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Intelligence in Transport

# THE WORLD IS TALKING ABOUT BIG DATA

ITS Canada  
Annual  
Conference  
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# “WHAT THE HECK IS BIG DATA?”

- “Big data” is a popular term used to describe the exponential growth and availability of data, both structured and unstructured.
  - Structured:
    - numeric data in traditional databases.
  - Unstructured:
    - text documents, email
    - Video, audio
    - Sensor data
    - financial transactions.
- What makes their analysis difficult is their volume, the velocity with which they arrive, their variability and their complexity

# 5 WAYS FOR BIG DATA TO CREATE VALUE

1. Can unlock significant value by making information transparent and usable at much higher frequency.
2. More accurate and detailed performance information can be collected as more transactional data is collected & stored in digital form
3. Sophisticated analytics can substantially improve decision-making
4. Allows ever-narrower segmentation of customers and therefore much more precisely tailored products, services or regulations and public funding programs.
5. Can be used to improve the development of the next generation of products and services.

# CHALLENGES TO OVERCOME

- Data is trapped in legacy systems or has not been digitized
- Up to 80% of data is unstructured, un-cleansed, and/or duplicated.
- A long data lifespan (for retention) stresses storage while the value of data diminishes over time.
- The volume, variety, and velocity of data require new data governance mechanisms, systematic thinking about data inventories, data stewardship, and master data management.
- Planning is needed to leverage the technology, skills, equipment, and standards needed to realize value.
- Finding skilled data scientists – those who design theories, design experiments and test hypotheses to extract relevant information from data – relatively few exist and they are in high demand

# THE EU

- The European Commission funded a 2-year-long Big Data Public Private Forum to define a strategy for research and innovation in the “Big Data Economy”
- Technical White Paper now on-line at:  
[http://big-project.eu/sites/default/files/BIG\\_D2\\_2\\_2.pdf](http://big-project.eu/sites/default/files/BIG_D2_2_2.pdf)
- Outcomes used in Horizon 2020 – the latest framework program – 90 million Euros over the next 2 years
- Developing a research roadmap – PPP in big data
- Promoting open science and boosting trust in data-handling
- New legislation to open up public sector information
- Connected Europe Facility – a pan-European open data portal

# STATE DOTs & BIG DATA

- USA –Senior Executives and/or Secretaries of State Transportation Departments spoke of the value of data for decision-making.
- Pressure on limited public funding highlights the need for factual, defensible information to be generated to support a variety of agency actions.
- Main uses for data that were identified were for:
  - greater efficiency of operations,
  - allocation of scarce resources,
  - providing transparency in communications to the public to support the agency’s decision-making in allocating public funds to specific projects.
- Weakness in their presentations was a “glossing over” of costs of collecting, storing and then converting data into digestible information (in human terms and in technology terms).

# MICHIGAN DOT

- Instituted a system of collecting information only once from its stakeholders – used in several places across the agency
- Info is then stored in a centralized location so that all parts of the agency can access it for their specific purposes.
- Oversight of centralized data is by Asset Management Council- created to establish protocols and standards to ensure commonality of data collection, terminology, etc.
- With this level of integration achieved, MDOT has been able to derive info on assets not previously available
- Example: Interactive Pavement Forecast Condition System – demonstrates what value is offered by various alternative funding options and choices.

# UTAH DOT

- Data and information provide support for the agency's strategic direction which is to:
  - preserve infrastructure
  - optimize mobility
  - achieve zero fatalities
  - strengthen the economy
- Data helps provide CEO's with technical measures of performance of
  - Network operations
  - Investments in:
    - Pavement
    - Bridges
    - technologies
  - Staff
- Linkage of technical measures of performance to stakeholder outreach
  - Technical performance measures can be used to explain why and how decisions /rules/regulations are made by the agency e.g., engineering approach to setting the speed limit
  - users ask more difficult questions e.g., allocation of public funding
- (visit [www.UDOTtraffic.utah.gov](http://www.UDOTtraffic.utah.gov) – powerful on-line tools)



# BIG DATA IN USE IN ROAD SAFETY

- CCMTA meetings – regulators now looking at using data analytics as a means of designing better performance-based regulations for:
  - Vehicles
  - Driver licencing
- Policing – connection of data sets can help in identifying speed profiles for certain locations and thereby assist in enforcement

# BIG DATA IN A TRANSIT EXAMPLE

- Challenges In public transit:
  - best operational service at best cost,
  - customer service
  - maximize ridership
- Wealth of information on each of these but a lack of integration among data sets, data duplications and errors
- Need an information architecture: to match info flows with business (planning, scheduling, customer service) - need to move seamlessly between all of these flows and sources of info
- Brought data sets together to improve efficiency and reveal weaknesses in service (e.g. automatic passenger counts matched to bus GPS data to identify overcrowding and then could redesign bus routes/scheduling)
- Better operational performance depends on large amounts of info, requires a commitment to performance monitoring and performance improvement and is customer focused.

# MAIN TAKE-AWAYS

- Big Data presents opportunities for improved service, operations but there are challenges
- Within a public agency, need to have agreed model to collect, interpret, and use data
- Requires planning, coordination among departments
- May have an impact on the skill sets of staff - need to be able to:
  - design systems,
  - interpret data
- Pay-off to public sector is in greater decision support and transparency to stakeholders
- Pay-off to industry is greater efficiencies, ability to target customers and to develop next-gen products.

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