How Crowdsourcing GPS Data Is Radically Changing The Traffic Information Landscape
What is Crowdsourcing?

Definition (Wikipedia)
The act of taking tasks traditionally performed by an employee or contractor, and outsourcing it to a group (crowd) of people or community in the form of an open call.

A Few Examples

Wikipedia has been crowdsourcing since January 15, 2001 over 3.3M articles in English

OpenStreetMap is a free editable map of the world
Crowdsourcing Benefits

Why crowdsource?

• **Good for business** – Businesses and organizations can use crowdsourcing as leverage and scale to solve problems in a revolutionary way
  1. Create new products and services
  2. Reduce costs
  3. Extend existing products and services
  4. Build or expand user communities

• **Good for consumers** – Individuals in the crowd can experience significant benefits from their participation in crowdsourcing apps
Challenges to Crowdsourcing Traffic Data

Crowdsourcing is more difficult to “get it right” than it appears on the surface

Key Challenges

- Scale
- Quality
- Coverage
- Technology
- Community & company commitment / experience

“Anyone can color roads on a map with red, yellow and green. Doing it accurately and at scale is significantly challenging.”
Traffic – Key Crowdsourcing Drivers

- Exponential growth of GPS-enabled mobile and embedded devices in the market
- Massive shift to 2-way device connectivity and phone integration with the car
- Significant leaps in software technology innovations and applications
- Willingness of consumers and businesses to contribute and / or derive benefits from crowdsourcing
Traffic – Key Crowdsourcing Drivers

Dash Express
First “connected” PND
DISCONTINUED

TeleNav Shotgun
$299 plus data

TomTom Go 740 Live
$159.95 - $399.95 plus data

Connected PNDs
Are consumers willing to pay?
Not likely. Maybe???
Traffic – Key Crowdsourcing Drivers

June 29, 2007 – Smartphone Revolution Begins

Note:
On June 28, 2007…
INRIX completes WisDOT acceptance test for Milwaukee-Green Bay traffic data

On June 29, 2007…

Apple puts the iPhone on sale. It sells ... fast.

Everybody knew it was coming. But nobody, not even Apple, predicted how the iPhone would change the way we look at phones forever.

First announced Jan. 9, 2007, by Steve Jobs, the iPhone is considered one of Apple’s worst-kept secrets, but still the most anticipated gadget of all time. Prior to the unveiling at Macworld Expo, tech blogs published rumors purporting to contain details on the iPhone. Apple fans dreamed up illustrations of the fabled device. And days before the iPhone finally landed June 29, hundreds of fanatical consumers camped outside Apple and AT&T stores for the $599 gadget.
Inside the App Economy

• Facts from BusinessWeek and Mac Observer
  • [http://www.businessweek.com/magazine/content/09_44/b4153044881892.htm](http://www.businessweek.com/magazine/content/09_44/b4153044881892.htm)
  • [http://www.macobserver.com/tmo/article/the_number_of_iphone_apps_is_no_longer_meaningful](http://www.macobserver.com/tmo/article/the_number_of_iphone_apps_is_no_longer_meaningful)

• Over 60 million iPad, iPhone and iPod touch users
  - 3 million iPads sold in first 80 days
  - 54 percent of iPhone and iPod touch users are in the United States
  - Morgan Stanley analyst Katy Huberty predicts Apple will sell over 60 million iPhones worldwide in 2011
  - Morgan Stanley analyst Mary Meeker predicts all mobile devices will sell 10 billion units per year in 2020 (10 times today’s PC sales)

• Apple released the iTunes App Store on July 11, 2008
  - Today, over 225,000 applications (up 10% since June)
  - Android (Google mobile OS) over 70,000 applications
Inside the App Economy

• Facts from BusinessWeek and Mac Observer
  • [http://www.businessweek.com/magazine/content/09_44/b4153044881892.htm](http://www.businessweek.com/magazine/content/09_44/b4153044881892.htm)
  • [http://www.macobserver.com/tmo/article/the_number_of_iphone_apps_is_no_longer_meaningful](http://www.macobserver.com/tmo/article/the_number_of_iphone_apps_is_no_longer_meaningful)
  • Over 5 billion iTunes app downloads
    • 511 < 200 million calls in North America since June 2001
    • 62% install between one and six new applications each month
    • 22% download more than 11 new apps each month
    • 40% of all iPhone users use four to six apps at least once a week
    • 5% use more than 20 apps per week
DevZones and SDKs

- **Developer Zone**
  - Virtual location for 3rd party developers to gain information to develop applications

- **SDKs**
  - Software Development Kits
  - Specific tools to aid 3rd party developers to create applications for specific Smartphone or OS

- **Goal**
  - Make it easy to create applications
DevZones and SDKs

Google Transit Partner Program

Attract new riders.

Transit on Google Maps is a public transportation planning tool that combines the latest agency data with the power of Google Maps. It integrates transit stop, route, schedule, and fare information to make trip planning quick and easy for everyone. For agencies around the world, Google Maps is a cost-effective solution targeted at transit novices and seasoned travelers alike. Google Maps is available in 12 different languages and is compatible with screen readers for the visually impaired. The Transit on Google Maps feature is available on selected mobile devices through Google Maps for mobile. Public transportation information is also included in Google Earth.

Participation can benefit your agency by:

- Raising awareness of public transportation to attract new riders
- Helping seasoned riders discover new routes to maximize the value of your infrastructure investment
- Linking to your agency website to increase rider awareness
- Connecting neighboring agencies' data to improve inter-agency connectivity
- Decreasing traffic congestion and environmental effects while increasing mobility
- Providing trip planning on both desktop and mobile devices
- Doing it all for free — all you have to do is share your data

Learn more about sharing your agency information on Google Maps.

New York Governor David A. Paterson said:

“Google Maps for Transit is a truly innovative marriage of information and infrastructure. It is a perfect example of how the public and private sectors can partner together to benefit us all — and it didn’t cost New York taxpayers a penny. I applaud my colleagues at the MTA and Port Authority for making this a priority, and our friends at Google for continuing to make the world an easier place to navigate.”

New announcement:
- LTA Singapore data was added to Google Maps on November 19, 2009.
- MBTA Boston data was added to Google Maps on July 30, 2009.
- LACMTA Los Angeles data was added to Google Maps on July 9, 2009.
DevZones and SDKs

MassDOT Developers Page Beta

Welcome to the BETA version of the MassDOT Developers Page. The information and links found here are meant to serve as resources for developers interested in working with real-time and static transportation data made available by MassDOT and its family of agencies.

MassDOT’s Relationship With Developers
Please note: Any use of the data on the MassDOT Developers Page acknowledges acceptance of MassDOT’s Developer’s License Agreement. (UPDATED 11/13/2009)
MassDOT and Developer’s Relationship Principles (UPDATED 11/13/2009)
Developer’s License Agreement (UPDATED 11/13/2009)

Join the MassDOT Developers Community
Connect with us on Twitter:
http://www.twitter.com/MassDOTdev

Join the discussion at our official Google Group:
http://groups.google.com/group/massatedevs

Learn More About MassDOT Developers
*Lightning Round* Presentation: http://www.youtube.com/watch?v=-1Mtdy4x1Sk

PowerPoint Presentations: http://www.slideshare.net/massdotdev

MassDOT Developers Press Highlights:
- Wall Street Journal
- Boston Globe
- Boston Herald
- Boston Metro
- NECN
- WhiteHouse.Gov
INRIX – What We Do

How Crowdsourcing GPS Probe Speed Data Works

1. GPS satellites identify & transmit location information to device
2. Probe vehicle/device uses GPS satellite info and on-board equipment to determine location, heading, speed, ignition status & other info
3. Vehicle/device sends “speed vector” data report with location, heading, speed, time via cellular data channel or satellite
4. “Speed vector” processed at data center
5. Batch data reports sent to INRIX every 1 - 2 minutes via T1 connections
6. INRIX reverse geo-codes each speed vector, analyzes and fuses with other data, and conducts additional processing (traffic quality data process)
7. INRIX distributes to customers
8. INRIX customers distribute to end users

Privacy layer ensures data is anonymous
INRIX TRAFFIC! for iPhone & Android

- Real-Time Traffic
- Traffic Forecasts
- Accidents, Construction & Events
- Powered by you & over 1.3 million other drivers
- Free

Android Users: Download at the Android Market from your phone

2.5M+

www.inrixtraffic.com

The leading provider of traffic & navigation services

www.inrixtraffic.com
Traffic

1. Call SYNC Services

2. Receive GPS Info look up destination

3. Call for traffic between two lat/long points

4. Create traffic report based on real-time traffic conditions

5. Leverage traffic report for response to SYNC

“Traffic to Las Vegas”

“There are two routes to Vegas, one along I-15 that will take 25 minutes with moderate traffic...”
INRIX Crowdsourced Probe Data

Billions of GPS data points per month (15 minute time slice below)

July 15, 2010 11:00 AM Pacific
Coverage – North America

- INRIX Total Fusion – 875,000+ miles
Coverage – INRIXTraffic.US

- Real-time Flow – 155,000+ miles FREE to Agencies
Routing – Just In Time Delivery

13 Hours and 48 Minutes via US-60, I-64 and Western Kentucky Parkway
Routing – Just In Time Delivery

13 Hours and 9 Minutes via I-64, I-44 and US-71
San Francisco Bay Bridge Closure

Bay Bridge closed for scheduled repairs over Labor Day weekend on 9/3/2009 at 8 pm

Google shows free flow on the Bay Bridge

INRIX correctly identifies & provides details on road closures

Construction on I 80
Sep 3, 2009 6:00 PM
In SAN FRANCISCO there are ramps closed on I 80 westbound at BAY BRIDGE - FREMONT ST/FOLSOM ST

Construction on I 80
Sep 3, 2009 6:00 PM
In BAY BRIDGE there are ramps closed on I 80 eastbound at FIRST/HARRISON/ESSEX ON RAMP
User Generated Incidents
Agency Implementations

Triad Region

Select by Region: Triad  Route:  County:  

Traffic Conditions
Incidents
Adverse Weather

TRAVEL TIME TO:
SR 119  9-12 MIN
I-459  12-15 MIN

10/15/2009 11:09:25 AM
Performance Measures

Los Angeles Metropolitan Area

National Congestion Rank: #1

Trends Year-to-Year for Peak Period Congestion in Metro Area

<table>
<thead>
<tr>
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</table>

- National Congestion Rank
- Travel Time Tax™
  - Rank
  - Change from referenced year to 2009

Patterns for 2009 Congestion in Metro Area

Population Rank: #2 (12,873,000)

Impact of 2009 Peak Period Congestion

For a One-Way, Uncongested, Peak Period Commute of...

<table>
<thead>
<tr>
<th>Los Angeles Metro</th>
<th>National</th>
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<tbody>
<tr>
<td>AM</td>
<td>PM</td>
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<tr>
<td>15 Minutes</td>
<td>15.7</td>
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<td>30 Minutes</td>
<td>31.4</td>
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<tr>
<td>60 Minutes</td>
<td>62.9</td>
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# Performance Measures

## Bottlenecks across Metro Area in 2009

### What Was the Worst Place and Time?

Harbor Fwy/CA-110 NB @ 8th Street/Exit 22, Thursday 5-6 PM

[6 mph average speed / 0.35 mile segment]

<table>
<thead>
<tr>
<th>Bottleneck Rank</th>
<th>Regional</th>
<th>National</th>
<th>Road/Direction</th>
<th>Segment/Interchange</th>
<th>County</th>
<th>State</th>
<th>Length (miles)</th>
<th>Hours of Congestion</th>
<th>Average Speed when Congested (mph)</th>
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<tbody>
<tr>
<td>1</td>
<td>0</td>
<td>13</td>
<td>Hollywood Fwy/US-101 NB</td>
<td>LOS ANGELES ST</td>
<td>Los Angeles</td>
<td>California</td>
<td>0.20</td>
<td>85</td>
<td>14.0</td>
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<td>2</td>
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<td>10</td>
<td>Hollywood Fwy/US-101 NB</td>
<td>VERMONT AVE</td>
<td>Los Angeles</td>
<td>California</td>
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<td>3</td>
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<td>4</td>
<td>16</td>
<td>36</td>
<td>Parthenia Fwy/CA-110 NB</td>
<td>SUNSET BLVD/EXIT 24A</td>
<td>Los Angeles</td>
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<td>43</td>
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<td>62</td>
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<td>23</td>
<td>Harbor Fwy/I-110 NB</td>
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<td>68</td>
<td>17.5</td>
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</tbody>
</table>
It’s all about the Apps…

Now, Even the Government Has an App Store

By MIGUEL HELFET

On Tuesday, Vivek Kundra, the federal chief information officer, unveiled Apps.Gov, a Web site where federal agencies will able to buy so-called cloud computing applications and services that have been approved by the government to replace more costly and cumbersome computing services at their own locations.

The push to promote cloud computing is part of the Obama administration’s effort to modernize the government’s information technology systems and to help reduce the $875 billion annual budget for federal I.T. in the process.

The app storefront, which is run by the General Services Administration, includes an array of business applications, productivity software, services...
Summary

- Crowdsourcing is exciting and has the potential to dramatically change market dynamics and create new opportunities.
- Just because you can crowdsource does not mean you should.
- Crowdsourcing is complicated and – depending on the application – requires:
  - Intelligent technologies
  - Ability to scale
  - Appropriate business models
  - Strategic understanding of the market eco-system and value chain
  - Hybrid processes and approaches for quality and coverage
Thank You!

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