Smart cities data

Matt Caywood
CEO
TransitScreen
India's pace of urbanisation

There are more people living inside this circle than outside of it.
“The sign of an advanced society is not where poor drive cars, but where the rich ride transit”

-Bogota Mayor Enrique Penalosa
There isn’t enough transportation
Collision Course

- 1.2 billion cars on the road today, 2 billion by 2035
- Cars sit unused 96% of the time
- 81% of seats in cars are unfilled
New concrete no longer helps

World’s largest freeway (Houston, 23 lanes)

In 2011, $2.8 billion expansion and tolls ↑

In 2014, 33% slower than before

Why? Sprawl + Induced Demand brought even more cars
A Mobility Revolution is Underway

- **Autonomous**: 26 companies are actively developing technology
- **Bikeshare**: 1.5 billion rides in 2016
- **Carshare**: 200 million trips in 2016
- **Rideshare**: 4 billion rides in 2016
- **Mass Transit**: 40 new urban metro systems opened in past decade
MANY TECHNOLOGIES ARE INVOLVED

THE SMART MOBILITY ECOSYTEM

Curated by:

Traffic Flow

Autonomous Vehicle Tech

Mobile Ticketing

Sensors

Street Level Information/Ads

Beacons/Proximity

Self-driving Cars

Mapping

On-Demand Mobility
chirot

BRIDJ

Sobi

SocialBicycles

motivate

Biking

Zagster

Bandwagon

Siemens

Cubic

moovel

Xerox

masabi

TransitScreen

Mobileye

NAuto

Cruise

Gm

Quanergy

drive.ai

STICK FACTORS

Sidewalk Labs

Clear Channel Outdoor

LinkNYC

JCDecaux

Intersection

CIVIQ

MAPZEN

MapBox

Radius Networks

estimote

Lyft

Apple

Faraday Future

Here

CartoDB

GeoSpatial on the cloud
Who lives in a “Smart City”?

[Image of a diagram showing various elements of a smart city such as solar panels, electric buses, smart houses, and wind farms.]
Sensor data: parking, ShotSpotter, mobiles
Sensors and Activators

A metaphor from biology

**Sensors** transform changes into data

**Activators** transform data into changes
People are the activators in Smart Cities
TRANSITSCREEN
turning data into actions
### Changing behavior at Harvard’s Cabot House

<table>
<thead>
<tr>
<th>Location</th>
<th>Route</th>
<th>Time</th>
<th>Walk Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Harvard</td>
<td></td>
<td></td>
<td>14 MIN WALK</td>
</tr>
<tr>
<td>Alewife Northbound</td>
<td>RL</td>
<td>1, 8 MIN</td>
<td>1 MIN WALK</td>
</tr>
<tr>
<td>Braintree Southbound</td>
<td>RL</td>
<td>4, 16 MIN</td>
<td>1 MIN WALK</td>
</tr>
<tr>
<td>Ashmont Southbound</td>
<td>RL</td>
<td>9, 23 MIN</td>
<td>1 MIN WALK</td>
</tr>
<tr>
<td>Concord Ave @ Bond St</td>
<td>74</td>
<td>6 MIN WALK</td>
<td></td>
</tr>
<tr>
<td>Belmont Center Outbound</td>
<td>74</td>
<td>10 MIN</td>
<td></td>
</tr>
<tr>
<td>Huron Ave Outbound</td>
<td>72</td>
<td>10 MIN</td>
<td></td>
</tr>
<tr>
<td>Arlmont Village Outbound</td>
<td>78</td>
<td>30 MIN</td>
<td></td>
</tr>
</tbody>
</table>

**Transit Screen GO (BETA)**

<table>
<thead>
<tr>
<th>Location</th>
<th>Time</th>
<th>Walk Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quad Express</td>
<td>11 MIN</td>
<td></td>
</tr>
<tr>
<td>uberPOOL</td>
<td>7 MINUTES AWAY</td>
<td>7</td>
</tr>
<tr>
<td>uberX 1.5x</td>
<td>7 MINUTES AWAY</td>
<td>9</td>
</tr>
<tr>
<td>uberXL 1.5x</td>
<td>7 MINUTES AWAY</td>
<td></td>
</tr>
</tbody>
</table>

**Bikes and Docks**

<table>
<thead>
<tr>
<th>Location</th>
<th>Bikes</th>
<th>Docks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Harvard Law School at Mass Ave / Jarvis St</td>
<td>7</td>
<td>12</td>
</tr>
<tr>
<td>Harvard University</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Radcliffe Quadrangle at Shepard St / Garden St</td>
<td>2</td>
<td>16</td>
</tr>
</tbody>
</table>
Similar smart city tech:
Energy behavior change

An easy way to save:
- Turn off lights when not needed
- Find people with similar interests to drive efficiency at home

Join a group, compete together!

You are being compared to 2,414,827 homes with these characteristics:
- 0-500 sq ft
- Central A/C
- No fireplace
- NE Climate

Show more tips
Search groups
Edit my home information
Opower’s founders (Harvard CS graduates)
What is Open Data?

Data that can be freely used, reused and redistributed by anyone

— freely available for any purpose, commercial or otherwise.

— available in digital, machine-readable formats so that it can be used in combination

— available in its entirety — and able to be downloaded “in bulk”
Impact of Open Data

Promotes new ideas and businesses

– Third party apps instead of government apps
– Small businesses (not just huge companies)
– Startup incubators specializing in open data businesses, like DC’s 1776
Openness...strengthens our democracy, promotes the delivery of efficient and effective services to the public, and contributes to economic growth
– President Barack Obama, 2013
Open Data Examples

OpenStreetMap

GTFS

Real-time APIs

Energy Data
OpenStreetMap gold medaled over Google at the Sochi Olympics.
Content edits to OpenStreetMap

Data as from "latest.osm.bz2" files available per world region on download.geofabrik.de on December 12, 2013.
OSM can solve problems for all citizens

You can crowd-source sidewalk access information to help disabled people, elderly, children.
Solar mapping of CS50 HQ
Custom map styles
(all generated from OSM data with Mapbox)
Explore global transit with open data schedules (GTFS)

How a National Transit Map could connect ‘transit deserts’ to the grid
GTFS is really simple to get started with.

Go here and click “download latest”

It’s a database, but it’s plain text spreadsheets – just open it up.
GTFS is complex enough to be complete

It’s a formal specification with

- **Creation tools**
- **Validator**

Database schema is relatively simple
A Network Analysis of Hubway

How does Hubway complement MBTA services?

Bike-sharing service, like Hubway, can provide better access to transit hubs and additional options for trips beyond those provided by public transit -- reducing the number of transfers, wait times, and travel time variability due to traffic. In order to quantify the impact of Hubway, we compare durations of trips in the historical data with the corresponding expected travel times by public transit (and/or walking) obtained using service information from the GTFS feed provided by MBTA. The travel time savings are then calculated and visualized here. We can see that most trips made by Hubway users would take longer on the MBTA network. As of September 2012, Hubway has helped its members save over 45,000 hours of travel time

Filter by station:

From:
South Station - 700 Atlantic Ave.
To:
Lewis Wharf - Atlantic Ave.
0.84 mi

See commuting price

Travel time savings
Bike
7 mins
or
Public transit
19 mins

As of September 2012

2,312 trips
425 hrs saved

service available in
2011

2012

total one-way trips made 513,733

total travel time saved 45,218 hours
Open APIs talk to remote databases

APIs are easy for your code to read (not just free form text)

APIs can be bulk (entire data set) or single-serving (just one bit)
Open energy datasets from Green Button

Green Button

Helping You Find and Use Your Energy Data
Some places to find inspiring APIs / data

US national data at data.gov
Developer portals like Boston MBTA
New API directory PublicAPIs.com
Venerable API directory programmableweb.com
OUR TEAM
OUR MISSION

— Make cities more sustainable
  Reduce CO2 emissions and traffic congestion
  Promote walkability and public health

— TransitScreen Green
  Our operations are carbon neutral
  Zero employees commute by car

In a smart city, technology is used to improve the lives of all citizens: janitor to CEO
My years as a CS student...and today