



*UNITED STATES*  
**DEPARTMENT OF TRANSPORTATION**

# **The New Analytics for Transportation Management: Using “Big” and Crowd-sourced Data**

James Pol, PE, PMP

Intelligent Transportation Systems Joint Program Office

May 17, 2012

# Why Are New Analytics Important?

“We show that the introduction of **E-Zpass reduced prematurity and low birth weight** among mothers within 2km of a toll plaza by 10.8% and 11.8% respectively relative to mothers 2-10km from a toll plaza.”

*Traffic Congestion and Infant Health: Evidence from E-Zpass*  
*Janet Currie, Reed Walker*  
*NBER Working Paper No. 15413*  
*The National Bureau of Economic Research*



# Concepts Explored Here

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- Transportation management is becoming more data driven.
- Individual travelers are exposed more to information that is user specific.
- Data analysis on newly fused datasets is enhancing our understanding of how to improve transportation services.
- Feedback loop for “user-optimal” choices to promote “system-optimal” performance is within grasp.



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# “BIG DATA” IMPACTING TRANSPORTATION

# Data.gov: Open Data from the Federal Government

- Leading the way in democratizing public sector data and driving innovation
  - 390,834 raw and geospatial datasets
  - 1,246 government apps
  - 236 citizen-developed apps
  - 85 mobile apps
  - 172 agencies and subagencies
  - New developer community created

SaferBus app provides the general public an efficient way to view and access the safety performance of commercial motor carriers including motor coach and bus companies.



# developer.data.gov

 An Official Website of the United States Government

Friday, May 4, 2012 | Text: A-A-A |  Share



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## Participate



## Collaborate



## Compete



# Investing in Big Data

## InfoWorld

### Surging demand for big data tools attracts investors

Venture and growth capital firms have recently poured hundreds of millions of dollars into big data, a \$26M investment this week in Birtz being the latest

## Los Angeles Times | BUSINESS

### UC Berkeley lab receives \$10 million to fund 'big data' research

   Comments { 0 }  Share { 183 }  +1 { 6 }  Tweet { 59 }  Recommend { 39 }

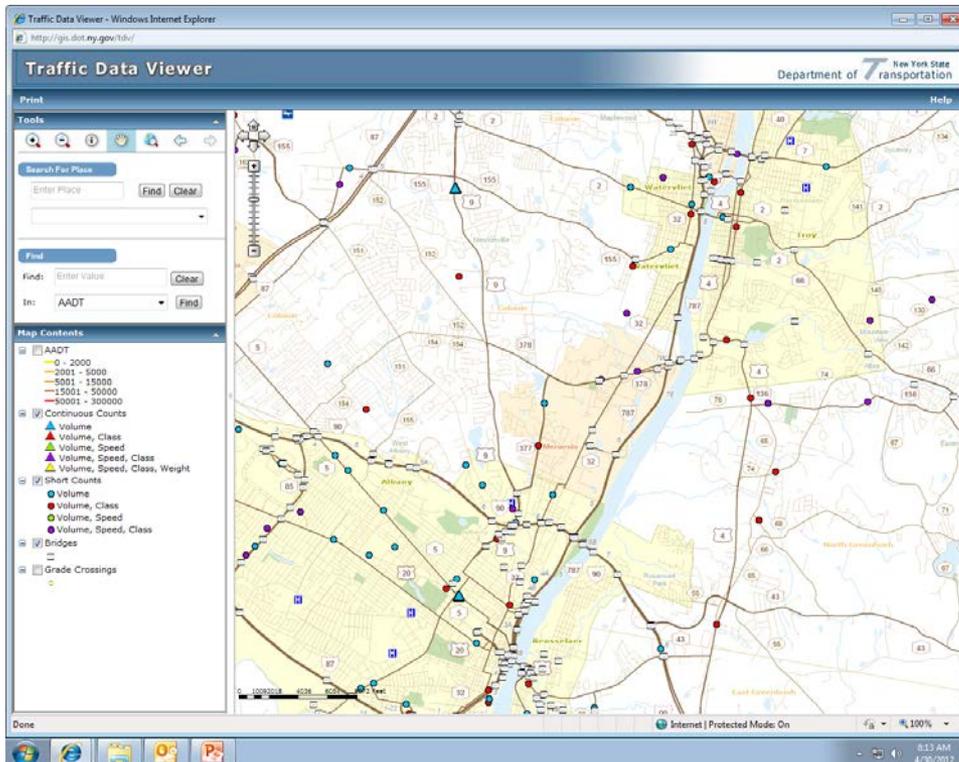
By Salvador Rodriguez  
*March 31, 2012 | 8:00 a.m.*

The National Science Foundation has awarded **\$10 million** to UC Berkeley for the purpose of advancing "big data" research and technologies.

The grant was part of a larger initiative by the Obama administration that allocated \$200 million around the country to big data technology Thursday.



# NYS Traffic Data Viewer



- Enables views of statewide traffic counts – a determining variable in Federal Aid funding
- Includes critical asset information such as bridges and hospital locations for emergency route planning

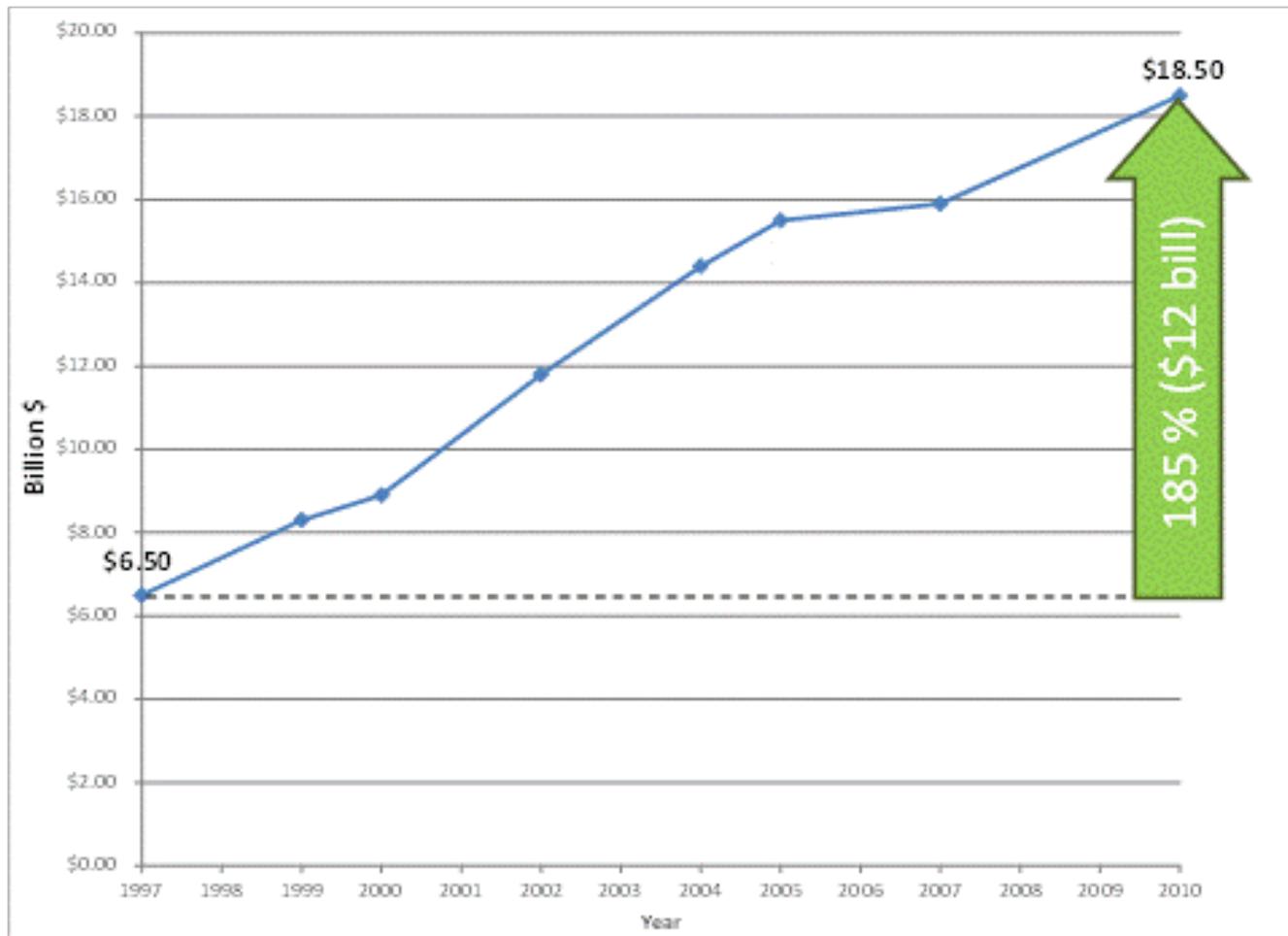
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ITS DEPLOYMENT CONTINUES TO GROW

# Tracking Our Success

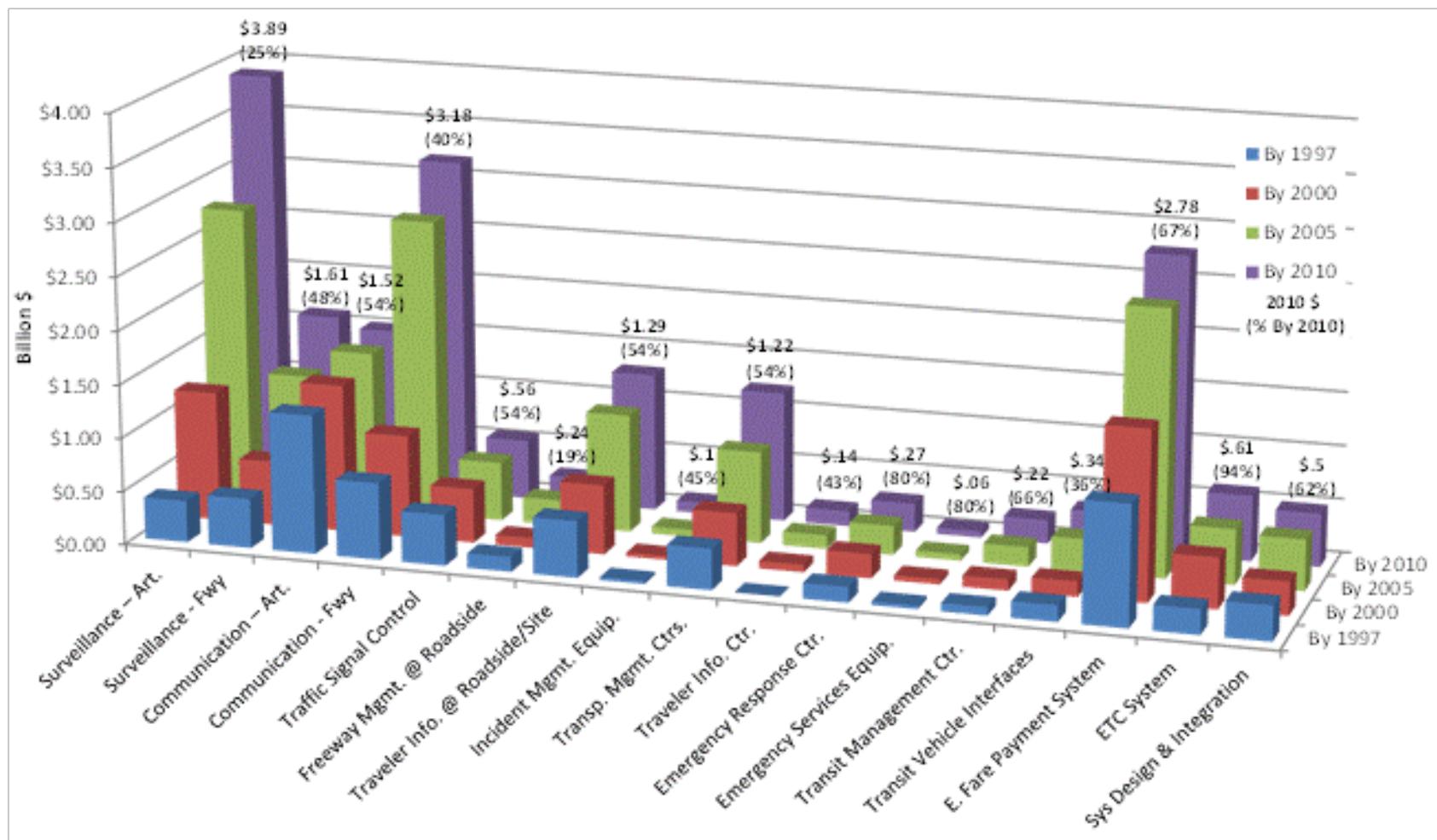
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Investment in ITS has nearly **tripled**



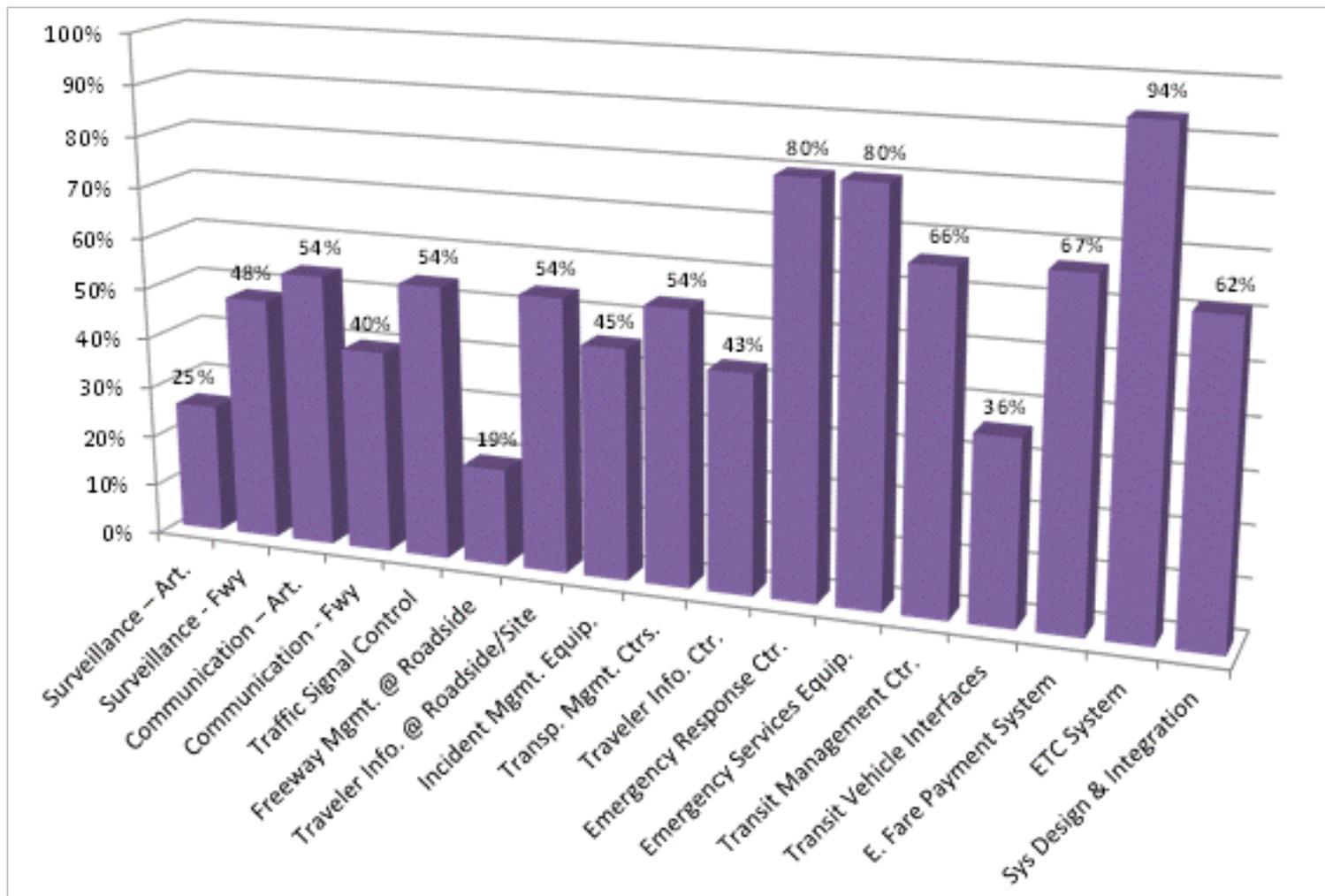
# Tracking Our Success

Most areas within ITS grew over the years.

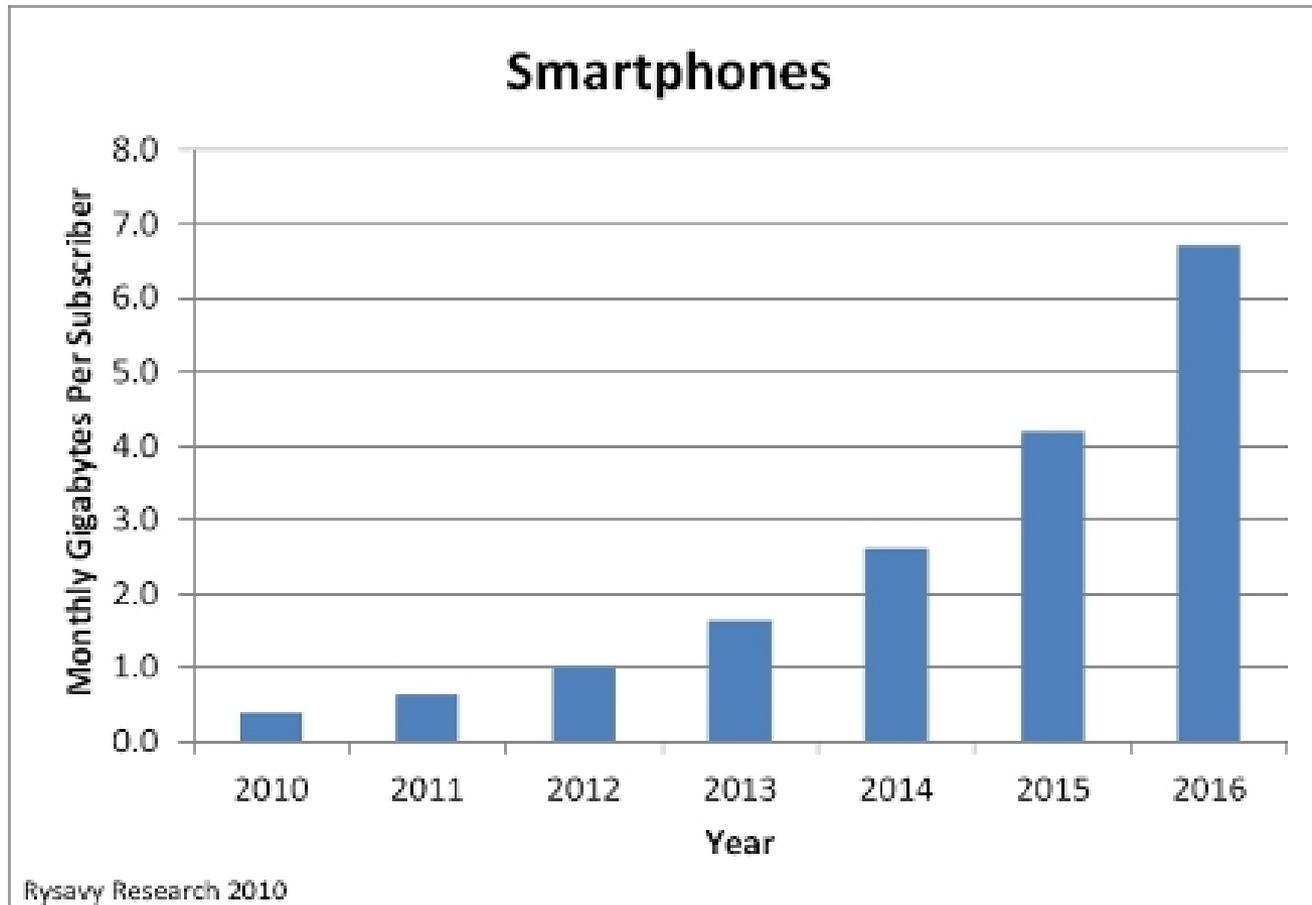


# Tracking Our Success

Some technologies have achieved near **universal deployment**.



# Consumer Forces on Communications and ITS



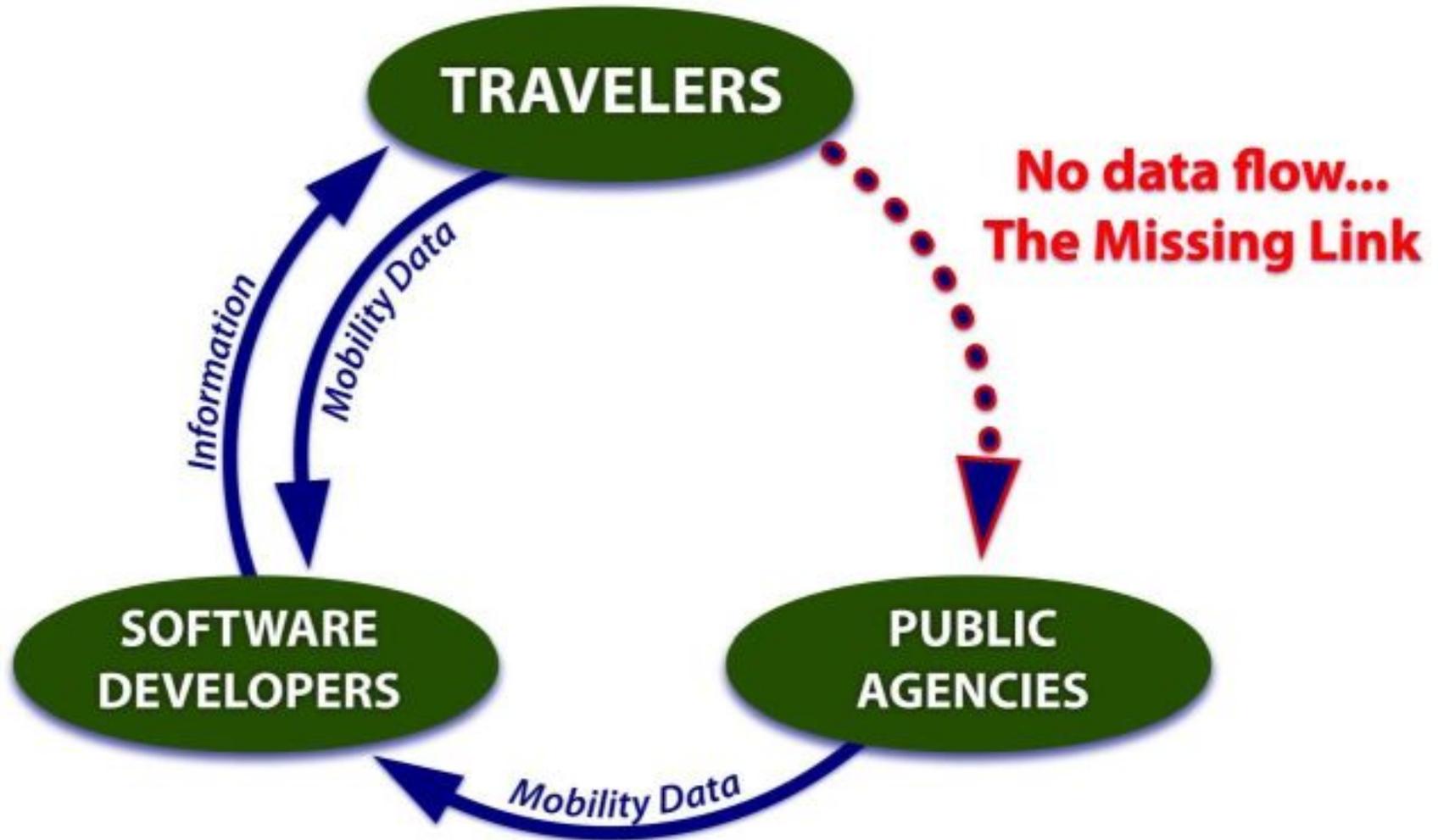
Blog entry dated March 16, 2011. <http://reboot.fcc.gov/blog>

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# OPPORTUNITY: JOINING BIG & CROWDSOURCED DATA WITH TRANSPORTATION MANAGEMENT

# The Mobility Data Ecosystem

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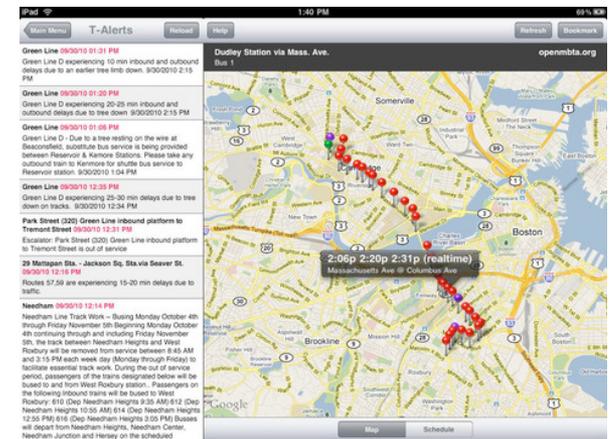
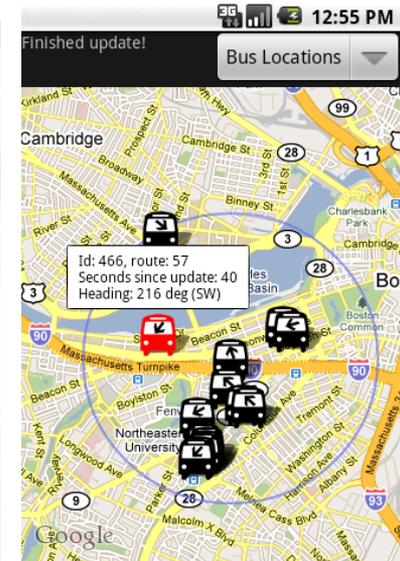
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# SOFTWARE DEVELOPERS ARE USING MOBILITY DATA FROM AGENCIES



# MassDOT

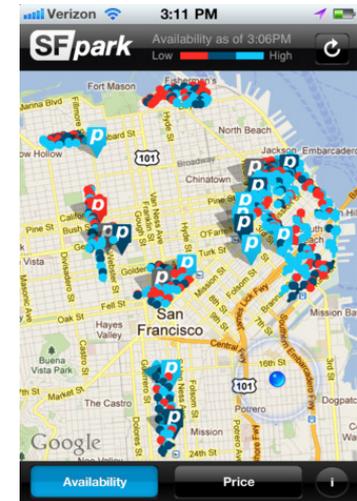
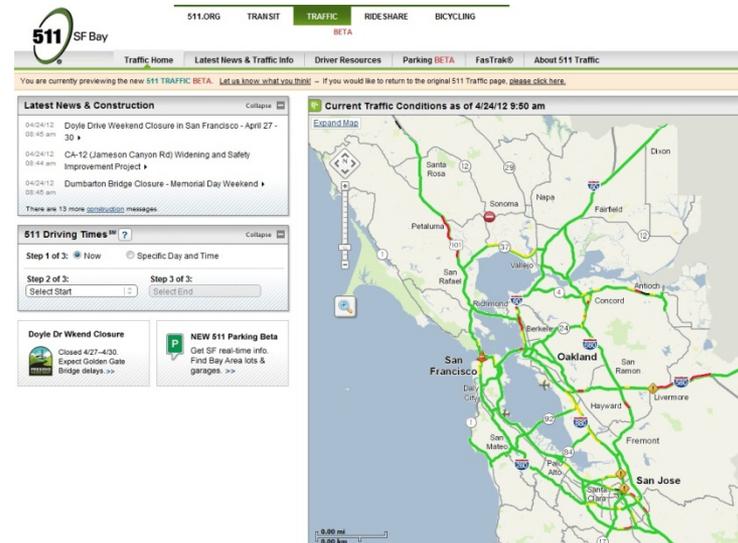
- All MassDOT buses are equipped with a GPS
  - Publishes transit data through the open-source General Transit Feed Specification (GTFS) and GTFS-realtime spec
  
- MassDOT partnership with NextBus provides real-time bus arrival predictions for every bus stop
  - MassDOT Real-Time XML Feed available to third-party developers for applications
  - Over 50 independent apps use MassDOT Data
    - Android, iOS, Web App, Text / SMS, Windows Phone, Blackberry, Desktop
  
- Access to the MassDOT GTFS-realtime Feed is governed by the language in the MassDOT Developers License Agreement



# SF511 – San Francisco Bay



- 511 is managed by a partnership of public agencies led by the Metropolitan Transportation Commission, the California Highway Patrol, and the California Department of Transportation.
  - Includes over 60 San Francisco Bay Transportation Agencies including Transit Agencies, Traffic Management, Ferry Operators, Parking, Paratransit Service Providers, etc.
- Multimodal Suite
  - 511 Traffic Data Feed
  - 511 Transit Data Feed
  - Custom 511 RideMatch Service
  - 511 Driving Times API
  - 511 Real-time Transit Departures API (beta)
  - 511 Parking (beta)

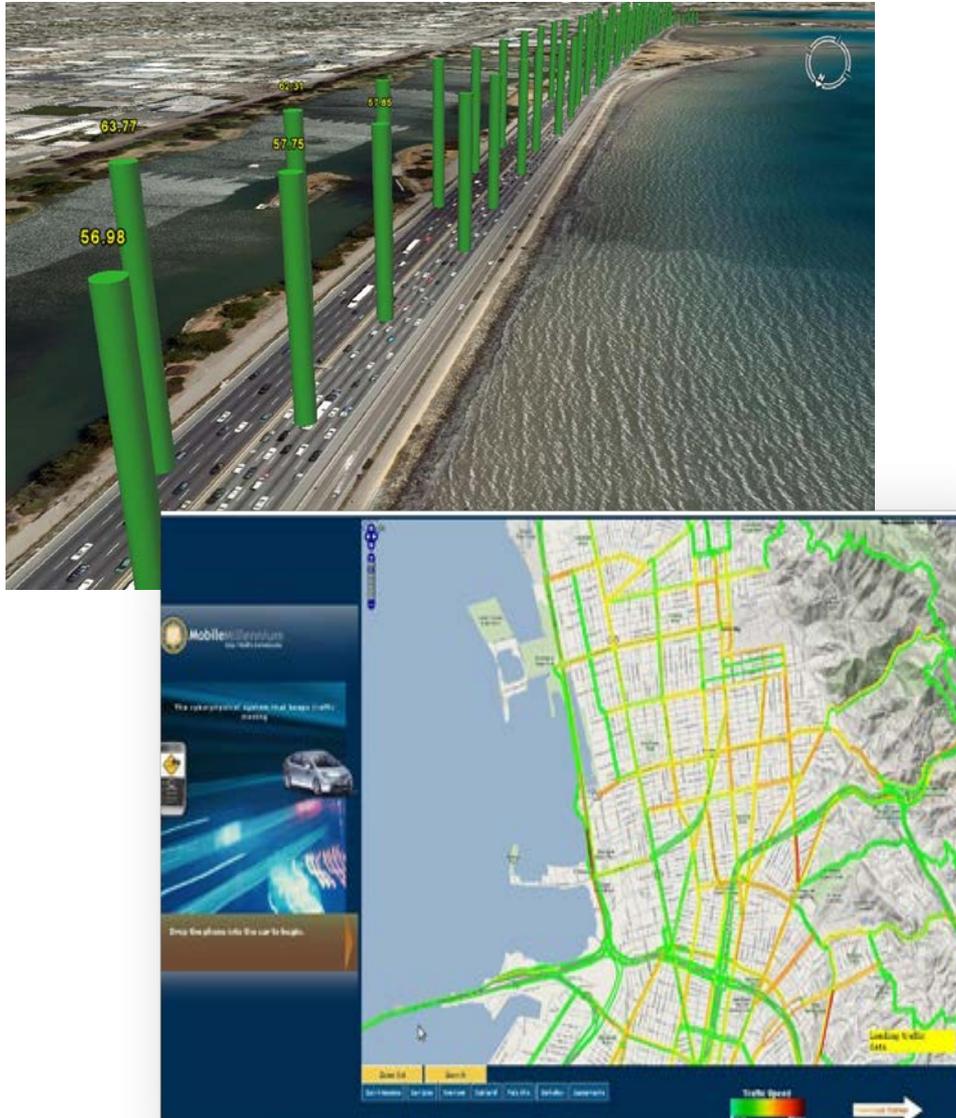


# SF511 – Open Data Feeds

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- 511 Traffic Data Feed - provides incidents, speed, and travel time data for individual links on the highways, freeways, and expressways
  - XML-formatted data provided via the Java Message Service (JMS)
- 511 Transit Static Data Feed - provides schedules, stops, timepoints, routes, fares, etc. for over thirty five transit agencies/providers
- 511 RideMatch Service - an interactive, on-demand system that helps people find carpools, vanpools, or bicycle partners
- 511 Driving Times API - provides 511's current and typical driving times between a starting and ending point, including incidents along the route
- 511 Real-time Transit Departures API - provides real-time departure predictions for several regional transit agencies, including BART, Muni, and AC Transit

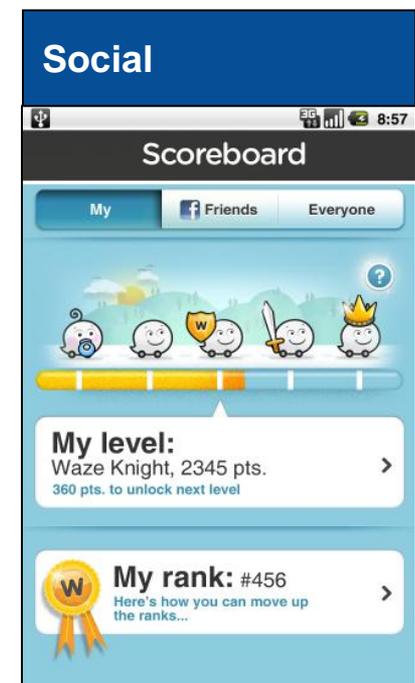
# Mobile Millennium



- Small population of users (2,200) can produce high fidelity information in a major metropolitan area.
- High percentage (33%) of daily repeated users.
- Two-thirds of users trusted their privacy was protected.
- High proportion of users (88%) indicated repeated use in the future.

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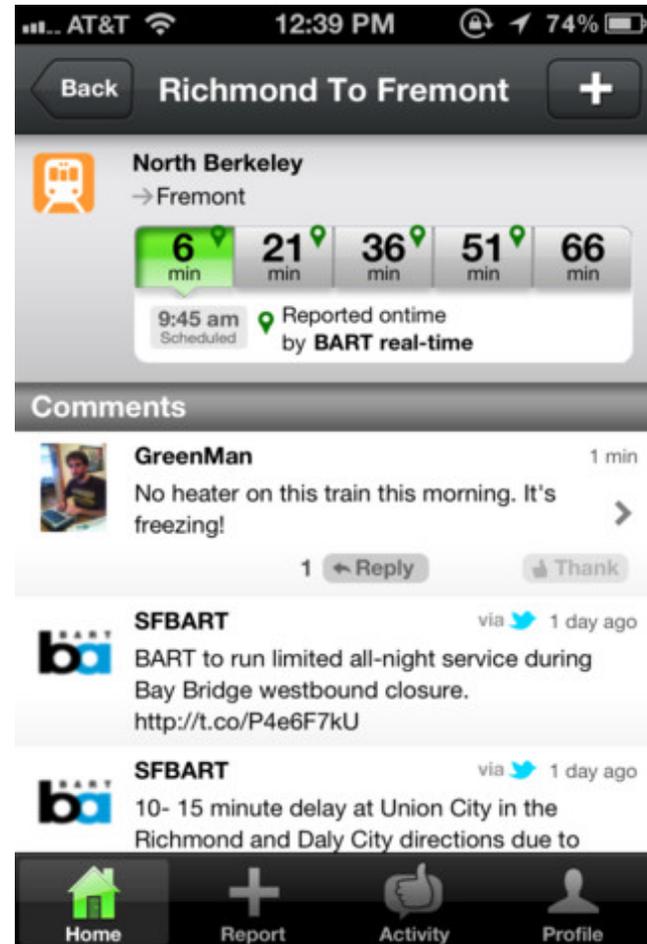
# SOFTWARE DEVELOPERS ARE USING MOBILITY DATA FROM TRAVELERS



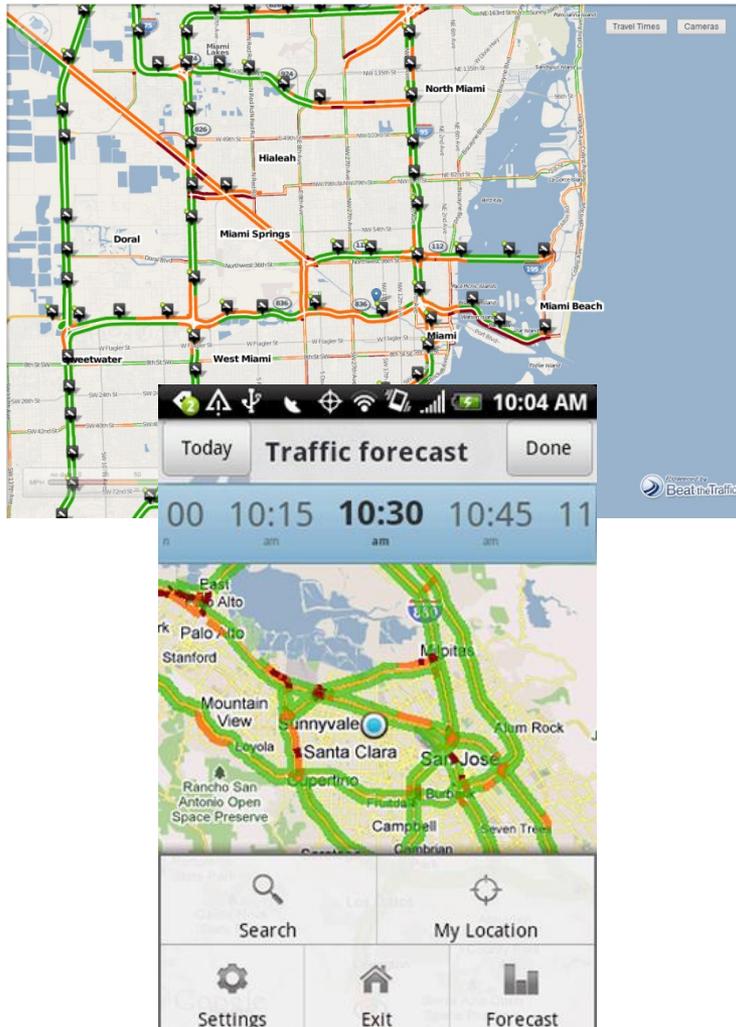
# Roadify



- Helps commuters get the information they need from official sources, while also allowing them to help one another along the way by adding reports of their own
  - Focuses on real-time transit data
- Combines transit schedules, service alerts, delays and other official data and adds a layer of crowdsourced commentary about local transit conditions from riders
  - Supplement rider comments with Tweets and other proprietary data
- Was the Grand Prize winner in New York City's "Big Apps" contest

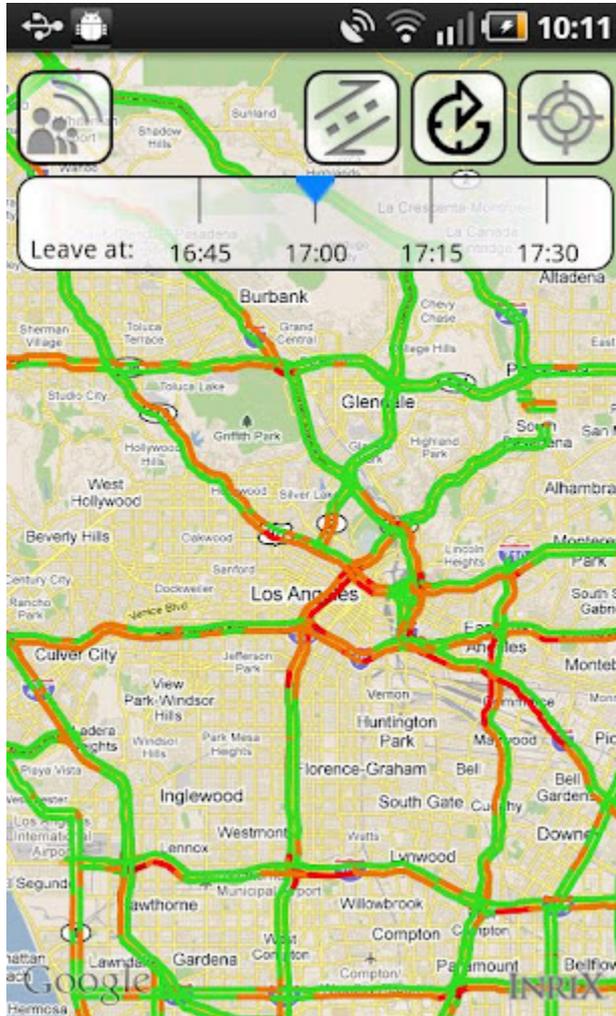


# Beat the Traffic 2.0



- Provides users with the ability to save routes and receive instant, personalized traffic updates
  - MyRoutes – provides commuters with custom, door-to-door traffic reports
  - automatically updated with real-time information about accidents and road delays
  - As traffic conditions change, MyRoutes notifies users via text message and email, so users can modify their travel plans if possible
- Beat the Traffic Mobile Rewards
  - Travelers can earn points that they can redeem for gift cards from Amazon, iTunes and other merchants

# Inrix Traffic



- Inrix gathers all of its traffic information from its Smart Driver Network
  - Aggregates data from more than 100 million GPS-enabled cars and mobile devices (with the Inrix app installed).
  - Network also taps into traditional road sensors, partnerships with regional traffic providers, and hundreds of other sources.

Comparative Traffic feature gives users a look at current conditions compared to normal conditions

Predicted Traffic feature provides users with snapshots of how traffic should be flowing at various times in the future

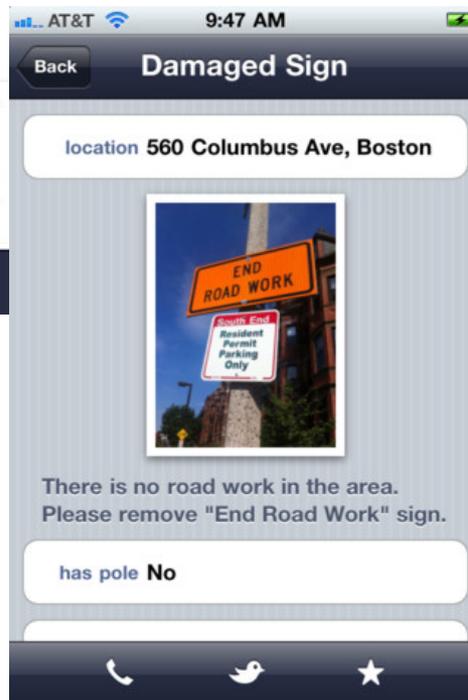
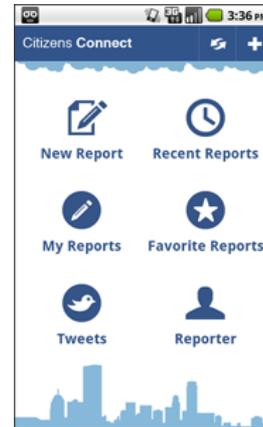
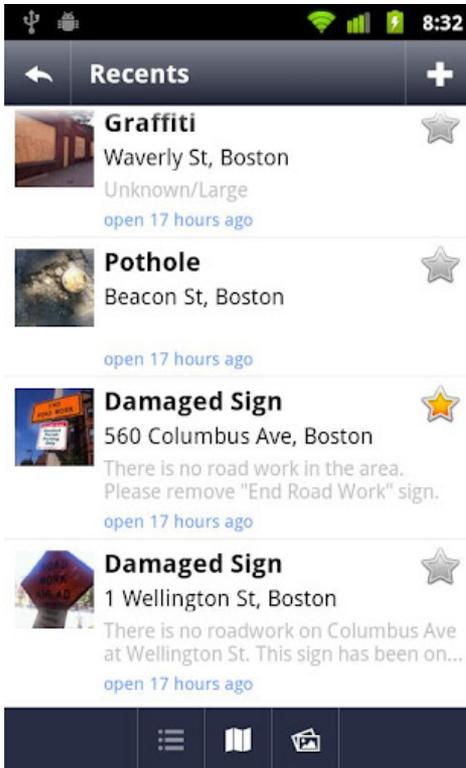
Incidents Tab reveals a list of reported traffic snags -- Inrix Traffic users can contribute to this list using the app's One Touch Reporting button



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# AGENCIES ARE USING CROWDSOURCED DATA FOR OTHER TRANSPORTATION ARENAS

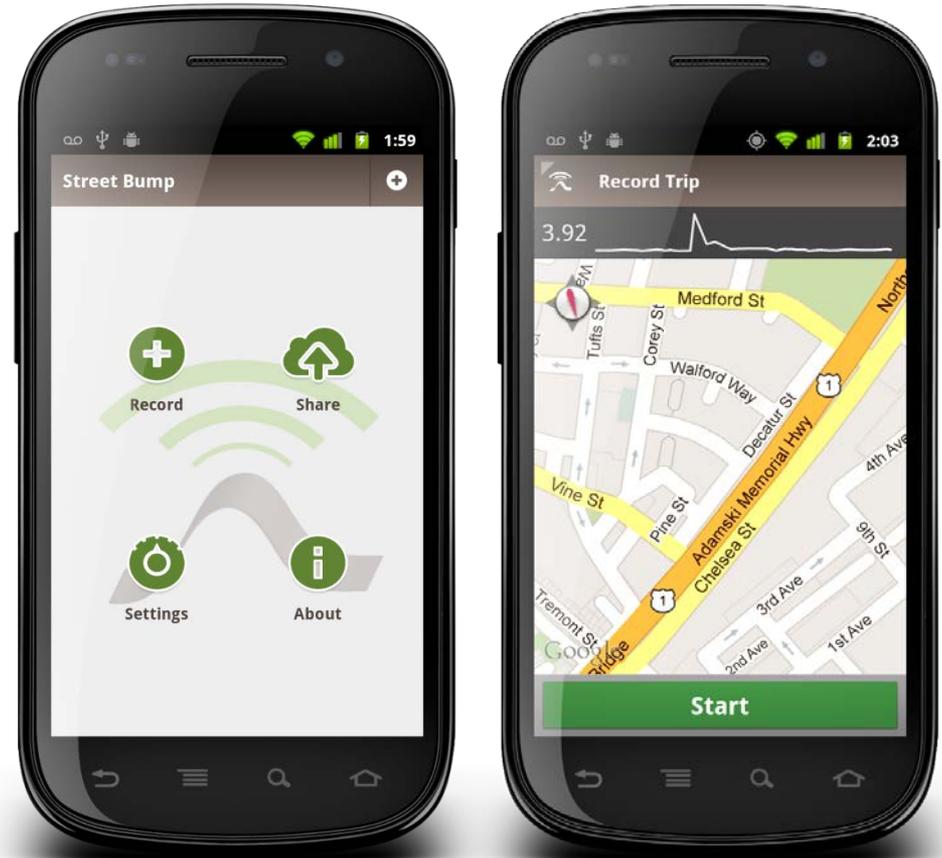
# Citizens Connect



- Citizens Connect helps Boston residents make their neighborhoods more beautiful by reporting local issues such as potholes, graffiti, and streetlights.
- Reports are routed immediately to the appropriate city department.
- Residents can track status of their requests and tweet about them to their friends.

# Street Bump

- Helps residents improve their neighborhood streets
  - As they drive, the mobile app collects data about the smoothness of the ride
  - Data provides the City with real-time information it uses to fix problems and plan long term investments
- Residents use Street Bump to record “bumps” which are identified using the device’s accelerometer and located using its GPS.
  - Bumps are uploaded to the server for analysis
  - Likely road problems are submitted to the City via Open311, so they get fixed (e.g. potholes) or classified as known obstacles (e.g. speed bumps)

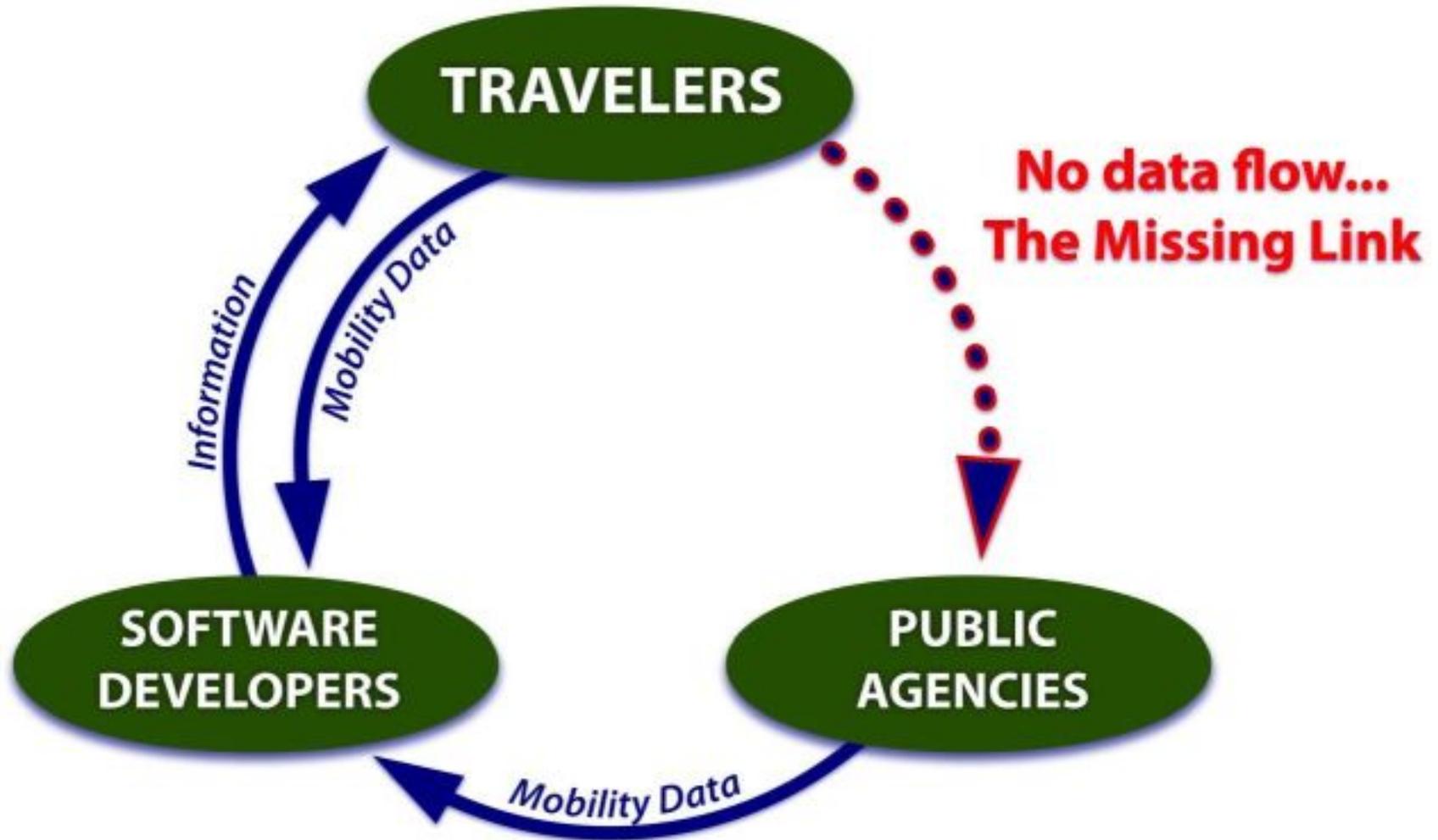


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HOW DO WE CREATE THE FEEDBACK  
LOOP TO APPLY CROWDSOURCED DATA IN  
TRANSPORTATION MANAGEMENT?

# Completing the loop

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# Overcoming Barriers / Finding Value

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## Barriers

- Trust in the fidelity of the data
- Uncertain ownership rights / reuse of the data
- Distracted driving sensitivity

## Value

- Leveraging user-optimal choices to deliver system-optimal performance
- Promoting more open government agency-end user dialogue
- Dynamic routing
- HOV/HOT lane management
- Road/congestion pricing
- Access to data at lower cost



# Where UTCs Can Help

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- What are the potential benefits of agencies using crowdsourced data?
  - Operational improvements
  - Cost savings to transportation system operators and users
  - Societal benefits
- What are the obstacles to that use?
  - Are crowdsourced data **reliable and secure** enough to use for certain active traffic management applications? What are the tradeoffs?
  - What institutional impediments to using crowdsourced data exist?
  - What can we learn from successes overseas?
- How do we make transportation agencies more accountable for improving our quality of life and providing for sustainable communities?



# For More Information

**RITA** U.S. Department of Transportation  
Research and Innovative Technology Administration

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Imagine that . . .  
transit and truck drivers receive regular updates, allowing them to stay on schedule -- and stay in business

**Message to Stakeholders from RITA Administrator Peter Appel**  
RITA is working with our colleagues and stakeholders to implement the Intelligent Transportation Systems (ITS) Strategic Research Plan, 2010 - 2014. [Read more...](#)

**Spotlight**

- Public Transit Intelligent Transportation Systems (ITS) Implementations – Lessons Learned 5/10/11
- Connected Vehicle Test Beds featured in Thinking Highways Magazine 4/25/11
- AERIS Program featured on White House Blog 4/18/11

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