What are LBS Data?

Location data collection by Apps
- Smartphones
- GPS quality
- User permission

Location-Based Services Data

Data Characteristics
- Large sample size
- Messy datasets
- Spatial precision
- Persistent ID
- Anonymized
Four Core Algorithms

**IDENTIFY TRIP ENDS**
- Process Activity Stays
  - Raw Data
  - Processed Data

**EXPAND THE DATA**
- Devices with NO regular workplace
- Devices WITH regular workplace

**IDENTIFY HOME & WORK LOCATIONS**
- Determine home and work locations

**SCALE TRAVEL PATTERNS**
- Normalize the Trips
Benchmark/Calibrate Mobility Metrics

Sample Size
- Market Penetration
  - # Valid Devices
  - # Valid Days
- Tract-level Stats

Activity Patterns
- Duration
- Start & End times
- Activity Type

Trip Statistics
- Trip Rates
- ToD Distribution
- Trip Length
- Travel Purpose

Travel Flows
- Screen lines
- Traffic Counts
- VMT
- RMSE
Trip Origins Compared to Regional Model

Trips by Origin District – LBS shares vs. SCAG model (for LA County)
Temporal Segmentation vs. NHTS

**Trip Time of Day—Weekday**

- **LBS Data**
  - Early AM
  - AM Peak
  - Midday
  - PM Peak
  - Evening
  - Owl

- **NHTS Data**

**Start Hour**

- **HBW**
- **HBO**
- **NHB**

CAMBRIDGE SYSTEMATICS
Activity Duration Analysis – Variation by Land Use Features

RESIDENTIAL NEIGHBORHOOD

<table>
<thead>
<tr>
<th>Duration Bin mins</th>
<th>Home</th>
<th>Work/School</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>[0, 5)</td>
<td>0%</td>
<td>0%</td>
<td>2%</td>
</tr>
<tr>
<td>[5, 10)</td>
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<tr>
<td>[10, 15)</td>
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<td>[15, 20)</td>
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<td>[20, 30)</td>
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<td>2%</td>
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<td>[30, 40)</td>
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<tr>
<td>[40, 50)</td>
<td>1%</td>
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</tr>
<tr>
<td>[50, 60)</td>
<td>1%</td>
<td>0%</td>
<td>1%</td>
</tr>
<tr>
<td>[60, 90)</td>
<td>3%</td>
<td>0%</td>
<td>2%</td>
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<tr>
<td>[90, 120)</td>
<td>2%</td>
<td>0%</td>
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<tr>
<td>[120, 150)</td>
<td>2%</td>
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<tr>
<td>[150, 180)</td>
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<tr>
<td>[180, 210)</td>
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<tr>
<td>[210, 240)</td>
<td>1%</td>
<td>0%</td>
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<tr>
<td>[240, 300)</td>
<td>2%</td>
<td>0%</td>
<td>1%</td>
</tr>
<tr>
<td>[300, 360)</td>
<td>2%</td>
<td>0%</td>
<td>1%</td>
</tr>
<tr>
<td>[360, 420)</td>
<td>1%</td>
<td>0%</td>
<td>1%</td>
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<tr>
<td>[420, 480)</td>
<td>2%</td>
<td>0%</td>
<td>1%</td>
</tr>
<tr>
<td>8 hours or more</td>
<td>52%</td>
<td>2%</td>
<td>2%</td>
</tr>
<tr>
<td>Grand Total</td>
<td>76%</td>
<td>4%</td>
<td>21%</td>
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Activity Duration Analysis – Variation by Land Use Features

CBD – DOWNTOWN BOSTON

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<td>9%</td>
<td>1%</td>
</tr>
<tr>
<td>8 hours or more</td>
<td>3%</td>
<td>23%</td>
<td>3%</td>
</tr>
<tr>
<td>Grand Total</td>
<td>4%</td>
<td>51%</td>
<td>44%</td>
</tr>
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</table>
Transit Competitiveness Analysis

**STEP 1**
Use farecard data to explain **TRANSIT** travel market

**STEP 3**
Compare **TRANSIT** travel to **TOTAL** travel in each market

**STEP 2**
Use cell phone data to explain **TOTAL** travel market

**STEP 4**
Use trip planners to compare transit and driving travel times
# Transit Riders Frequency of Travel

## USING 4 MONTHS OF FARECARD DATA

<table>
<thead>
<tr>
<th>Usage Frequency</th>
<th># of Farecards</th>
<th>Count or Boardings</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total</strong></td>
<td>2,859,258</td>
<td>83,908,041</td>
</tr>
<tr>
<td>Infrequent</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;10 Transactions</td>
<td>1,905,501</td>
<td>5,614,072</td>
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<tr>
<td>Occasional</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10 – 50 Transactions</td>
<td>552,374</td>
<td>12,585,194</td>
</tr>
<tr>
<td>Frequent</td>
<td></td>
<td></td>
</tr>
<tr>
<td>50 – 150 Transactions</td>
<td>248,851</td>
<td>22,027,882</td>
</tr>
<tr>
<td>&gt;150 Transactions</td>
<td>152,532</td>
<td>43,680,893</td>
</tr>
</tbody>
</table>

Source: TAP data - Metro and Municipal Operators (July through October, 2017)
Competitiveness of Relative Travel Times

When driving is over twice as fast, transit is less competitive
Long-Distance Commute Trips and Transit

**TRANSIT SHARE BY DISTANCE & PERCENT OF TOTAL TRIPS**

<table>
<thead>
<tr>
<th>Trip Distance</th>
<th>Transit Share</th>
<th>% of Total Trips</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-1 mi</td>
<td>16%</td>
<td>46%</td>
</tr>
<tr>
<td>1-5 mi</td>
<td>7%</td>
<td>22%</td>
</tr>
<tr>
<td>5-10 mi</td>
<td>6%</td>
<td>5%</td>
</tr>
<tr>
<td>10+ mi</td>
<td>4%</td>
<td>2%</td>
</tr>
</tbody>
</table>

Short trips represent the largest potential market.
Sylmar/San Fernando Key Facts

- **Trips:** 380,000 trips
- **Market Share:** 1.4% market share
- **Mileage:** 76% of trips under 2.5 miles
- **Travel time competitiveness:** 3.25-3.50

60% of trips occur within the area
27% of trips are to the Valley
1% of trips are to Downtown LA
3% of trips are to Sunland/La Crescenta

Percentages do not equal 100%. Additional trips dispersed throughout the County.
Sunland/La Crescenta Key Facts

- Trips: 325,000 trips
- Market Share: 0.7% market share
- Mileage: 44% of trips under 2.5 miles
- Travel time competitiveness: 3.00-3.25

60% of trips occur within the area
2% of trips are to Sylmar/San Fernando
11% of trips are to the Valley
1% of trips are to Downtown LA
8% of trips are to Glendale
6% of trips are to Pasadena

Percentages do not equal 100%. Additional trips dispersed throughout the County.
Only 2-3% of trips travel between Sylmar and Sunland

Only one route connects to North Hollywood, every 12-21 min

No connection to North Hollywood Station

Only 1% of trips go all the way to Downtown
New circulators to address short-distance travel

Fewer routes go Downtown, feed Red Line, frees up resources

Increase frequency to every 10 minutes all day

Direct connection to North Hollywood

Modified Service
- Line 90/91
- Line 92
- Line 222
- Line 224
- Sylmar Shuttle 1
- Sylmar Shuttle 2
- Sylmar Shuttle 3
- Line 901 (Orange Line)
- Red Line
- North Hollywood Station
COVID-19 Recovery Planning for Transit
To Help with COVID-19 Recovery for Transit

1. What is the impact of work-from-home?
2. Have travel patterns stabilized?
3. Are automobile sales going up?
4. Are equity-focused communities impacted disproportionately?
5. What role does social distancing play?
To help agencies assess the changes in travel behavior as a result of COVID-19, we have developed a suite of near real-time LOCUS products powered by Location Based Services (LBS) data.

Traffic Footfall Tracker
Measures store visitation trends by location, day of week, brand, and category

Travel Tracker
Measures resident travel patterns – travel sheds, time-of-day of travel, VMT – to study changes in behavior.
1. Impacts on City Centers/Downtowns – New York
1. Impacts on City Centers/Downtowns – Los Angeles
2. Travel Pattern Stabilization - Dallas and Houston
2. Travel Pattern Stabilization - Los Angeles
3. Automobile Dealership Traffic Trending up in LA County

![Traffic Footfall Tracker](image)
4. Dining Trends in Equity Communities in Denver
4. Dining Trends in Other Communities in Denver
Forecasting Travel Behavior in Uncertain Times

We are developing and implementing an integrated method of forecasting and planning that is driven by near real-time LOCUS data. Our approaches are refined based on what we learn from these data. Given the uncertainty, we recommend supplementing traditional modeling with best practice risk analysis tools.

**Scenario Planning:** Define “what if” scenarios that you want to test

**Modeling Tools:** Assess scenarios by ingesting LBS data to calibrate models

**LBS Data:** Develop a clear picture of what is happening in real time to study impacts

**Risk Analysis:** Bound the future given the uncertainty of key input variables