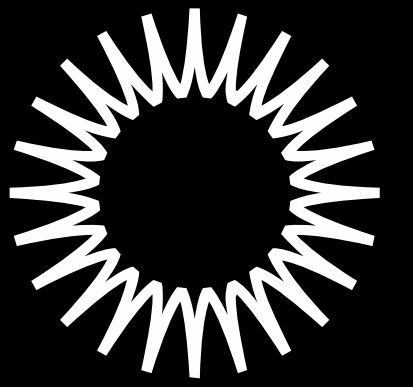


SPUR

Ideas + Action for a Better City

learn more at SPUR.org

tweet about this event:
@SPUR_Urbanist
#BetterData

Transitime & Swyft 

What can one now do with Transit Data?

Background

- 15+ years in real-time information
- Led engineering and GM at NextBus
- Developed key algorithms
- Transportation advocacy

Why?

Transit is important

Transit is messy

Accuracy!

"Better three hours too soon than a minute too late"

- WILLIAM SHAKESPEARE, THE MERRY WIVES OF WINDSOR

Worst case scenario

Missing the bus by a few seconds

Maximizes wait time & travel time

Transit still not good enough

- Long wait time = long travel time
- Bus bunching
- Missed trips
- Congestion

Competition

Flywheel

lyft

UBER

As a startup we…

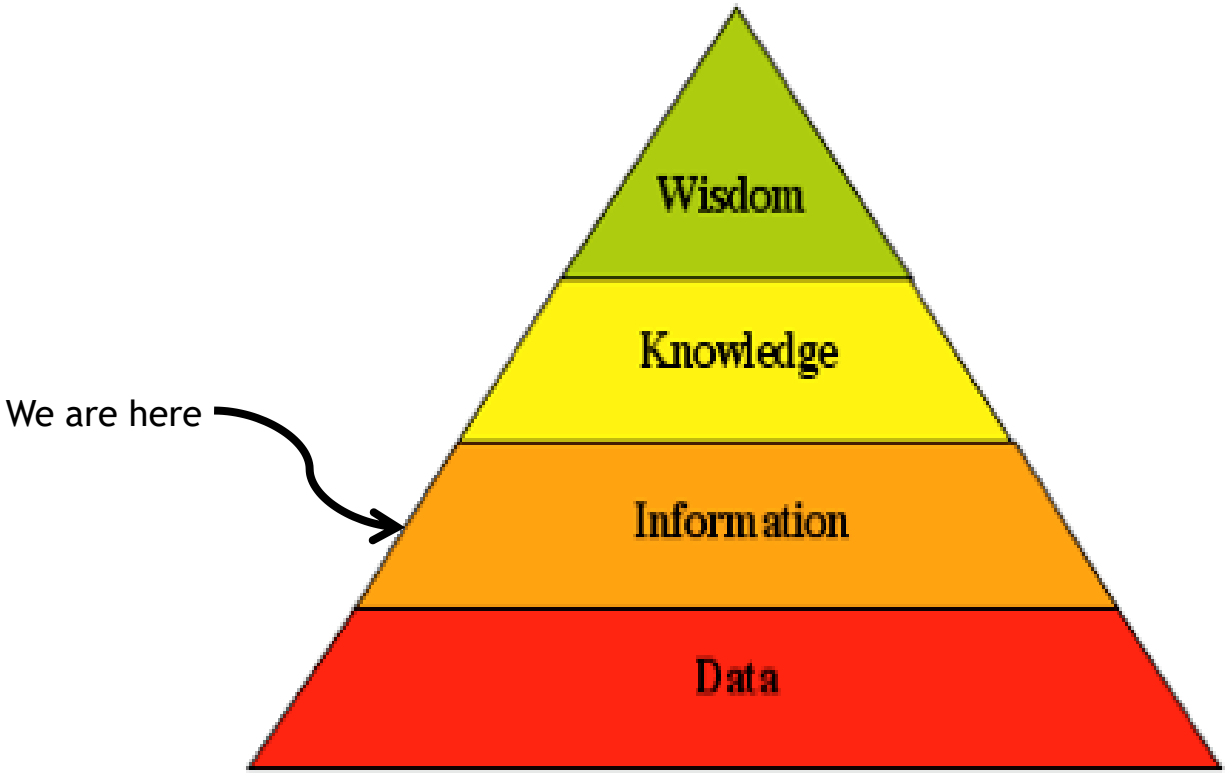
~~Disrupt!!!~~

Improve!!!

Can’t manage what you don’t measure

Happy passengers

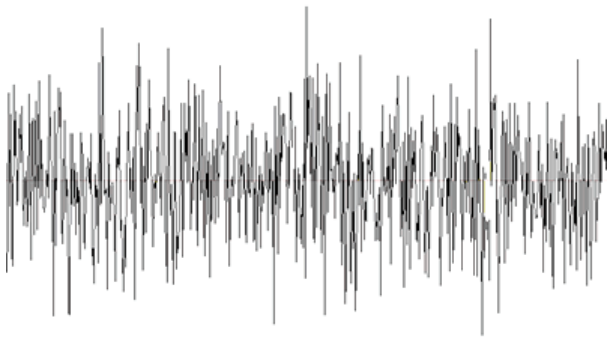
Making data useful

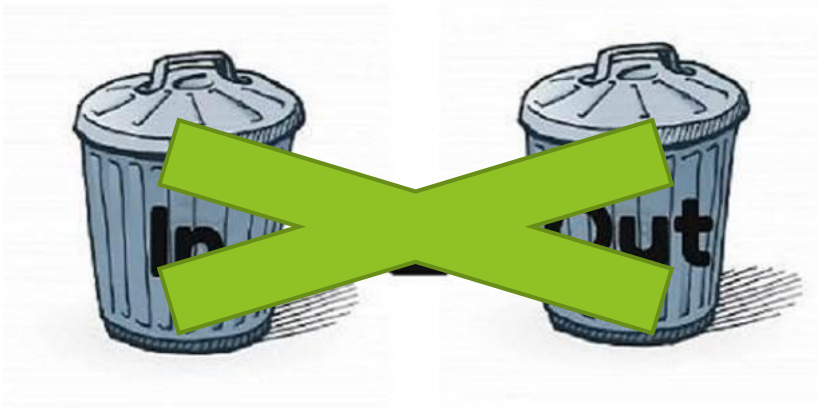


Open Data

- Still not enough
  - Not all data is accessible
  - Not adequately accurate
- Can enable very interesting things!

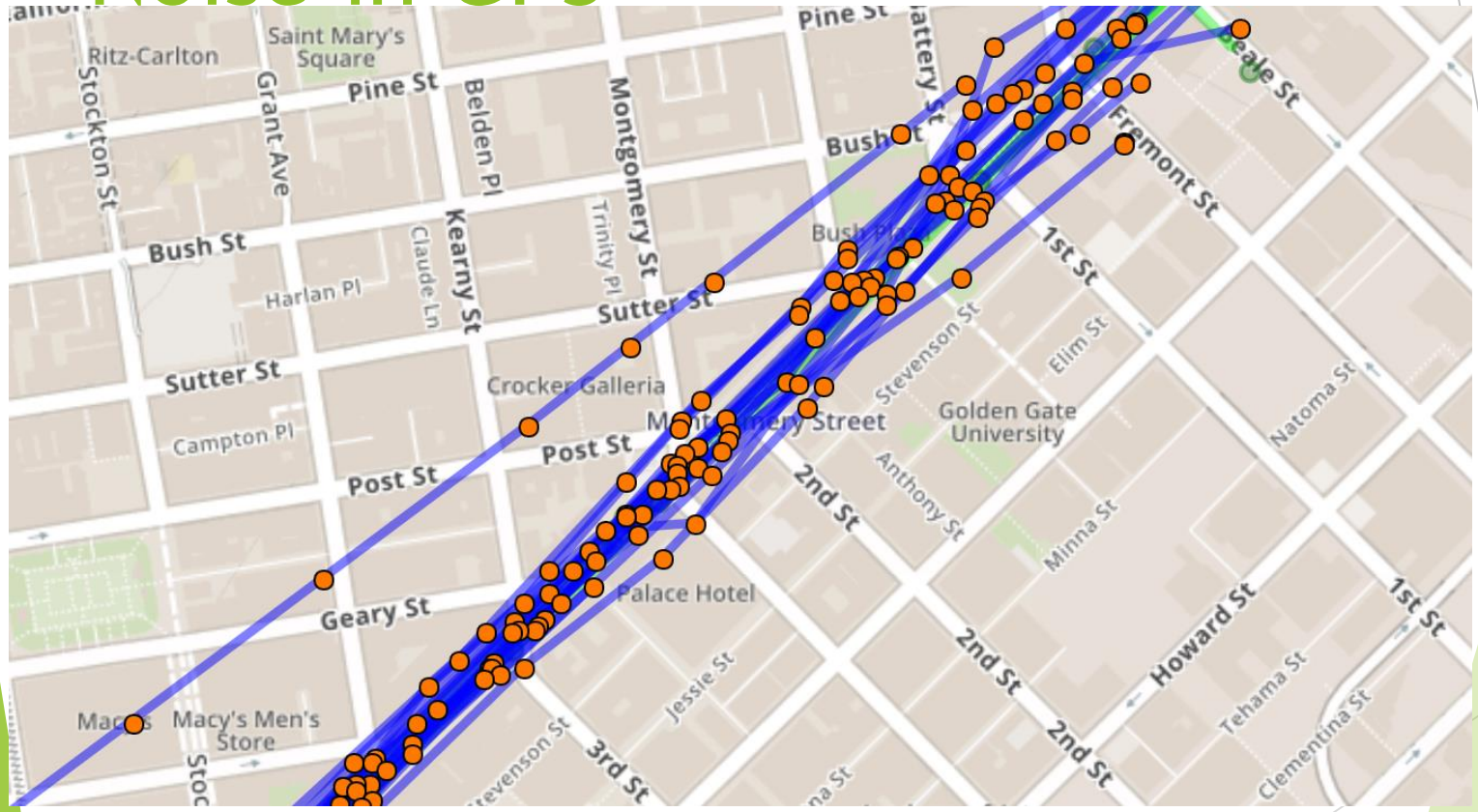
Noise



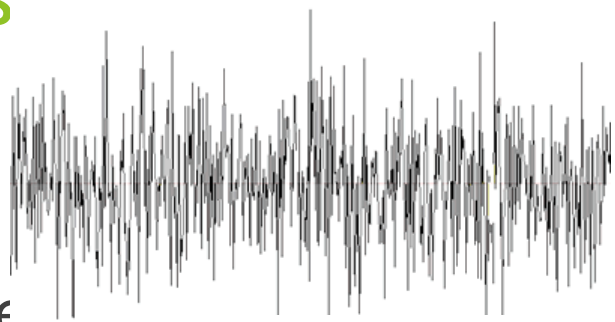


Not acceptable
Must work well!

Noise in GPS


Ritz-Carlton
Saint Mary's Square
Pine St
Stockton St
Grant Ave
Belden Pl
Montgomery St
Kearny St
Bush St
Harlan Pl
Claude Ln
Trinity Pl
Sutter St
Campton Pl
Crocker Galleria
Post St
Geary St
Palace Hotel
Macy's Men's Store
Jessie St
3rd St
Stevenson St
Anthony St
Minna St
Golden Gate University
Elim St
Natoma St
Fremont St
1st St
2nd St
Howard St
Tehama St
Clementina St

Other data problems



- Schedule not attainable
- Stops in wrong location
- Plain old data errors
- Changes to assignments
- Drivers doing interesting things

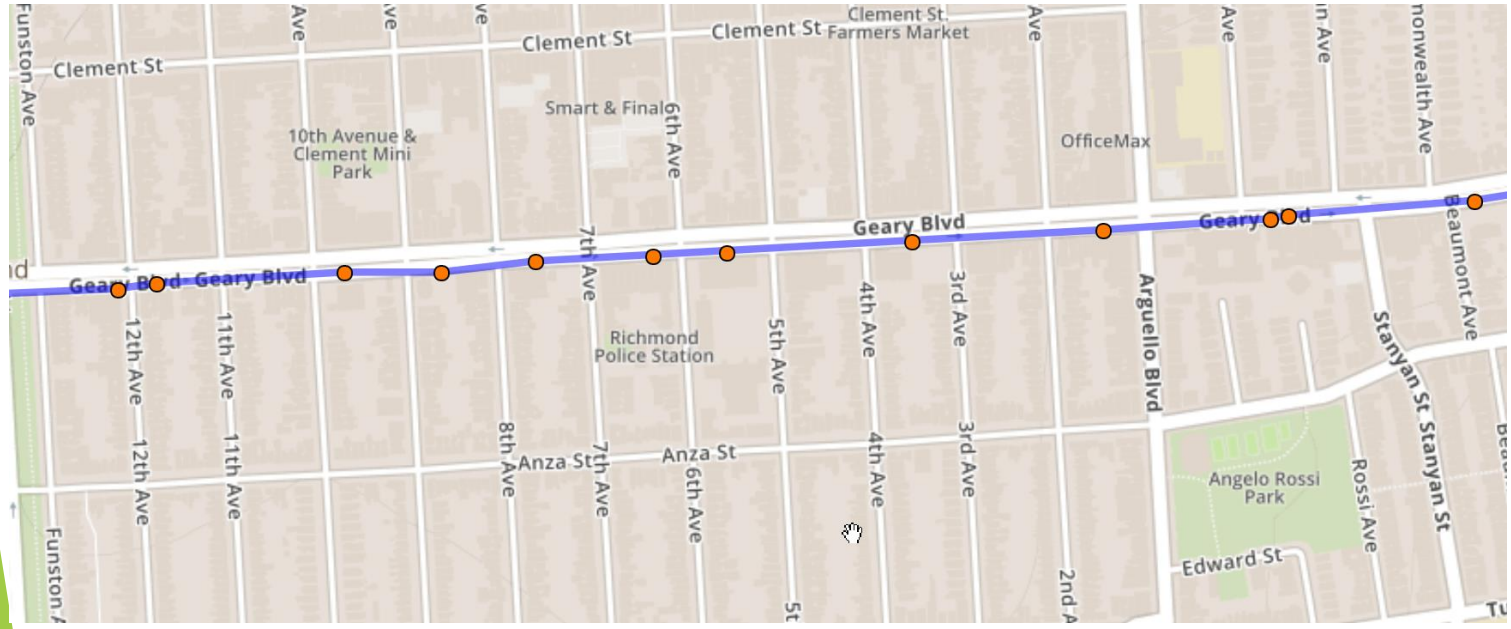
Filtering!

Recent improvements to passenger info

Much better BART signage!

Fewer extraneous (bicycle) messages!!

Frequent GPS updates for SFMTA



New GPS every 20 seconds means greater accuracy!

Transitime

GPS

Configuration data

- Commodity
- Usually already available
- Open data sources
- Can provide low-cost trackers
- 20 second reporting rate preferable
- Often noisy
- GTFS data
- Routes, stops, schedules
- Open data
- Often problematic
- “Good enough” not good enough

Transitime

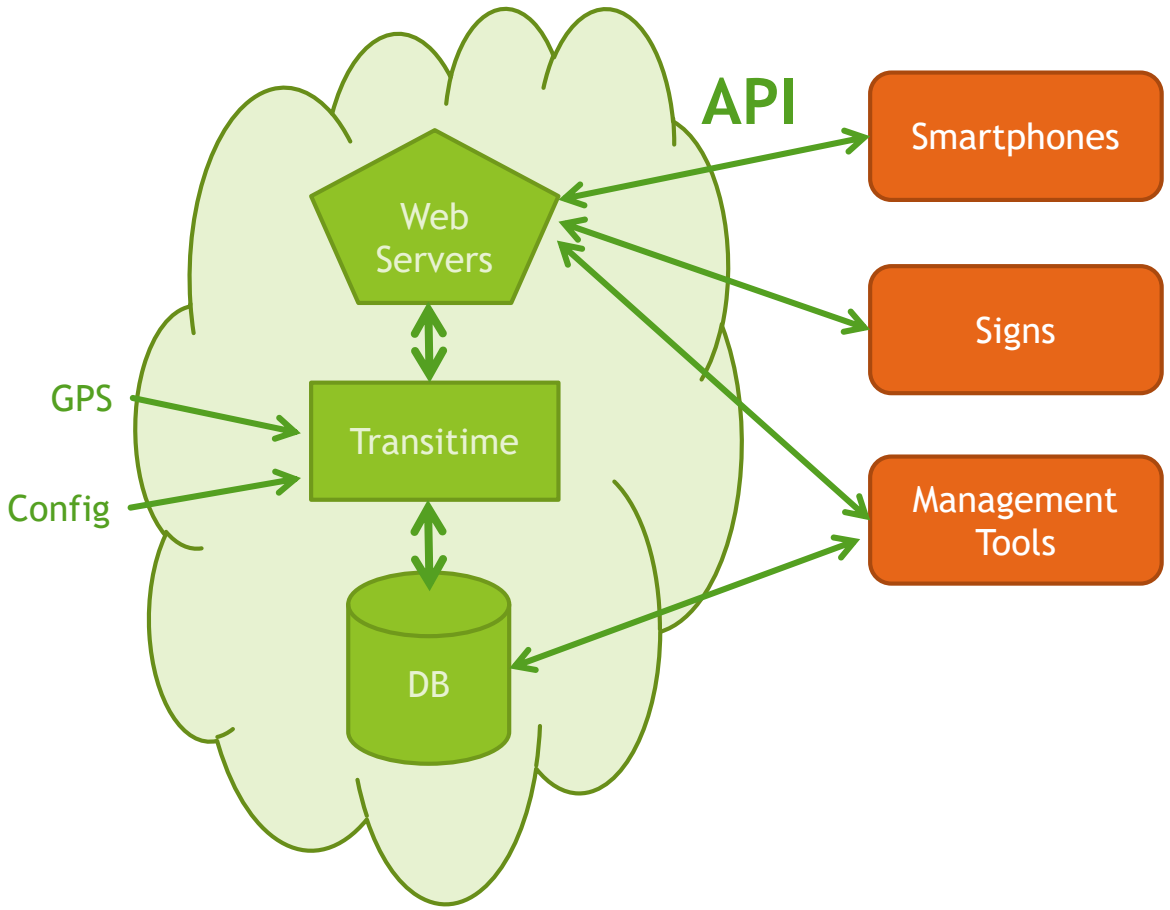
GPS

Configuration data

Great deal of software

Real-time information

Transitime


API
Smartphones
Web Servers
Signs
GPS
Transitime
Management Tools
Config
DB

Prediction Accuracy

Prediction Accuracy Improvements

- Far more data
  - Each trip considered separately
- Historic trip start times taken into account
- Tools for data visualization and testing
  - Can find problems and make improvements
- Compensates for found problems
  - e.g. GPS time from NextBus API incorrect

Prediction Accuracy Measurements

Compares predictions to calculated arrival times

10:00am

7 min prediction

10:06am

1 minute early!

- Measured sample of actual arrival times to confirm
- Very large volume of data

Schedule Adherence

- Best proxy for measuring system
  - Frequency of service
  - Bus bunching
  - Missed runs

Schedule Adherence

- Schedule not accurate
  - aspirational, what we want buses to do
- Trips plans that use schedule are not accurate
- Transitime can output schedule based on GPS data
- Passengers will actually get to there on time

Demo!

Immediate Next Steps

- More analytics, including travel time info
- Further improved accuracy

Future Plans

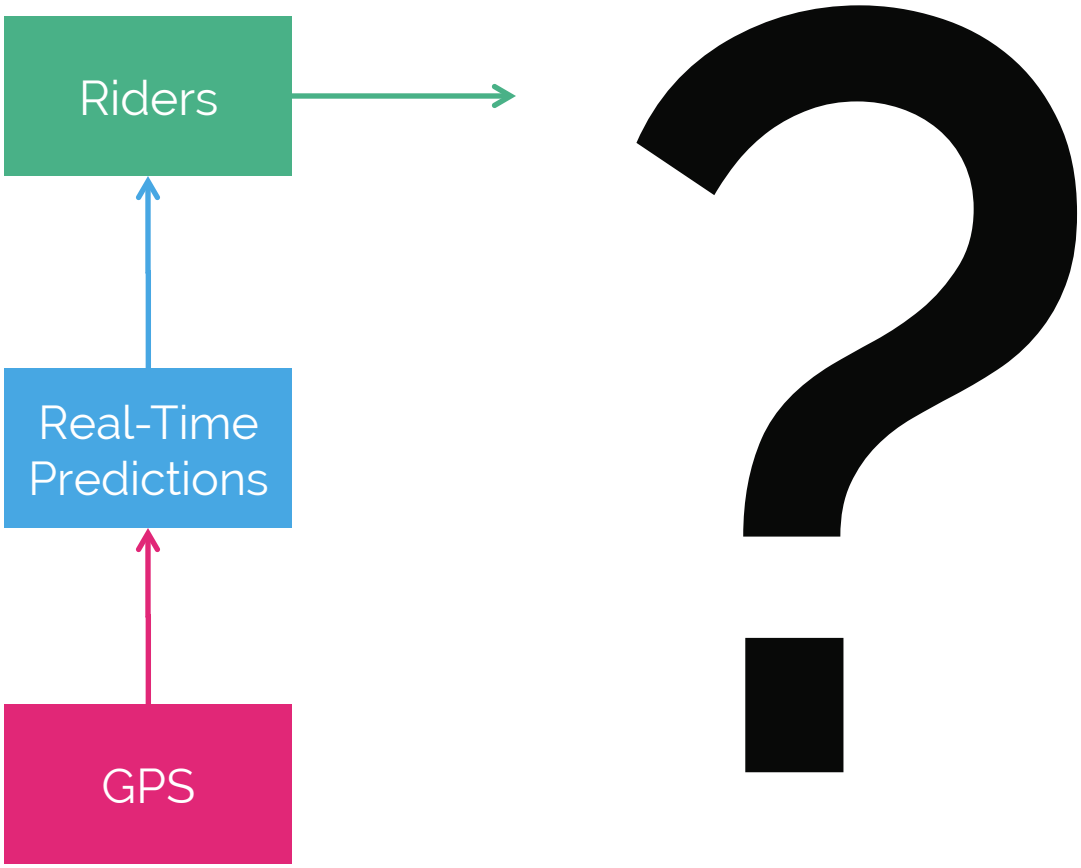
- Holistic Transit Priority Signaling
- Even better management tools
  - BRT management
  - Ability to access raw information
- Integrate management of vehicles with real-time info
  - E.g. If bus taken out of service system adjusts both when drivers are to start trips and real-time information
- ???

Swyft

Jonny Simkin, CEO

www.swyftapp.com | @swyftapp | @jonnysimkin

TRAVEL BEHAVIOR BLACK BOX



GOOD DATA CAN INFORM TRANSIT INVESTMENTS

- Travel origins and destinations
- Transit effectiveness
- Travel times
- System reliability
- Etc...

TRADITIONAL DATA COLLECTION IS LIMITED

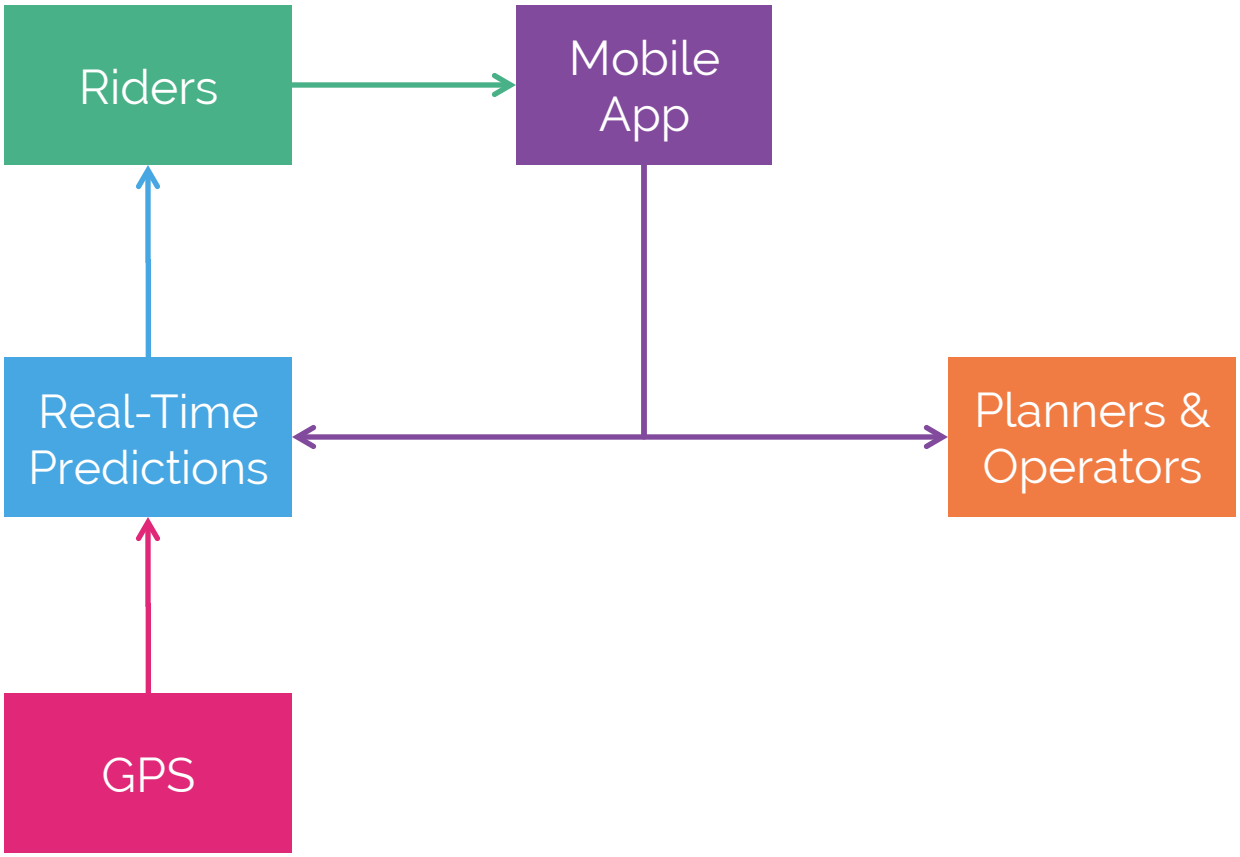
Travel Surveys & Observation

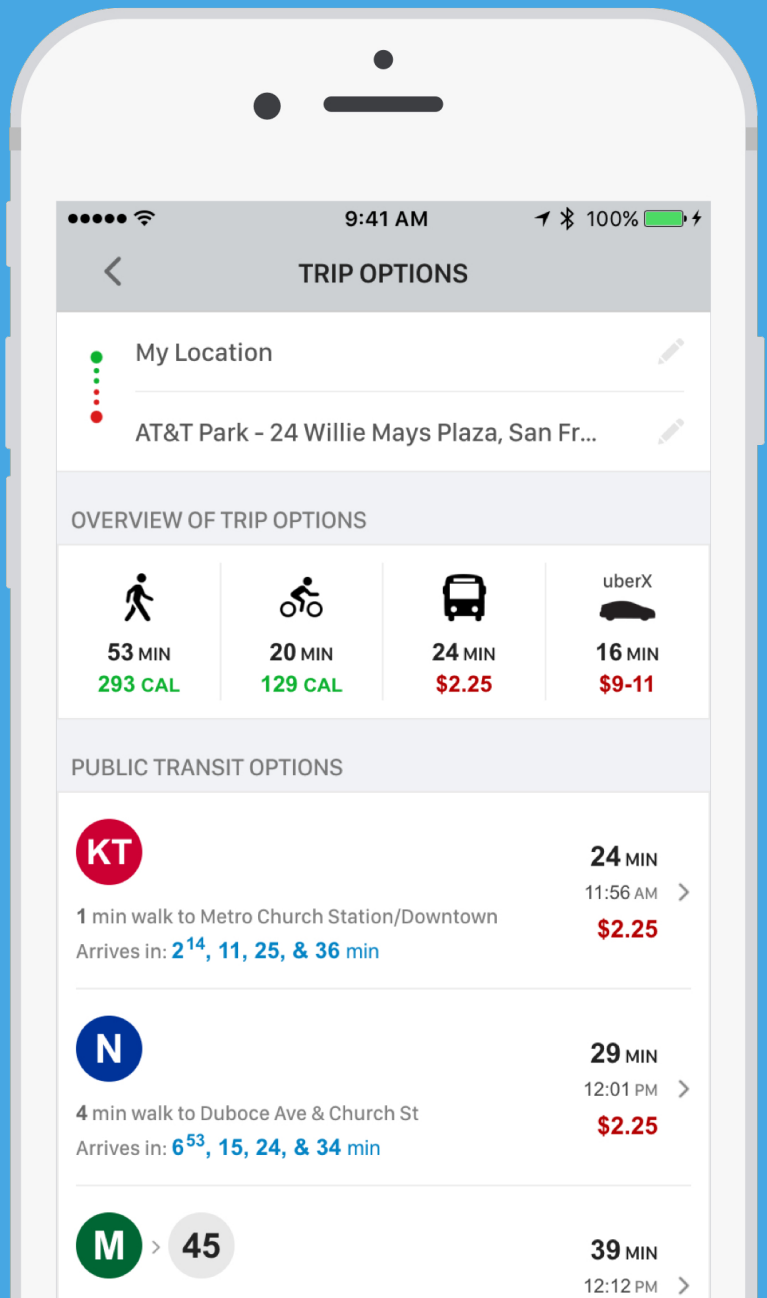
Fare Data

TRADITIONAL DATA COLLECTION IS LIMITED

- Surveys
  - Expensive
  - Small data samples (100's to 1000's people)
  - Data is reported, not necessarily true
- Fare data
  - Subset of users
  - Usually only origin
  - Can't obtain actual origin or destination

SOLVING THE RIDER BLACK BOX



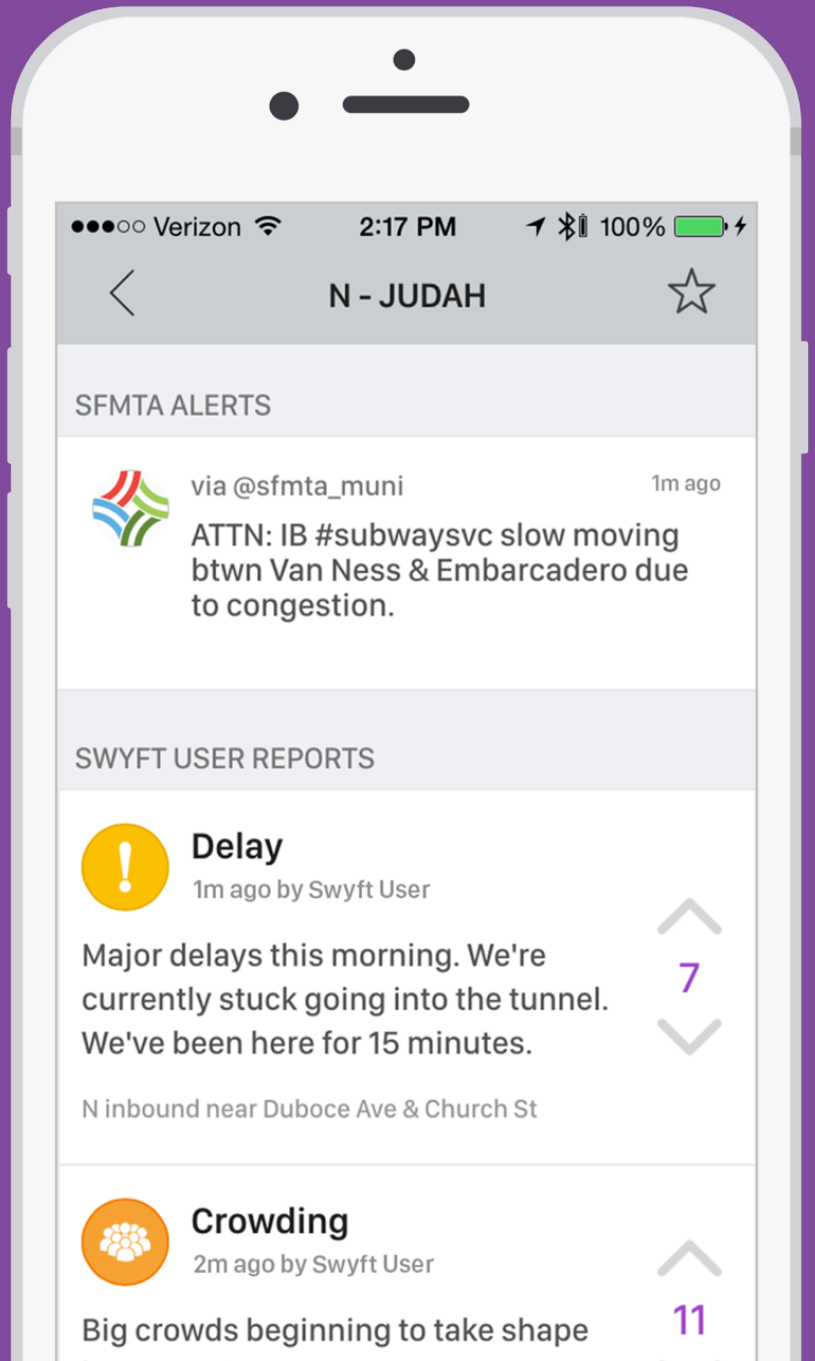


SWYFT MOBILE APP

Find the fastest and cheapest ways to get around town.

CROWDSOURCED REPORTS

Swyft leverages Twitter, user reports, and a big data engine to suggest the fastest ways to get around town.



SENSORS ON SMARTPHONE

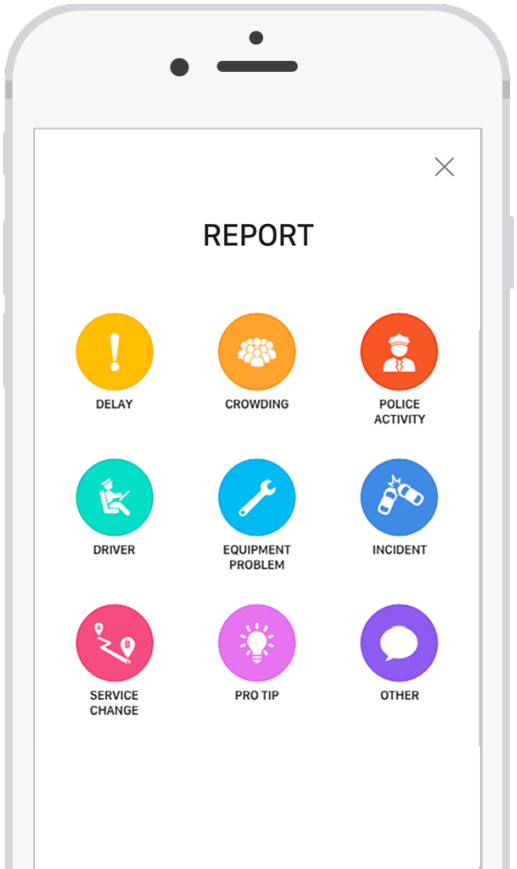
- Position
  - GPS
  - WIFI
  - Cellular
  - Bluetooth
- Accelerometer
- Camera
- Light sensor
- Barometer
- Gyroscope
- …and many more

TYPES OF DATA WE CAN COLLECT

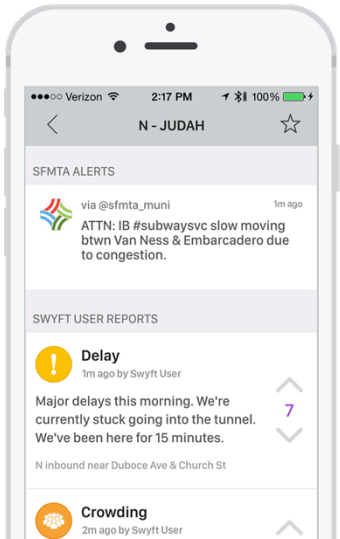
- Delays, overcrowding, etc (crowdsourcing)
- Travel behaviors
- Mode share
- …and much more

HOW CROWDSOURCING WORKS

User reports a problem within Swyft



Swyft can alert transit agencies of the problem



Swyft helps fellow riders avoid the issue

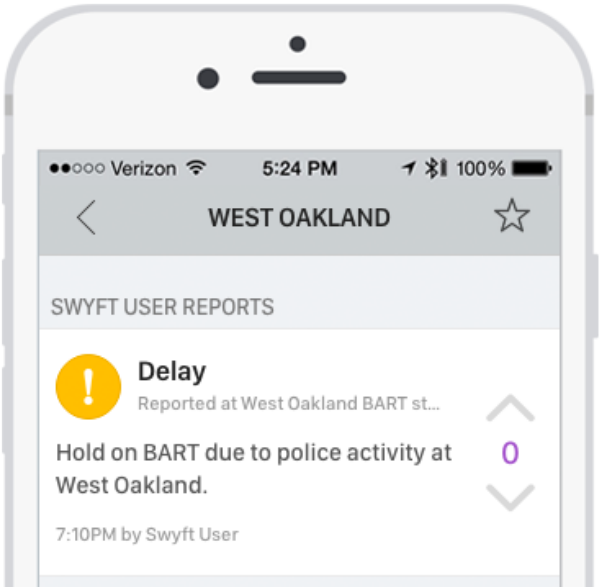
RAPID COMMUNICATION PLATFORM

Swyft can detect issues before they show up on Twitter

Twitter

Station closure announced at 8:10pm

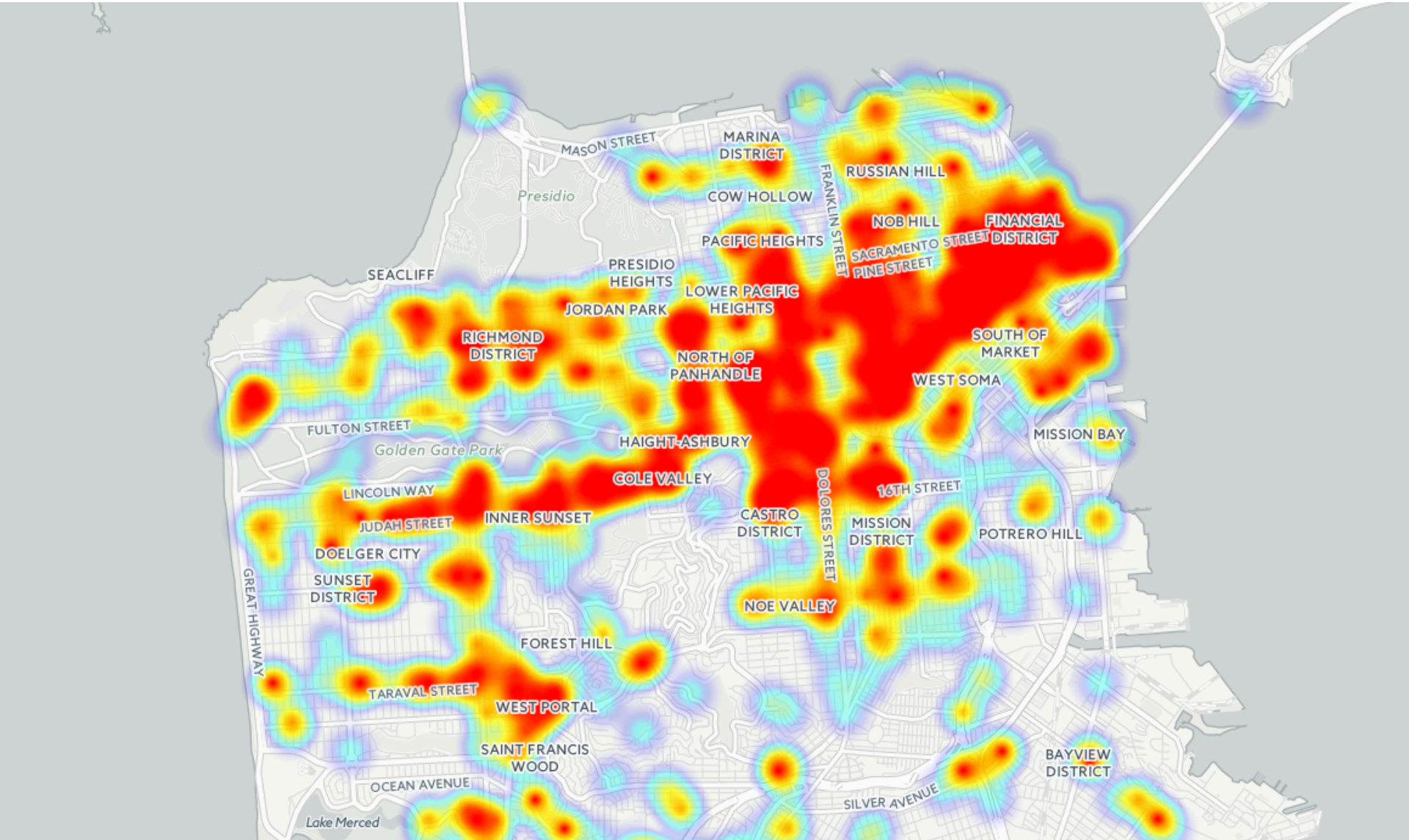
1 HOUR DIFFERENCE



Swyft

Station closure reported at 7:10pm

UNDERSTAND WHERE ISSUES OCCUR

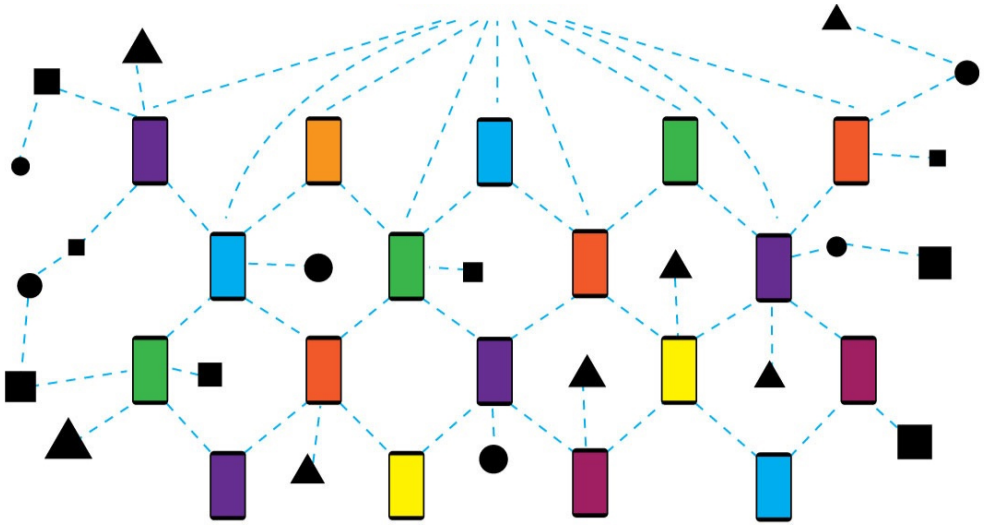


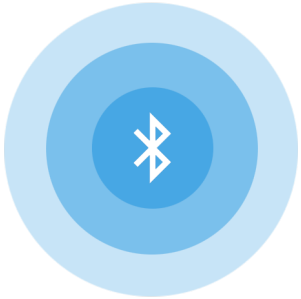
CROWDSOURCING BENEFITS

- Faster incident detection and response
- Better rider communication
- Historical reporting
- Can crowdsource many things:
  - Operations: delays, equipment issues, driver performance, etc.
  - Prediction accuracy
  - Accessibility (broken elevators)
  - Real-time crowd levels

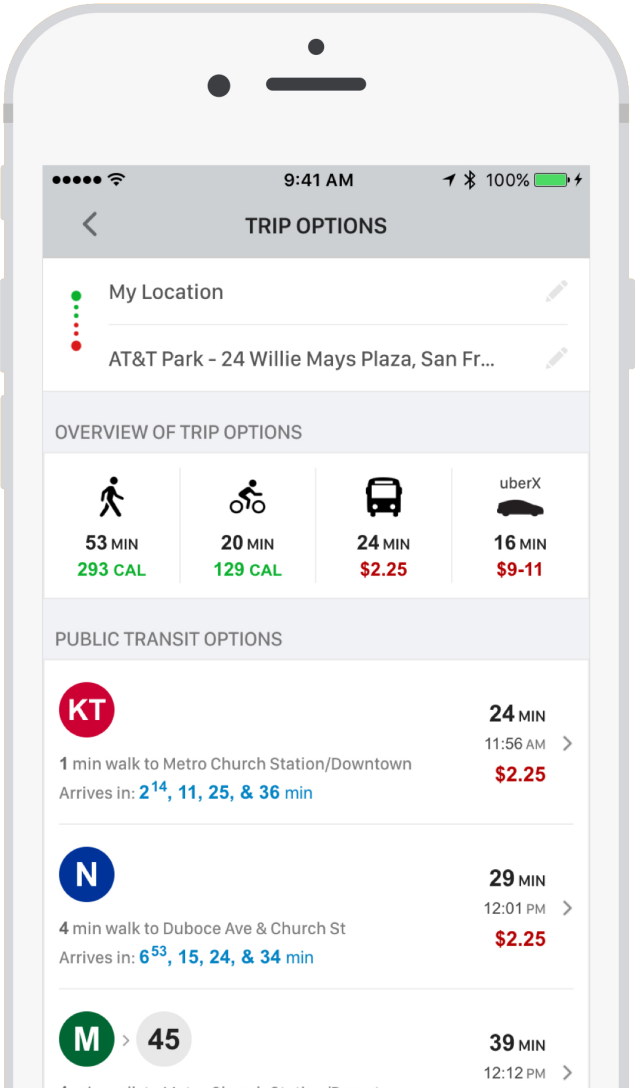
REAL-TIME CROWDING LEVELS

Create a mesh network of devices communicating position





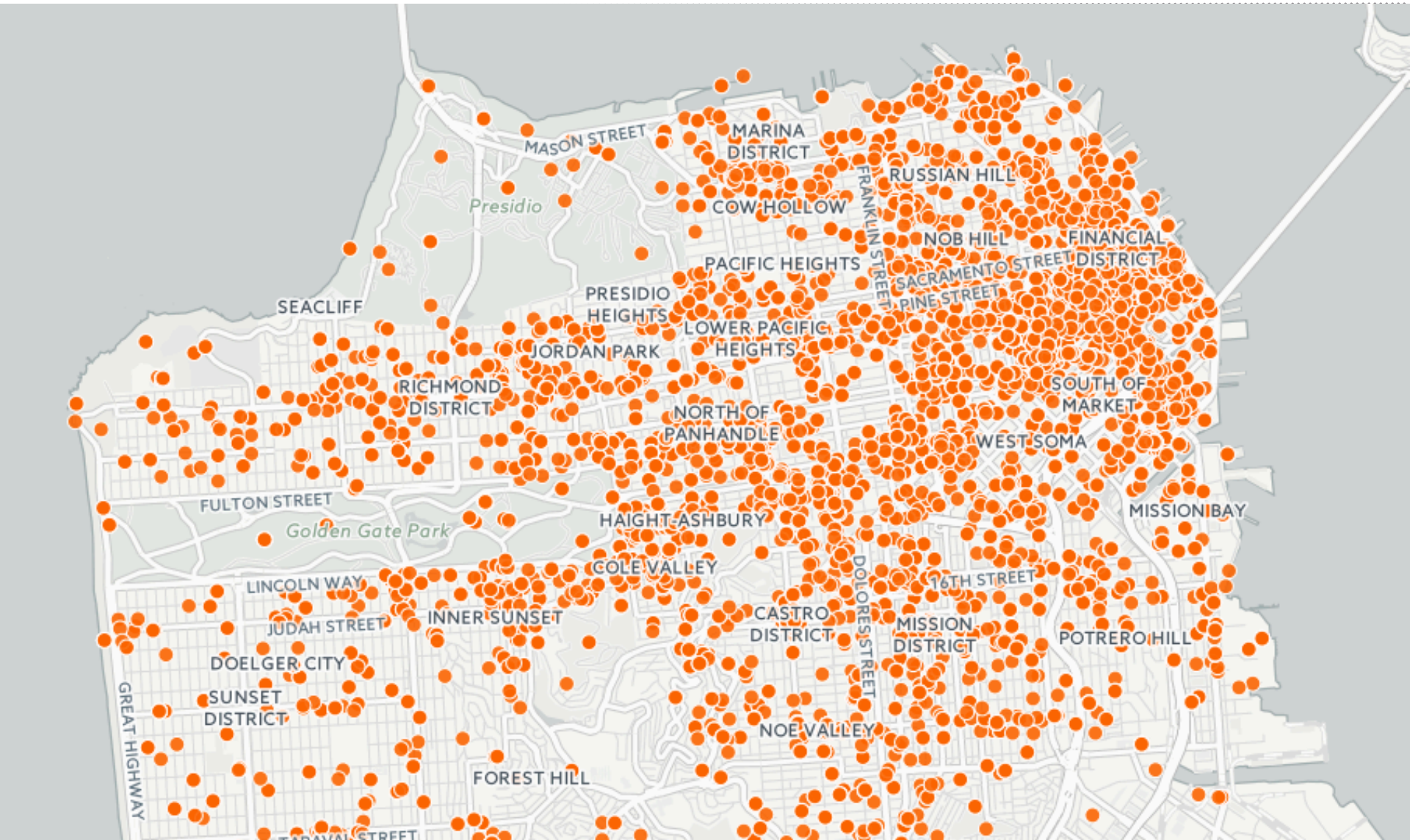
TRAVEL BEHAVIORS



- Origin-destination pairs
- Mode choice*
- Route choice

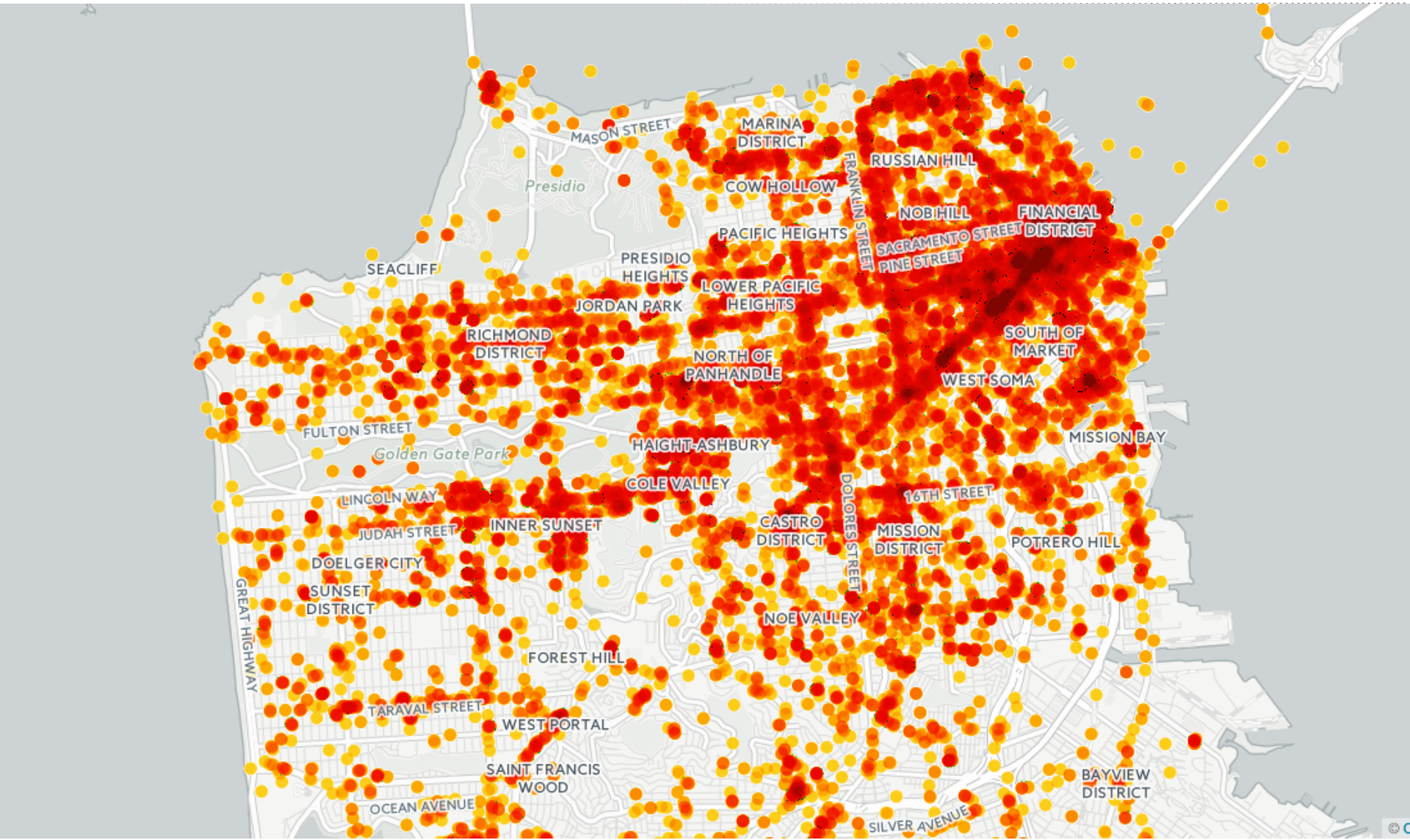
* When permitted by partners

ORIGIN-DESTINATION PAIRS



TRANSIT USAGE

Transit usage density in San Francisco



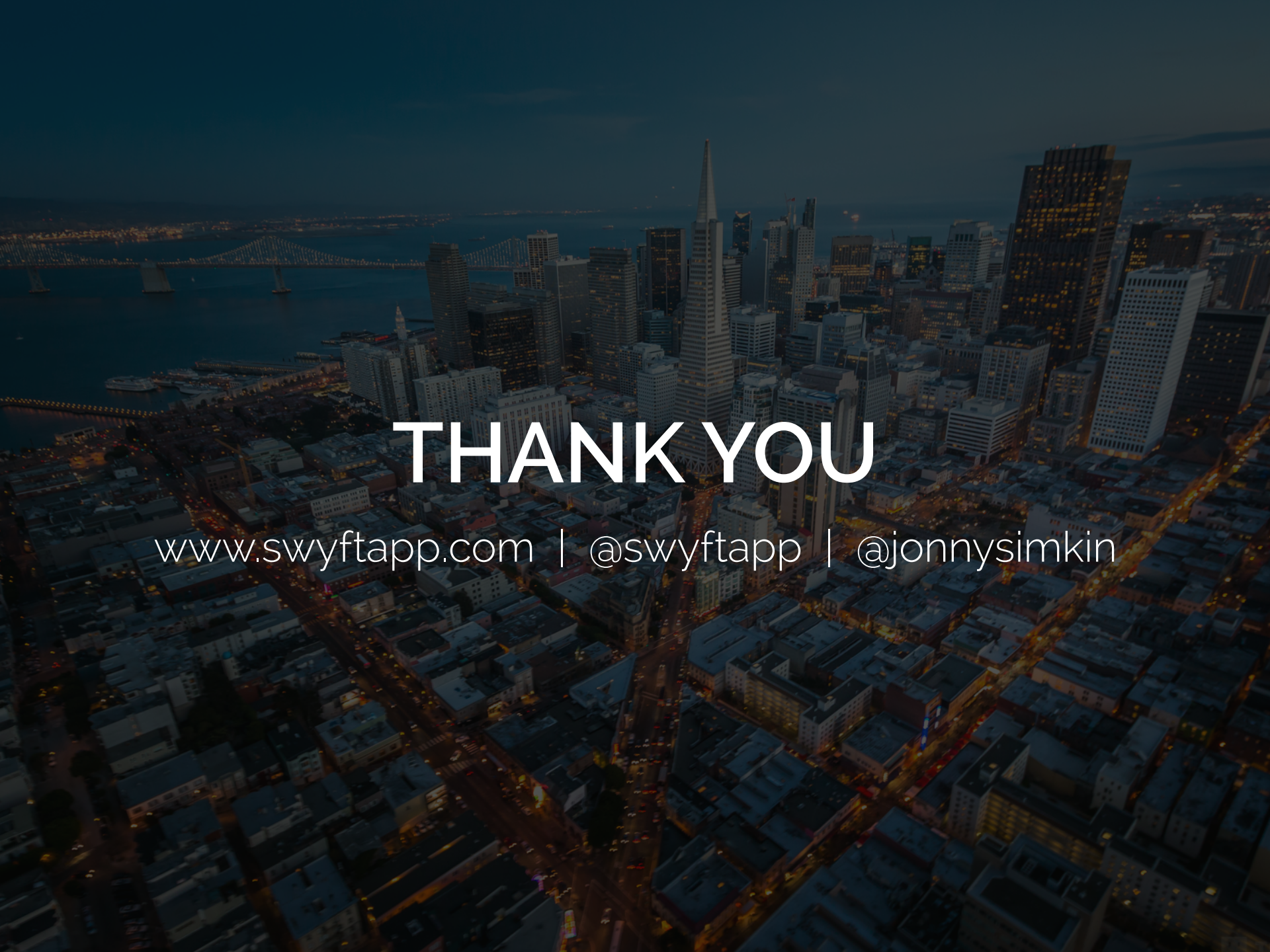
SUMMARY

- Smartphone data can help us understand:
  - Delays, overcrowding, etc.
  - Travel behaviors
  - Mode share
  - Etc.
- Data can be used to improve transportation system

* When permitted by partners

USER PRIVACY

- User permission
- Protect identity
  - No sign in
  - Shuffle anonymous user IDs every 24 hours
- Protect locations
  - Census tract level data


THANK YOU
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