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

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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

- 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.
“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.
Welcome to Developer.Data.gov

Here you can participate, collaborate, and compete with the best developers to drive the publishing and use of government data. Ask for what you need, share what you've learned, and brag about your successes. This is your space!

Special Features
Open Government Platform

Check out the first open source release delivered by the US and Indian governments!

VIEW MORE
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

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

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
ITS DEPLOYMENT CONTINUES TO GROW
Tracking Our Success

Investment in ITS has nearly \textit{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

OPPORTUNITY: JOINING BIG & CROWDSOURCED DATA WITH TRANSPORTATION MANAGEMENT
The Mobility Data Ecosystem
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

- **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.
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
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)
HOW DO WE CREATE THE FEEDBACK LOOP TO APPLY CROWDSOURCED DATA IN TRANSPORTATION MANAGEMENT?
Completing the loop

TRAVELERS

SOFTWARE DEVELOPERS

PUBLIC AGENCIES

No data flow... The Missing Link

Information

Mobility Data

Mobility Data
Overcoming Barriers / Finding Value

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

- 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?