

# Big Data Meets Customer Service

... how ITS can Prepare  
for the 'Tsunami of Data' that  
will inevitably follow ?



**RGS Consulting**  
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# Rationale

- ▶ ITS Industry is already generating large data sets from ‘traditional’ ITS applications (traffic management, transit operations, commercial vehicles, payment systems, freight management, etc.)
- ▶ Trend is towards increasingly ‘data intensive’ applications (e.g. connected vehicles, geo-positioning systems, mobile customer information, social media, and business intelligence)
  - ▶ Much of this data is ‘unstructured’ in a conventional sense
- ▶ How can governments, agencies and private industry benefit from the ‘*tsunami*’ of transport-related data that will be produced in the next generation of ITS systems and applications?
- ▶ Goals are to:
  - ▶ Put ‘big data’ in context for ITS
  - ▶ Make the case for regional data management strategies



## Google Meets Gekko

Why hire a platoon of Russian mathematicians to beat the market when a software program called Warren can do the same thing?

BY STEVEN BERTONI

Many industries are experiencing truly *disruptive* opportunities by using ‘big data’:

- Using highly sophisticated data mining techniques, Daniel Nadler a 28-year old Canadian Harvard Ph.D. in Economics has developed a software product called “Warren” that can predict the impacts of world events on the markets and isolate which companies will be most impacted based on historical and environmental factors.
- Out of the box, Warren can find answers to over 65 million question combinations *in an instant* by scanning more than 90,000 actions such as drug approvals, economic reports, monetary policy changes, social media trends, weather and political events; and predict their impact on nearly every financial asset on the planet.
- Teams of hedge fund analysts can spend days answering these kinds of questions . . . *assuming they can find the data.*

# Using Big Data in the Transport sector

## How are Governments using big data?

- Traffic Controlling
- Transport Planning and Modeling
- Route Planning
- Congestion Management
- Intelligent Transport Systems

## How is the Private Sector using big data?

- Travel Industry
- Route Planning and Logistics
- Revenue Management
- Competitive Advantage
- Technological Enhancements

## How are Individuals using big data?

- Route Planning (save time/increase fuel-efficiency)
- Travel (tourism)

## GSM and Transport Modeling

Global System for Mobile Communications (GSM) data is location-based information retrieved from mobile phones.

GSM data is used to extract Origin-Destination (O-D) matrices:

- Decreased cost of data collection.
- Improved accuracy of transport models and their validation.
- Allows more frequent/easier updates of 'base year' matrices.

### Case study

#### Orange Telecom's 'Data for Development Challenge' 2012

Goudappel Coffeng, Omnitrans International and KDD-Lab responded to the challenge to build the best transport model of Ivory Coast using only publicly-available data.

- GSM analysis tools were used to process location of callers/recipients and tie them to a region (region defined by GSM cell site antenna's reception area)
- Used departure/arrival times and origins and destinations combined with frequency of trips to show approximate home/work locations and create average O-D matrices for the region to be used as a transport model

## Examples of where Government and the Private Sector is using Big Data

Mode	Name	Project Type	Year	Value	Technology/ Consulting Partner
Road	<b>City of Dublin</b>	Congestion & Traffic Management	2010	€66 million	IBM
Road	<b>City of Stockholm</b>	Traffic Patterns & Congestion	2006-2011	€218 million	IBM
Road/ Maritime	<b>City of Da Nang, Vietnam</b>	Congestion & Traffic Management	2013-ongoing	Smart Cities Challenge worth €37 million	IBM
Air	<b>Lufthansa</b>	Revenue Management	2013		SAP/HANA
Air	<b>Air France-KLM</b>	Revenue Management			
Air	<b>Swiss International Airlines</b>	Revenue Management			
Air	<b>Frontier Airlines</b>	Revenue Management			
Air	<b>British Airways</b>	Competitive Advantage	2012	"Significant amount" of €7b investment in new products, technology, etc.	Opera Solutions
Road	<b>Munich Airport</b>	Competitive Advantage & Tech Enhancement	2013		Lufthansa & Amadeus

# How do we drive business value out of the mass of transport data available?

- ▶ What does it mean to deliver superior customer service in a big data world?

- ▶ First, who are our customers?

- ▶ Road users
    - ▶ Transit users
    - ▶ Port users
    - ▶ Freight users
    - ▶ Gov't stakeholders
    - ▶ Developers
    - ▶ the Public



# What do customers want? (internal or external)

- ▶ In short, what I want, when I want and, where I want
- ▶ In the modern world with modern customers, this means:
  - ▶ Everything
  - ▶ Real-time
  - ▶ Mobile
  - ▶ Integrated with social media



# How can big data help?

- ▶ Predict what customers want before they ask for it
- ▶ Get customers excited about their own data
- ▶ Improved customer service interactions
- ▶ Identify customer pain points and solve them
- ▶ It starts, but does not end, with big data





# Where are the gaps?

- ▶ Understanding stakeholder's information needs
  - ▶ Standards can help
    - ▶ Allows easier synthesizing of information for multi-variate possibilities/analyses
- ▶ Managing and exposing data - The Challenge of the Three V's
  - ▶ Big data is not only about the *volume* of data but also its *velocity* and *variety*
- ▶ ITS and IT departments need to work in conjunction
  - ▶ Both bring invaluable skills to the table
  - ▶ Focus on expertise and interoperability (its not just ITS that has a lot of data to deal with)
- ▶ Managing risks
  - ▶ Creating deeply dependant stakeholders
- ▶ Need central strategy to guide various groups
  - ▶ Buy in from executive and participating departments
  - ▶ Must have shared vision and goals



# Where does open data and open government fit into all this?

- ▶ Overall societal trend towards openness and transparency of information
  - ▶ Pushed along greatly by social media (want don't our kids share these days?)
- ▶ Who has data ownership?
  - ▶ Still the producer of data but value added providers blur the line
- ▶ For ITS, need top down data management strategies
  - ▶ Ensures all levels of government have an interoperable plan that meets stakeholder needs



# Open Data - What is public transit doing?

- ▶ Biggest example by far is GTFS
  - ▶ Scheduled transit data provided in a common standard to Google but also available for developers
  - ▶ Key advantage is transferability of applications
    - ▶ Mobile app built for large market (New York), can be easily/cheaply modified to work for small markets
  - ▶ Successful?
    - ▶ Over 70 percent of the world's population doesn't own a car<sup>1</sup>. Buses, trains, trams and subways included in Google Maps travel 200 million kilometers every day—that's the equivalent of driving every single road in the world three times!<sup>2</sup>  
1-World Bank 2- Google/CIA World Factbook
- ▶ GTFS-RT (real-time)
  - ▶ Model has not proven to be as successful for real-time information
  - ▶ Google business model inherently limiting for 3<sup>rd</sup> party real-time information sharing
  - ▶ Industry still looking for solutions
  - ▶ Struggling to find acceptable new standard for data

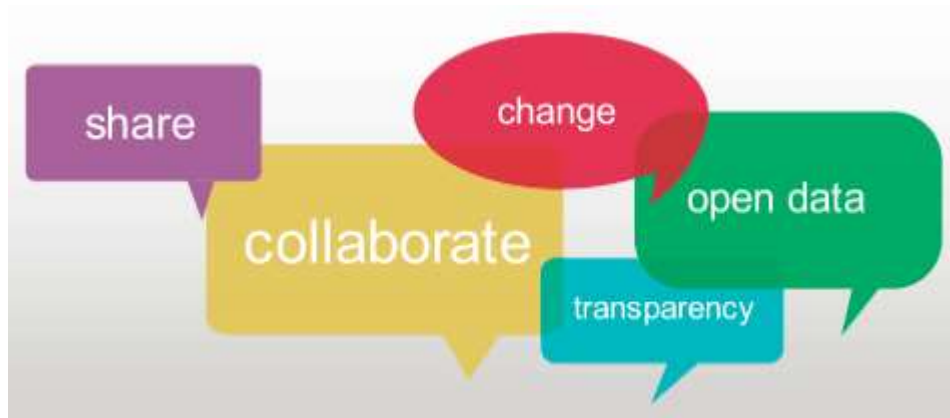
# Open Data - What should transport authorities do?

- ▶ Regional Strategy
  - ▶ Both for structured and unstructured data
  - ▶ For overall architecture and data management
- ▶ Involvement in emerging ITS and non-ITS standards
- ▶ Congestion and construction information
  - ▶ Making information available for all
  - ▶ Supplementing information when it is lacking
    - ▶ Cell-phone probes as a proxy
- ▶ Updated GIS information
  - ▶ Allows all 3<sup>rd</sup> party products to keep current



# Benefits of Open Data

- ▶ Creative minds will innovate in ways we cannot imagine
- ▶ Open data becomes *actionable intelligence*.
- ▶ Could provide an economic boost and increased job creation (e.g. The EU's move toward open data directive is expected to create 58,000 jobs in the UK through 2017 and add £216 billion to the country's economy).
- ▶ Good public relations story helps image and stakeholder relations

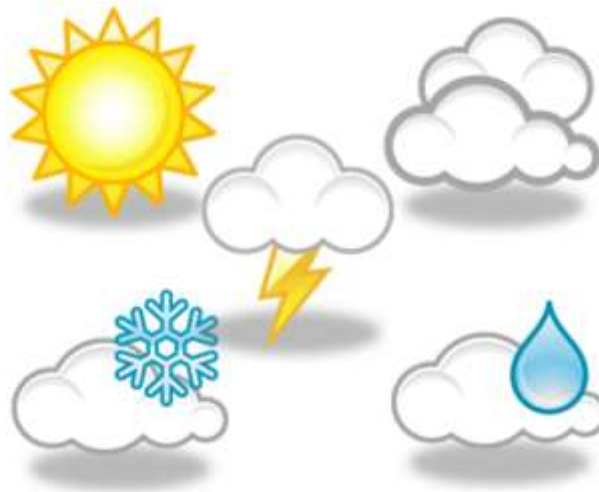


# Challenges of Open Data

- ▶ Creates 3<sup>rd</sup> party dependencies on your data and your ability to provide it
- ▶ Creates potential credibility problem when 3<sup>rd</sup> party applications go sideways
- ▶ Enabling ‘mass mobilisers’ (training journalists and civic groups) to disseminate and make data understandable by the general public, not just statisticians.
- ▶ Data format: Presenting the data in a way which makes it accessible to all users (especially the public, which often is left behind in the availability and agency to use the data).
- ▶ Finding skilled workers, educating the workforce.
- ▶ What is the truth?

# Open Data - There is only one truth but there are multiple paths

- ▶ Who do you trust?
- ▶ Victoria weather for today (forecasted last week)
  - ▶ Weather Network - 18, mainly sunny
  - ▶ Environment Canada - 21, mix of sun and cloud
  - ▶ The Weather Channel - 23, sunny
  - ▶ Accuweather - 18, mostly sunny
  - ▶ Check News - 23, sunny



# Big Data architecture and infrastructure

## ► Challenges

- Is the cloud the answer?
- How do we secure internal-only data?
- Highly scalable and available vs affordable
- Is your organization ready to be 24/7/365?
  - Internal support vs outsource

## ► Risks

- Cloud vs FOIPP Act vs Patriot Act
  - What are your legal obligations?
  - What are your stakeholder needs?





# Summary of Opportunities for the Transport Sector

- ▶ New capabilities emerging
  - ▶ Real-time route optimization
  - ▶ Real-time route rescheduling
  - ▶ Predictive maintenance requirements and scheduling
  - ▶ Real-time opportunities for cost and environmental savings
  - ▶ Real-time multimodal journey planning (walk/car/transit/train/ferry/parking/etc.) with personalization/preferences and real-time adjustments based upon changing conditions)
- ▶ Visualisation of data is paramount for its successful use
  - ▶ Increase the signal to noise ratio
- ▶ Strategy and standardization are key !



# Thank You !

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