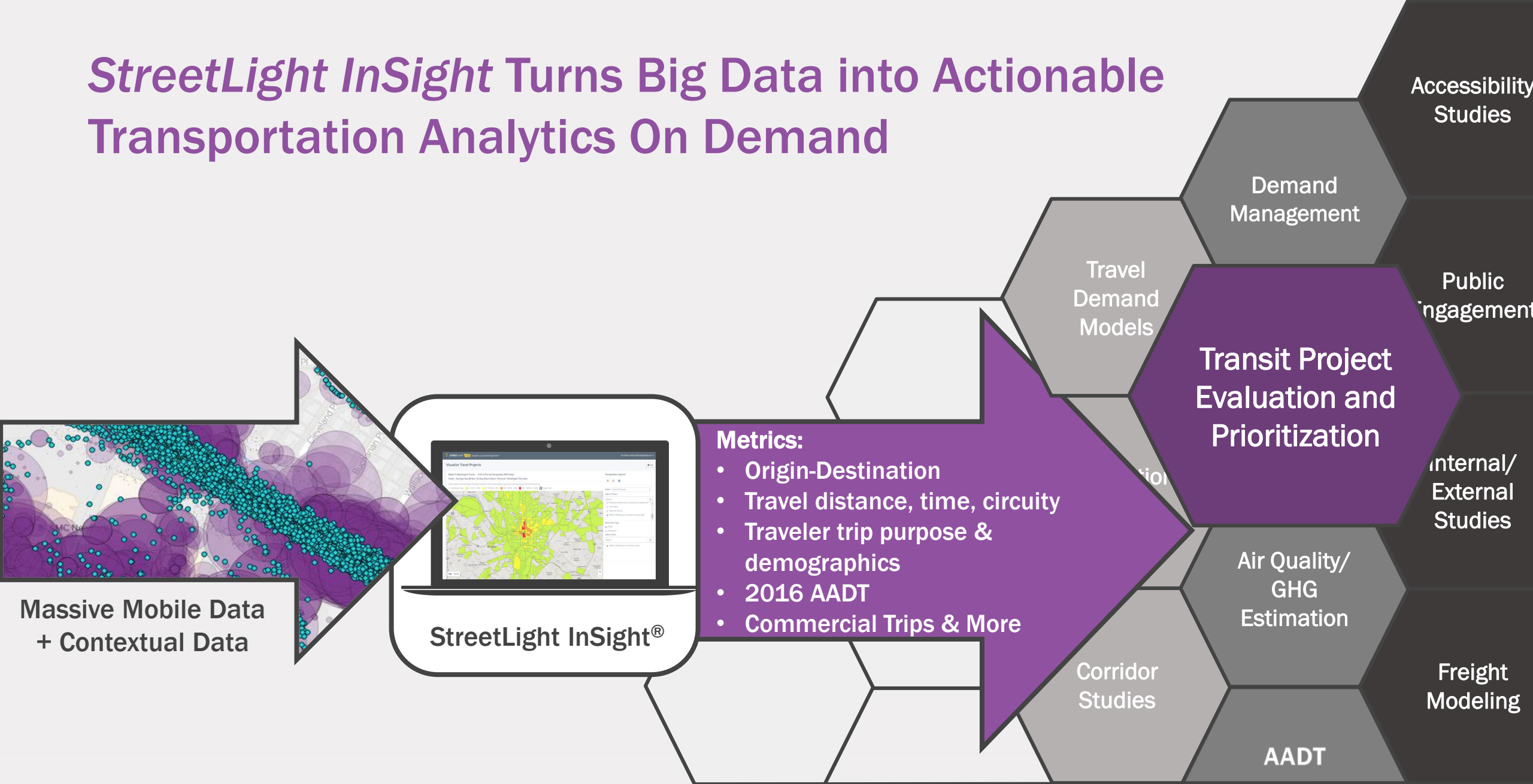


We Offer The Best Big Data and Analytics Platform Together



StreetLight InSight®:
The Only On-Demand Platform For Running
Actionable Transportation Analytics

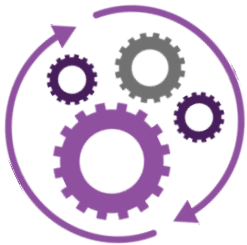
StreetLight InSight Turns Big Data into Actionable Transportation Analytics On Demand



We Deliver Additional Value Above and Beyond Our *StreetLight InSight* Platform

1

Data Science Expertise



We Bring 100+ Years of Collective Experience in Data Science and Engineering to Transportation

2

Evaluations of Big Data



We Select the Best Range of Real-World Data Sources from a Fast-Changing, Emerging Technology Landscape

3

Privacy Commitment

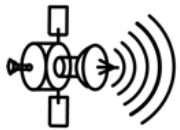


We are Committed to Privacy and We Follow Privacy-by-Design Principles that Protect Consumers and You

We Offer the Best Combination of Data Resources for Understanding Travel Behavior



Locational Big Data



Navigation-GPS Data

- Segments commercial trucks
- 23B+ data points/month



Location-Based Services Data

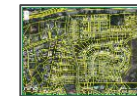
- Larger sample size
- 60B+ data points/month



Contextual Data



Road Network Maps

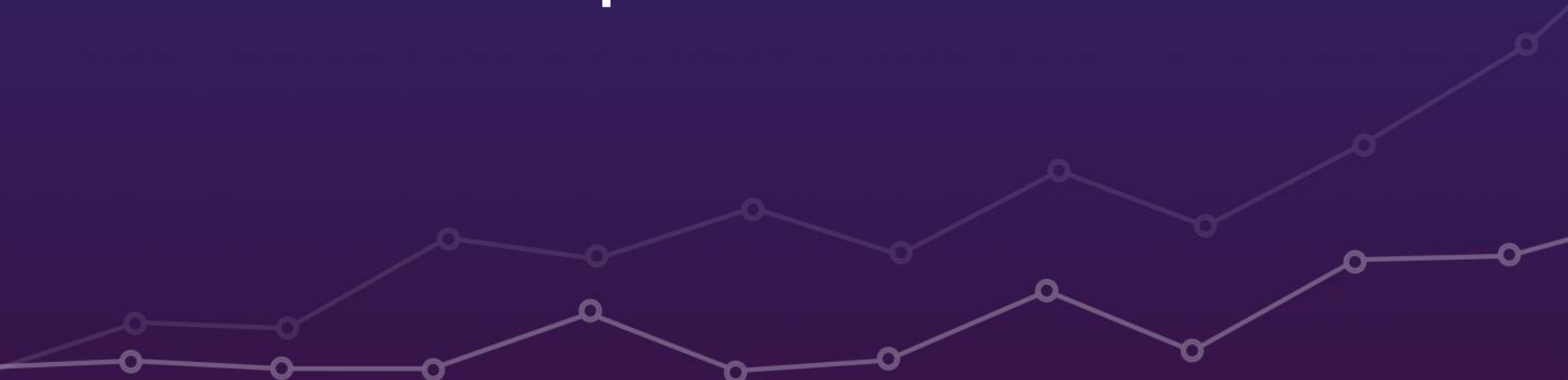


Parcel Data



American Community Surveys

Big Data Applications for Transportation and Transit



Big Data is Just A Buzzword...



Will **Big Data** Cure Cancer?

Fortune - Nov 2, 2016

While there's a lot of breathless talk about the potential of **big data**, Commons now holds the raw genomic data, from the Cancer



Re-thinking Analytics: How **big data** analytics can revolutionise your ...

BusinessTech - Oct 25, 2016

Re-thinking Analytics: How **big data** analytics can revolutionise your ... data sets, and help make sense of the new **buzz** word "**BIG DATA**".



Big Data: Key to Customer Understanding and Service Delivery

MassTransitMag.com (press release) (registration) (blog) - Nov 6, 2016

Transit agencies invest millions to **transport** people in the most seamless, efficient, safe and reliable manner. Whether public or private, mass ...



This Startup Is Using **Big Data** And Smart Tech To Save The Oil ...

Forbes - Oct 29, 2016

While experiencing an influx of **funding** and increased cash flow from ... The failure to adopt a smarter business model driven by **big data** and ...



Why Cultural Change Is Necessary For **Big Data** Adoption

Forbes - Nov 8, 2016

Love it or hate it, **big data** is here to stay. As data volumes and sources of data proliferate at ever increasing rates, leading companies will be ...



Big Data Unleashes Business Opportunity

Forbes - Nov 1, 2016

Businesses have gone **data** crazy. You can't blame them. Streaming, real-time **data** analysis promises to bring the type of predictability that cuts ...

Mitigating the Security Risks of **Big Data**

CIO - Nov 1, 2016

Different Types of “Big” Geospatial Data Offer Different Benefits for Modelers


	Cellular	Navigation-Based GPS	Location-Based Services
Spatial Precision	200-1000 meters	5 meters	5 meters – 50 meters
Frequency of Data Pings	Irregularly; every 15 min – hours	Regularly; every 1 sec – 1 min	Variable; sometimes triggered by location change
Type of Trip	Blends personal and commercial trips	Differentiates personal and commercial trips	Blends personal and commercial trips (for now)
Sample Size	Varies by telco: ~10% of population for small telcos and ~25-30% for large telcos	Varies by region; ~1-4% personal trips; ~10-12% of commercial trips (for INRIX)	Medium – 62M US and Canadian devices in our database (~23% of US adult population)

Location Data from Mobile Devices Can Show When, Where, and How People Move

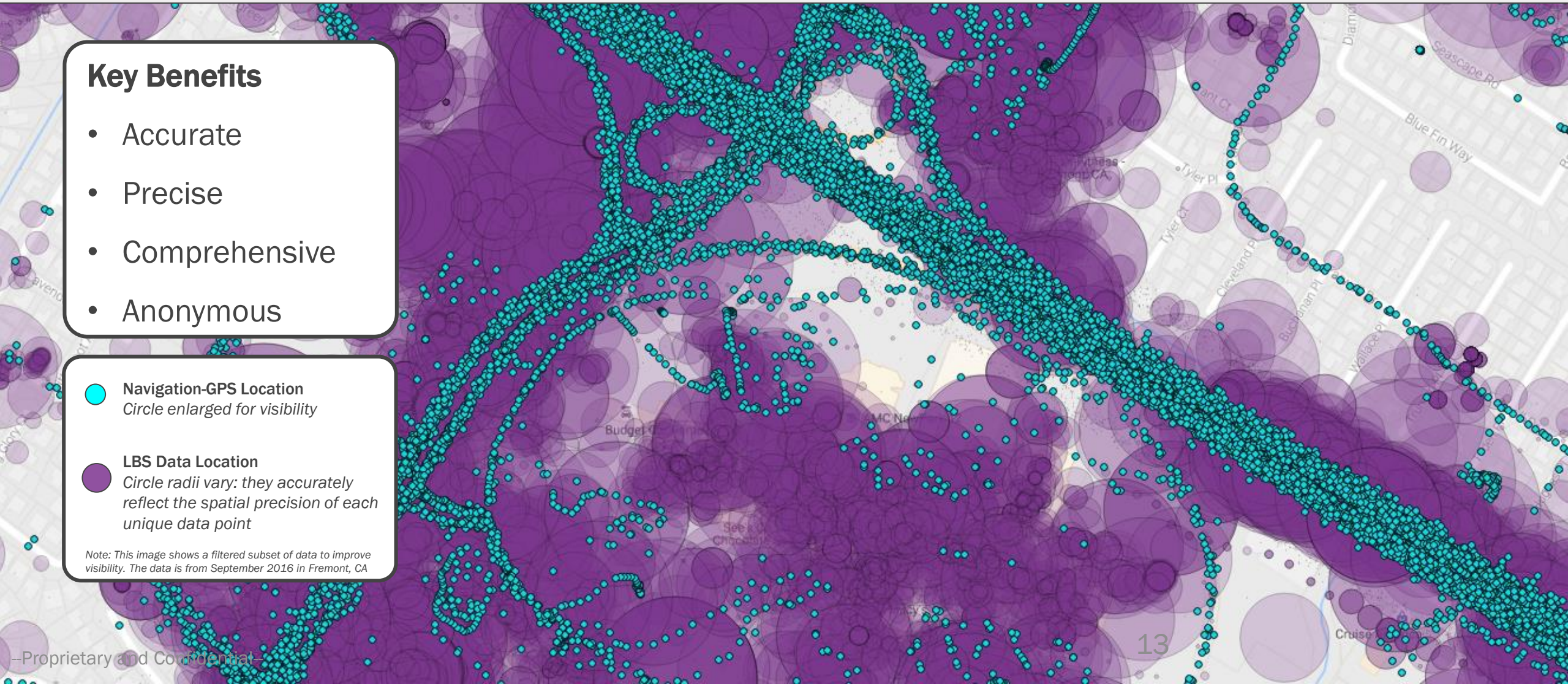
Key Benefits

- Accurate
- Precise
- Comprehensive
- Anonymous

 **Navigation-GPS Location**
Circle enlarged for visibility

 **LBS Data Location**
Circle radii vary: they accurately reflect the spatial precision of each unique data point

Note: This image shows a filtered subset of data to improve visibility. The data is from September 2016 in Fremont, CA



Navigation-GPS Data Is Created by Devices That Do Turn-by-Turn Navigation

Technical Characteristics

Spatial Precision	~5 meters
Frequency of Data Pings	Regularly; every 1 sec – 1 min
Type of Trip	Differentiates personal and commercial trips
Sample Size	Penetration rate varies by region – but much smaller than LBS. ~1% - 4% for personal, 12% trucks.

Navigation-GPS Data Creation



Location-Based Services Data Is Created By Mobile Applications (Think “Apps”)

Technical Characteristics	
Spatial Precision	~5 meters – 25 meters
Frequency of Data Pings	Variable; usually triggered by location change
Type of Trip	Personal
Sample Size	~23% of US adult population (62M+ US devices in our database)

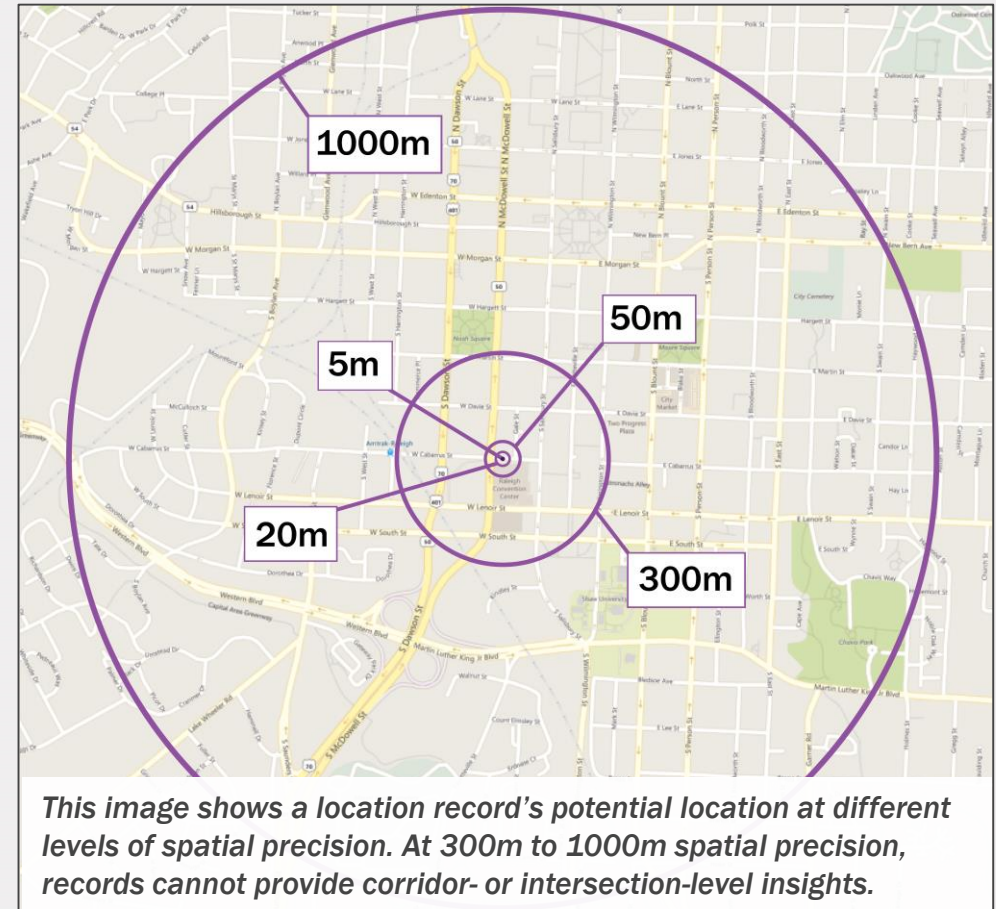
LBS Data Creation



The image shows three smartphones at the top, each displaying a different mobile application interface. Below them is a grid of eight colorful icons representing various mobile applications: a weather icon (sun and cloud), a shopping cart icon, a heart with a pulse line icon, a fire icon, a weather icon (sun and cloud), a shopping bag icon, a paint roller icon, and a heart icon.

Not all Data is created equal... Sample size, Spatial and Temporal Precision are all important

Key Characteristics of Our Locational Big Data	
Multiple Types of Data	<ul style="list-style-type: none"> Location-Based Services records Navigation-GPS records
Sample Size	<ul style="list-style-type: none"> Covers ~23% of adult population in US and Canada Unbiased sample backed up with automated normalization
Spatial Precision and Coverage	<ul style="list-style-type: none"> As precise as 5-25 meters, average better than 18 meters 4-carrier coverage – no rural gaps
Temporal Precision	<ul style="list-style-type: none"> One-hour intervals Weekends vs. weekdays
Archival Data	<ul style="list-style-type: none"> Monthly data periods from 2014 through “month before last”
Privacy Protection	<ul style="list-style-type: none"> All data is de-identified by our suppliers No personally identifying information Metrics are aggregated into groups



Challenge; Big Data is often Messy Data

StreetLight Converts into Useful Transportation Metrics

Input:
Big Data

Processing:
RouteScience®

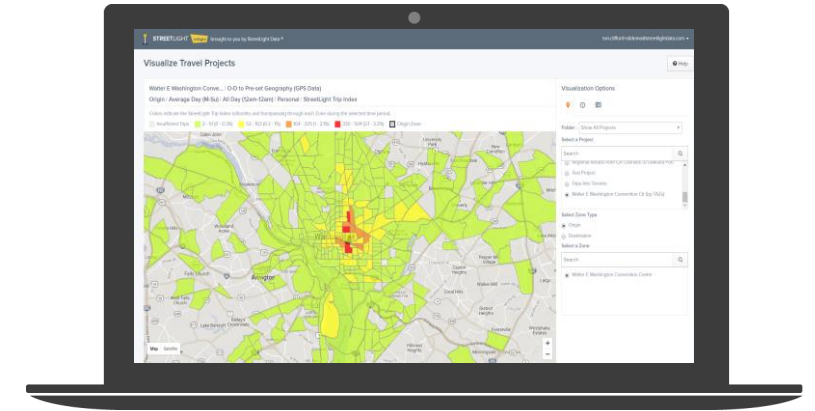
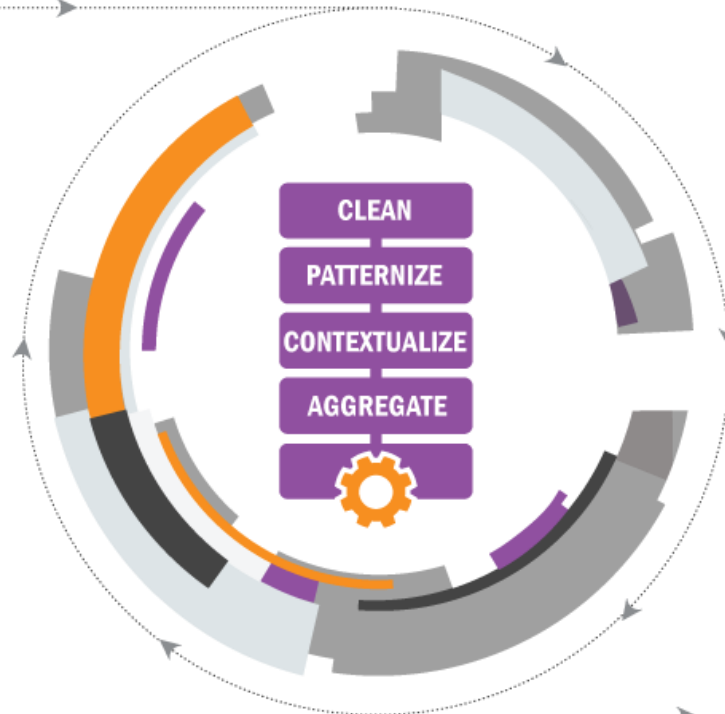
Output:
StreetLight InSight Metrics



Anonymous
and accurate
Big Locational Data



Road network,
land use, parcel,
census and more
Contextual Data



When Does it Make Sense to Use Big Data?

1. Going “Back in Time”

2. Large Study Areas

3. Need Large Sample

4. Complex Project Set-Up

5. Need Complete Trips

6. For Truck Trips & Demographics

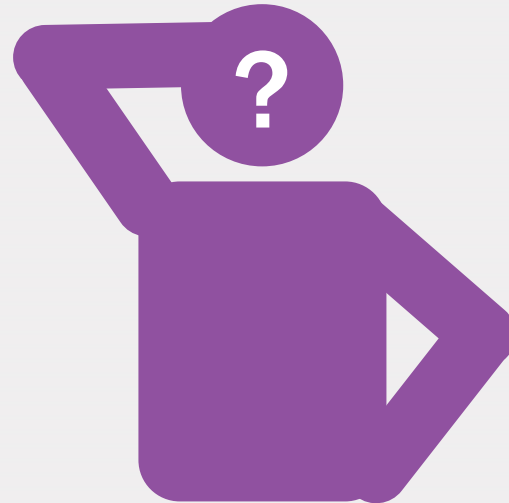
What Questions Can Big Data Analytics Answer for Planners? A Few Examples....

What types of trips cause congestion on a particular roadway?

What are the origins and destinations of travelers on a particular roadway?

How do travel patterns vary during different types and times of day?

What are the demographic characteristics of travelers? How long are their trips?

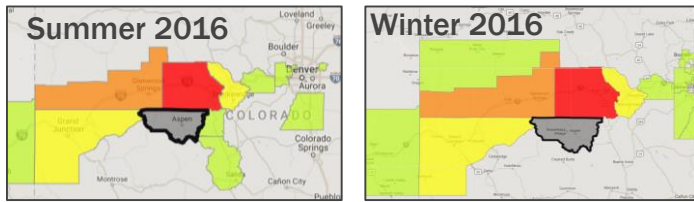


Where do commuters live, and where do residents work?

StreetLight InSight Supports A Range of High Priority Transportation Planning and Modeling Initiatives

Travel Demand Modeling

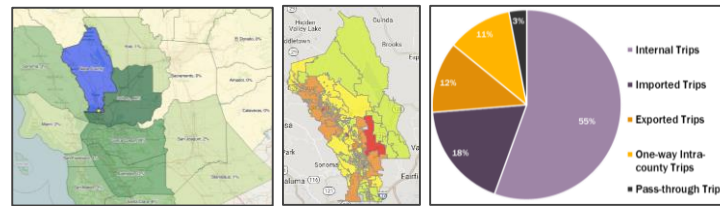
Calibrate with Empirical, Comprehensive O-D Matrices



Colorado DOT used StreetLight InSight To Understand Seasonal & Weekday/Weekend Trends

Long-Term Planning

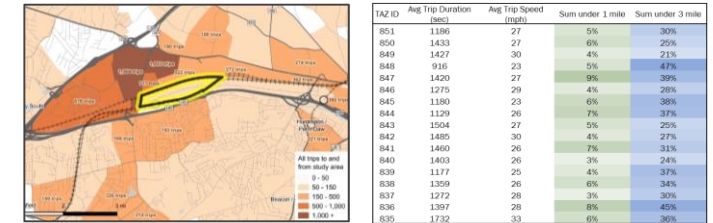
Study Regional Patterns & Engage With the Public



Fehr & Peers and Napa Valley Transport. Authority Used StreetLight InSight to Study Regional Trends

Travel Demand Management

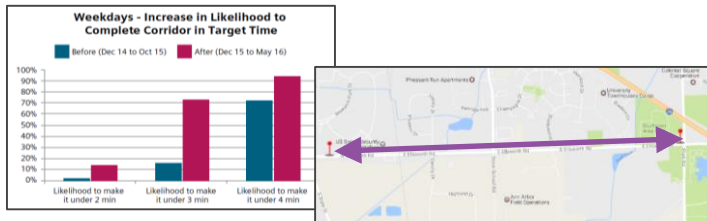
Scan for High-Potential Project Opportunities



Virginia DOT, Michael Baker, and SSTI Scanned for "Displaceable Vehicle Trips" with StreetLight InSight

Performance Measurement

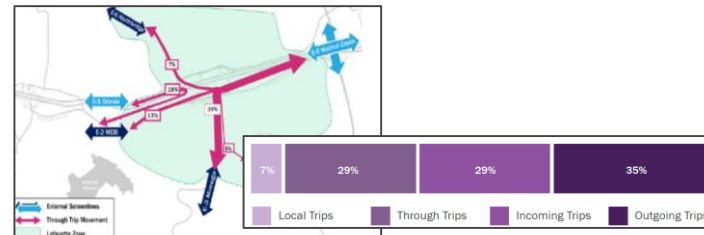
Evaluate AADT, Travel Time Reliability, & More



Siemens Used StreetLight InSight to Study the Impact of its ITS Traffic Signals on Travel Time Reliability

Congestion Studies

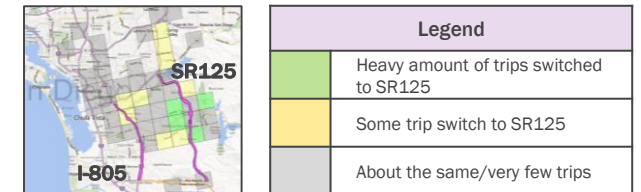
Identify the Cause of Congestion



The City of Lafayette, CA and Arup used StreetLight InSight to Analyze Downtown Congestion

Project Evaluations

Easily Conduct "Before & After" Studies

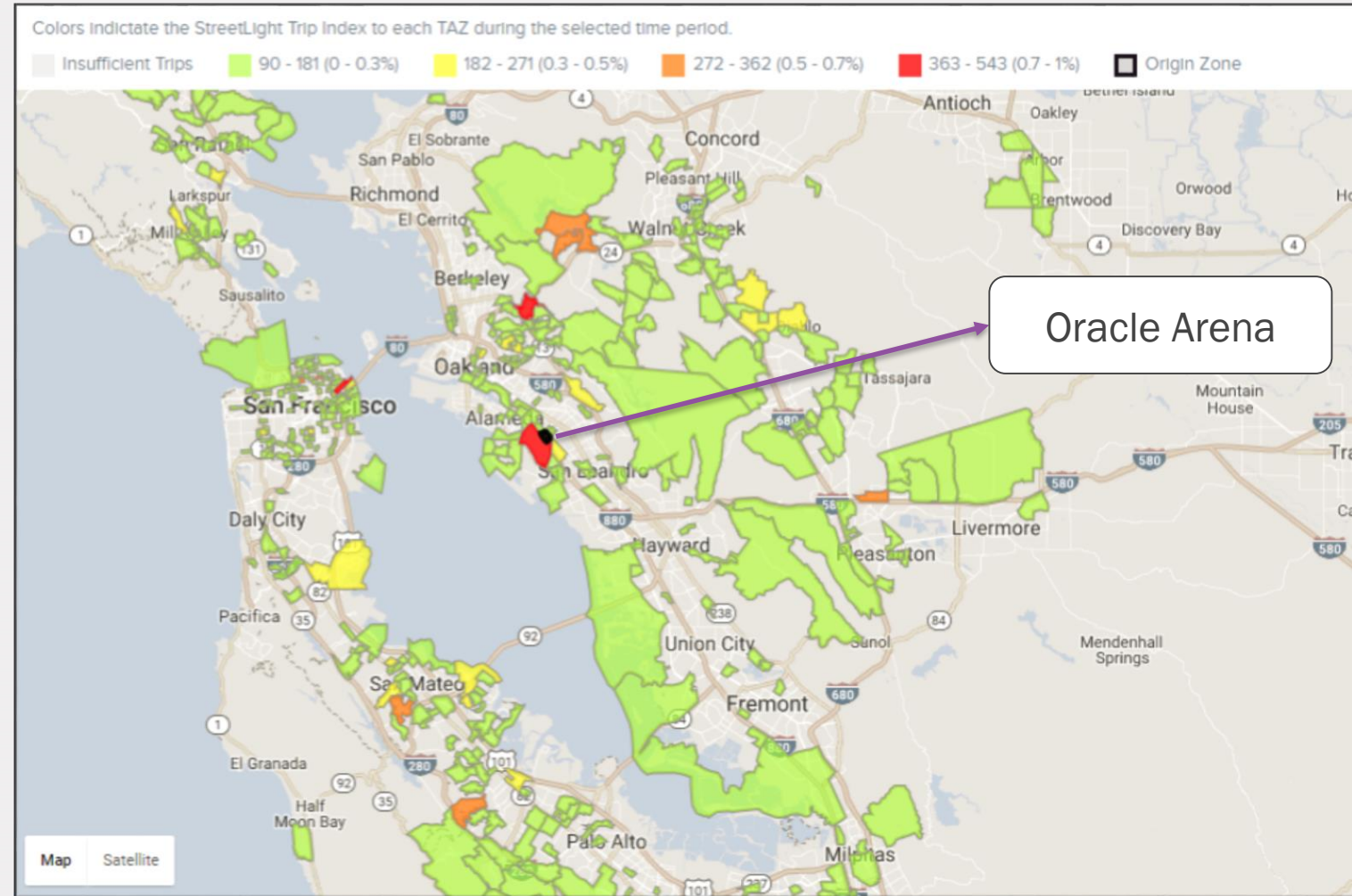


Fehr & Peers and SANDAG used StreetLight InSight to Determine the Impact of a Toll on Behavior

Some Attendees Drive Despite Transit Options

O-D to Preset Geography (TAZs) with GPS Data – Project Results:

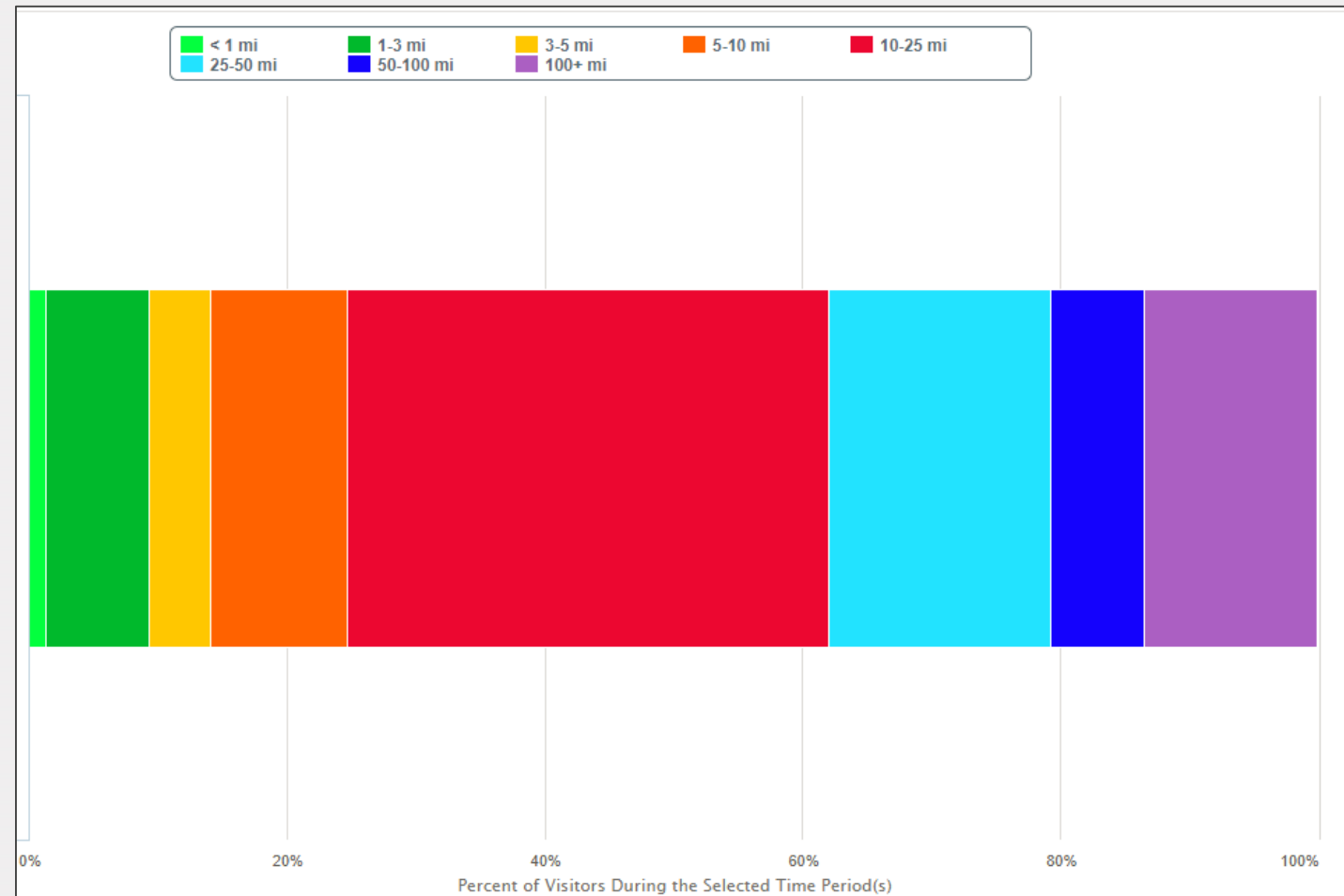
- Some vehicle trips originate where BART operates in San Francisco, Oakland
- Good opportunity for cities and transit agencies to focus game-day marketing efforts.



Approximately 75% of Game Attendees Live 10+ Miles from Stadium

Visitor Home-Work Analysis with LBS Data – Project Results:

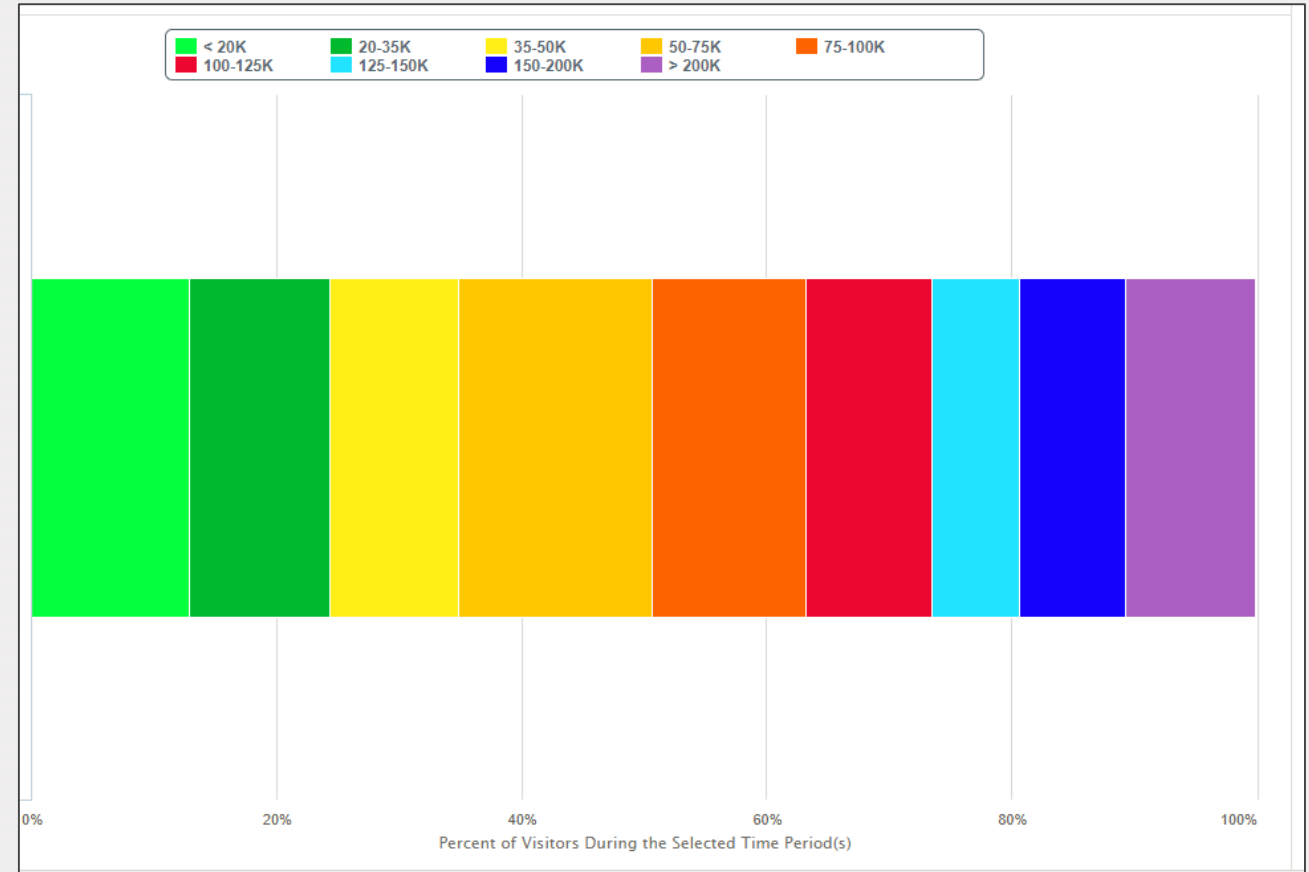
- Most attendees live or work more than 10 miles away from the stadium.
- Thus, you can expect attendees to drive or take BART (regional transit system) as opposed to walk or bike to the stadium.



Game Attendees Are Geographically and Economically Diverse

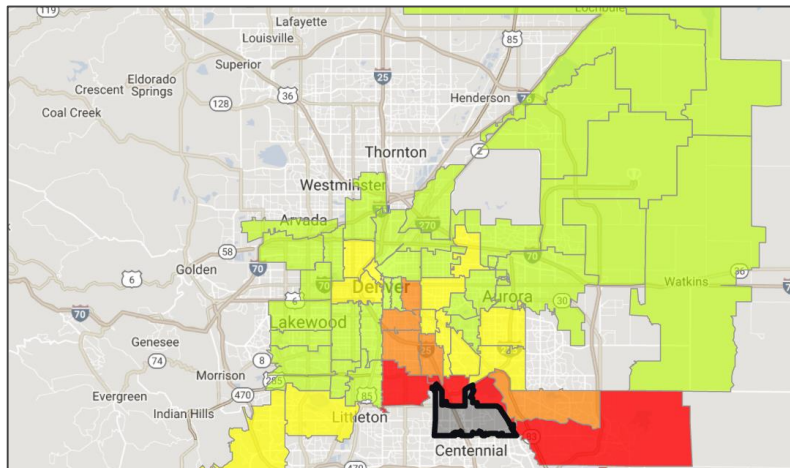
Visitor Home-Work Analysis with LBS Data – Project Results:

- Attendees not only come from all over the Bay Area, they generally have a diverse economic background.
- Would this change if/when the stadium moves to San Francisco?

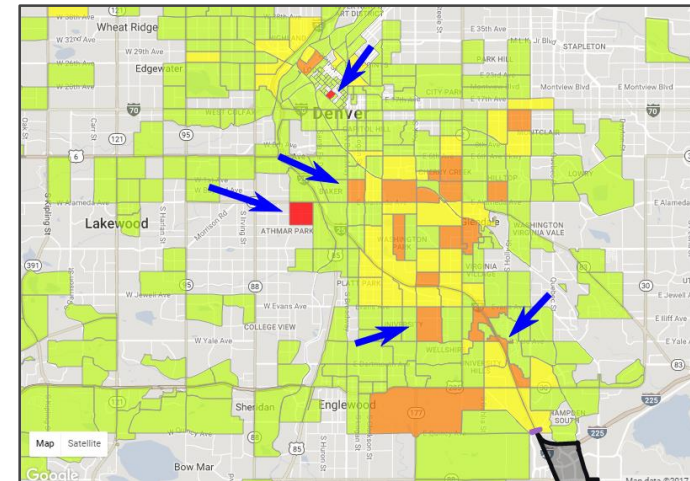


Big Data Helps Reveal the Best Opportunities for Converting Vehicle Trips to Other Modes

Scan Large Areas for Transit Opportunities



Drill Down on Refined Areas to Understand Transit Gaps



A Corridor Impact Study for a New Route

Corridor +
Facility
Improvement

Corridor Impact in Canada

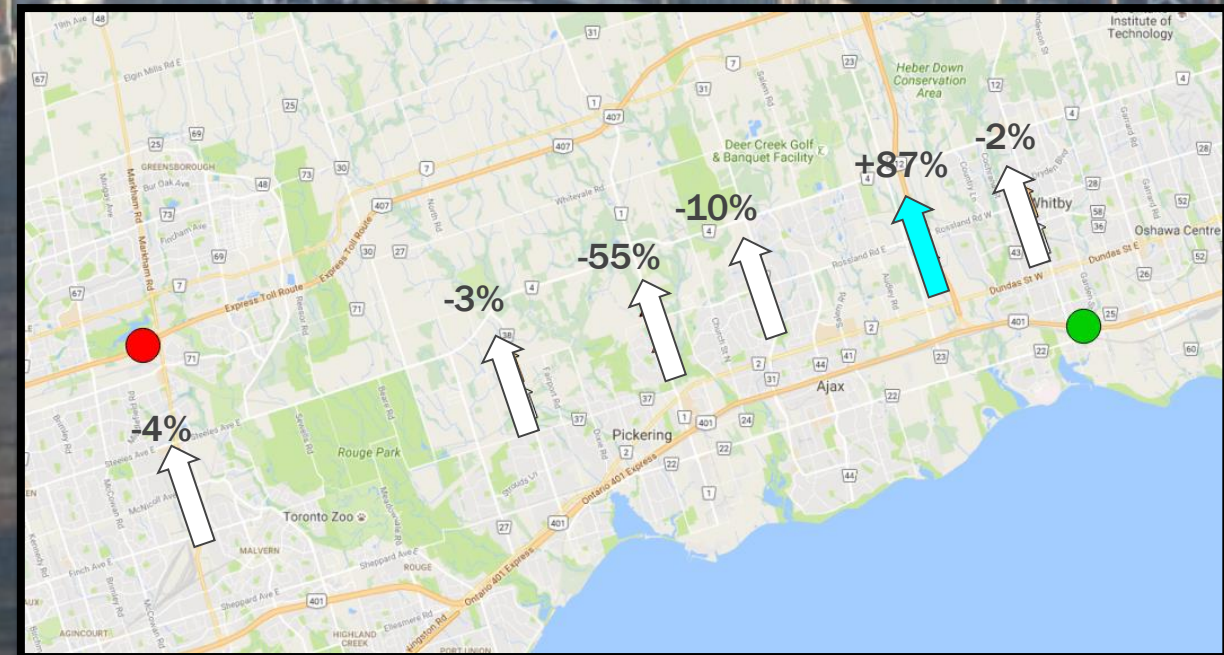
Need: Route choice between 2 highways to measure the impact of offering a new option.

Zones: 6 routes, 3 origin zones, 6 destination zones.

Metric: O-D with Middle Filter

Months: May, June 2016

Time to Run: 2 min for each month



Prioritize Bike/Ped, Transit or Improvement projects



Big Data & Privacy



StreetLight Data Privacy Principles

Our Commitment to Privacy

- Privacy is one of the core principles at StreetLight Data.
- Our analytics only describe the movement of groups of people - not the movement of individuals.
- Privacy Officer (

What We Expect from Our Data Suppliers

- Data files are not to contain personally identifiable information.

How We Protect Our Location Data Resources

- Once in house, the data sources are algorithmically processed into Metrics in a secure data repository behind a multilayered network security architecture supported by system audits and controls.
- Metrics about aggregated composite groups... “half of the group of people who shop in this shopping district live 10 miles away or more.”
- Every analysis in the StreetLight InSight® platform goes through an automated coverage and privacy check.

StreetLight Data Participates in Creation of Best Practices & Policies

- ✓ Future of Privacy Forum (FPF) think tank www.fpf.org
“brings together industry, academics, consumer advocates, and other thought leaders to explore challenges posed by the technological innovation and develop privacy protections, ethical norms, and workable business practices.”

Working Groups and Issues of Interest:

- Smart Communities Working Group
- Mobile Location Analytics
- Internet of Things
- Big Data
- Connected Cars
- Government and Law Enforcement



<https://fpf.org/2017/03/30/smart-cities/>

<https://fpf.org/2016/04/25/a-visual-guide-to-practical-data-de-identification/>

<https://fpf.org/2018/01/30/fpf-publishes-model-open-data-benefit-risk-analysis/>

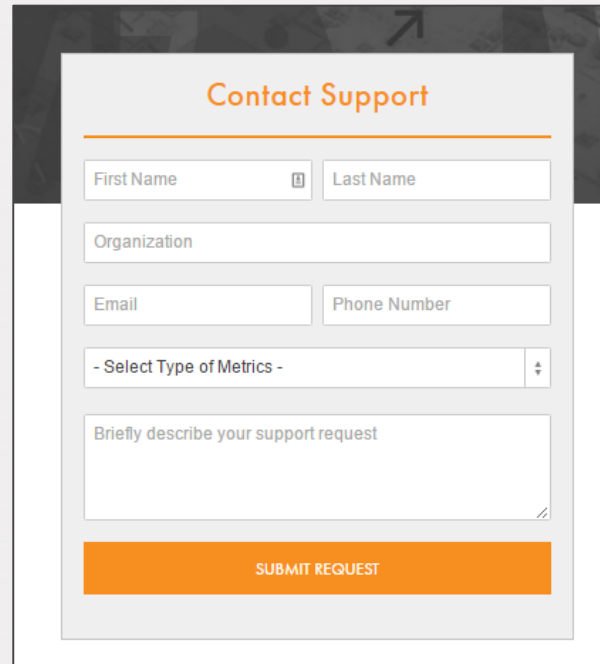
We're Here to Help!

Contact Me


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Contact Us

support@streetlightdata.com



Contact Support

First Name  Last Name

Organization

Email Phone Number


- Select Type of Metrics -

Briefly describe your support request

SUBMIT REQUEST

Check Our Blog

blog.streetlightdata.com




BIG DATA | TRANSPORTATION

NEW STREETLIGHT INSIGHT® CALIBRATION FEATURE: USE LOCAL DATA TO ESTIMATE VEHICLE COUNTS

By: [Laura Schewel](#)
November 30, 2016

Ever since we launched StreetLight InSight, our transportation clients have asked about scaling the StreetLight Trip Index to estimate actual vehicle trip counts. Our recommendation has always been to do this manually using trusted local calibration data. In yesterday's StreetLight InSight update, we transformed that manual process into an automated one with our new, BETA calibration feature. This means that if you have average daily travel data that you trust for roads that are nearby (or even within) your project, you can enter that information directly into StreetLight InSight and automatically scale Metrics to estimated counts.

[READ MORE](#) [Share](#) 

Thank you!

Now You're Ready to Leverage Big Data

Contact Us to Get Started:

Curt.Thye@streetlightdata.com