Statewide Traffic Flow Data: Probe Vehicle Study for Iowa DOT

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May 25, 2011

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Types of Mobile Probe Data

- Cellular Telephone-Based Methods
  - Angle of arrival (E911)
  - Cellular network traffic analysis
  - Tower association
- Device-Based Tracking Methods
  - Cellular phone application-based tracking
  - GPS-based fleet systems
  - Wireless device detection (Bluetooth reader)
- Hybrid Methods

Iowa DOT Data Needs

Need Area	Examples
Planning applications	• Statewide travel demand modeling • Origin/destination studies
Traveler information	• Statewide 511 and flow map • Travel time posted on DMS
Traffic management applications	• Incident detection
Federal requirements	• Section 1201 (Real-Time System Management Information Program) • Performance measures
Research	• Various

A Different Animal

BLACK BOX

- Travel time
  - DMS display
  - 511 system
  - Web map
  - Incident detection
  - Calibrate travel demand model
- Average speed
- Origin/Destination
- Research

Data Collection Methods

Location Based	Area Based (Mobile Probe)
Pro	Pro
Reliable Accurate Real-time Granular	Large geographic area No infrastructure deployment
Con	Con
Limited geographic area Comm infrastructure needs Capital costs O&M costs	Time lag Less robust in low volumes No volume data Ongoing cost

Agencies Surveyed

Survey Questions

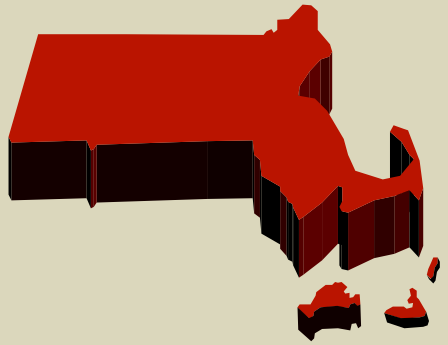
- Describe roadway system and coverage area
- How are you using data?
  - Planning
  - Dynamic message signs
  - 511 system
  - Severe weather impact analysis
- How have you dealt with the non-technical issues?
- Have you conducted an evaluation?
- Data accurate enough for intended applications?
- Greatest benefits?
- Lessons learned?

Survey Findings

- Data field indicates data source
- Historical data substituted in low volume conditions
- Time lag in data
  - Lag is longer when speeds are low
  - Lag occurs when need for data is greatest (i.e. incident)
  - Data will sometimes revert to historical conditions
- Roadway segments based on Traffic Message Channel (TMC)
- Improved performance seen over time, probably due to greater penetration

Survey Findings (cont.)

- Massachusetts 511 system received data at no cost in return for advertising
- Data costs are higher if:
  - Real time data (as opposed to historical)
  - Non-standard (non-TMC) roadway segments
- Clearly state data requirements
  - Length of time data is made available
  - Allowed uses for data



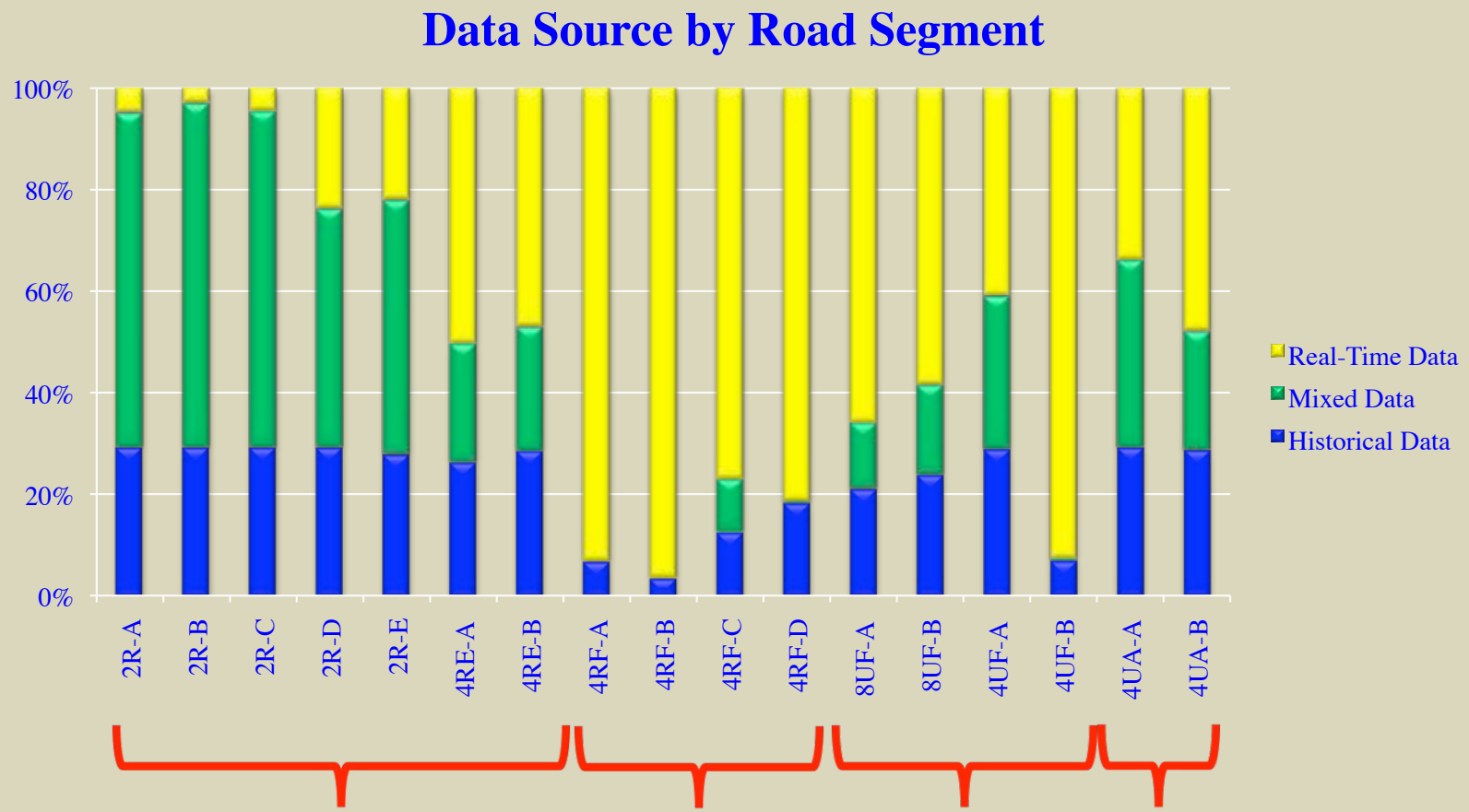
INRIX Data Evaluation

- 30-day trial evaluation, August-September 2010
- 17 roadway segments chosen in Iowa
- Existing sensors (loops, NIT) used as baseline for comparison
- Data was queried from INRIX's database and stored for analysis

Test Methodology

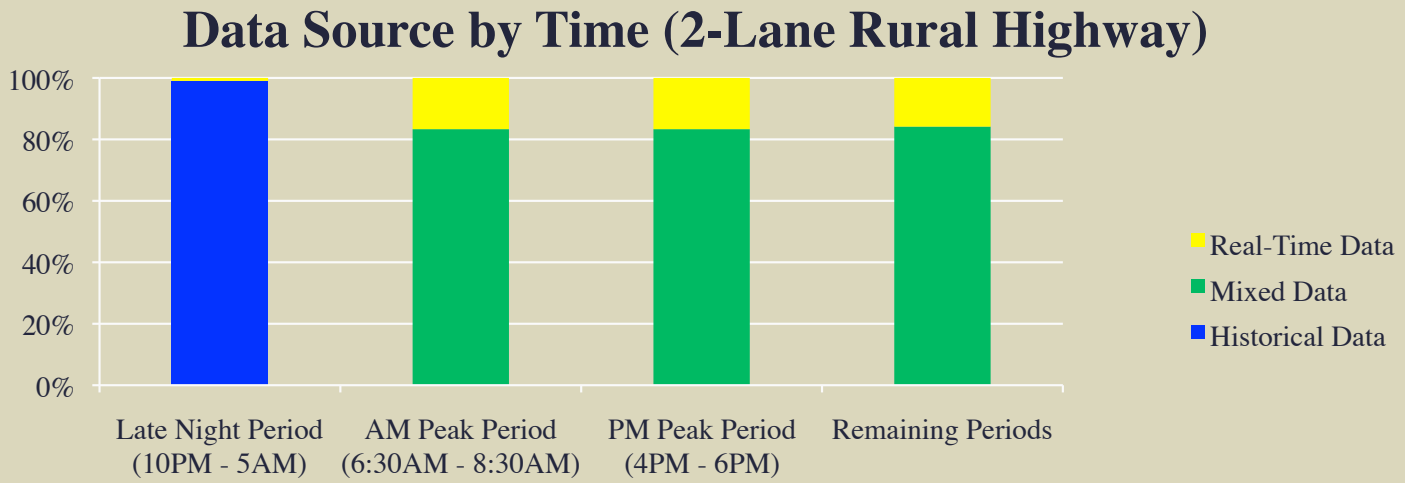
- Evaluate Performance
  - High and low volume roadways
  - Peak and off peak periods
  - Work zone caused congestion
  - Incident caused congestion
- Document source of data (real time vs. historical)
  - Urban vs. rural roadways
  - Number of lanes
  - Freeway vs. expressway vs. arterial
  - Time of day

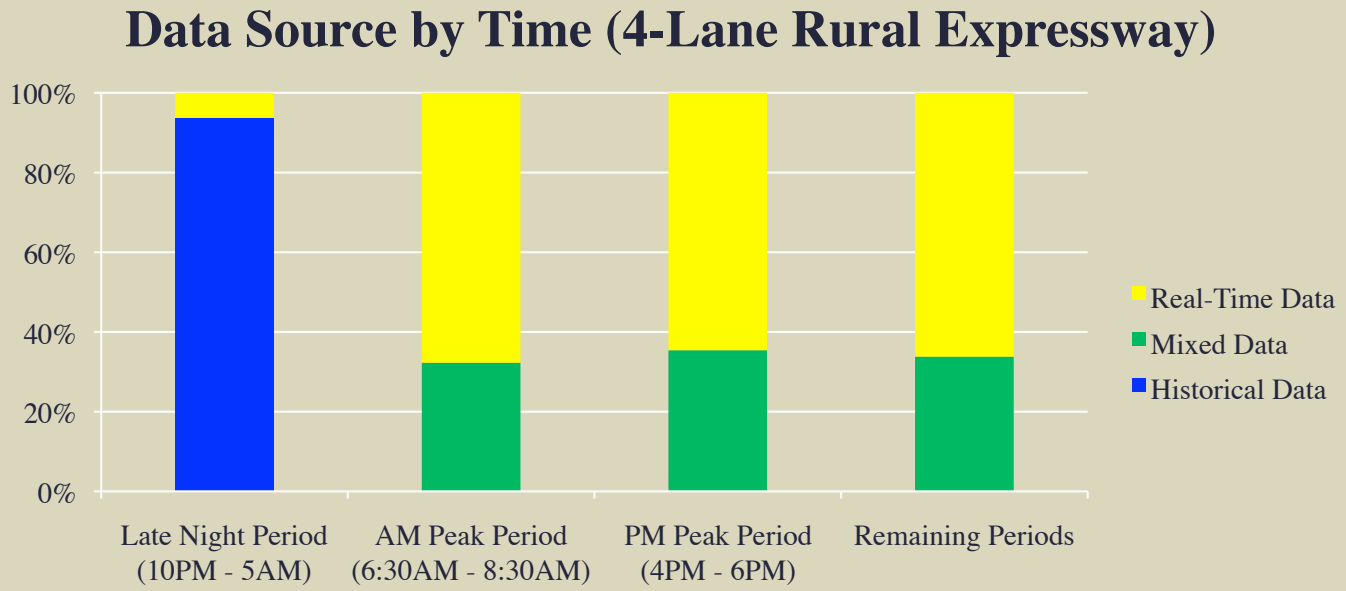
Metadata Analysis



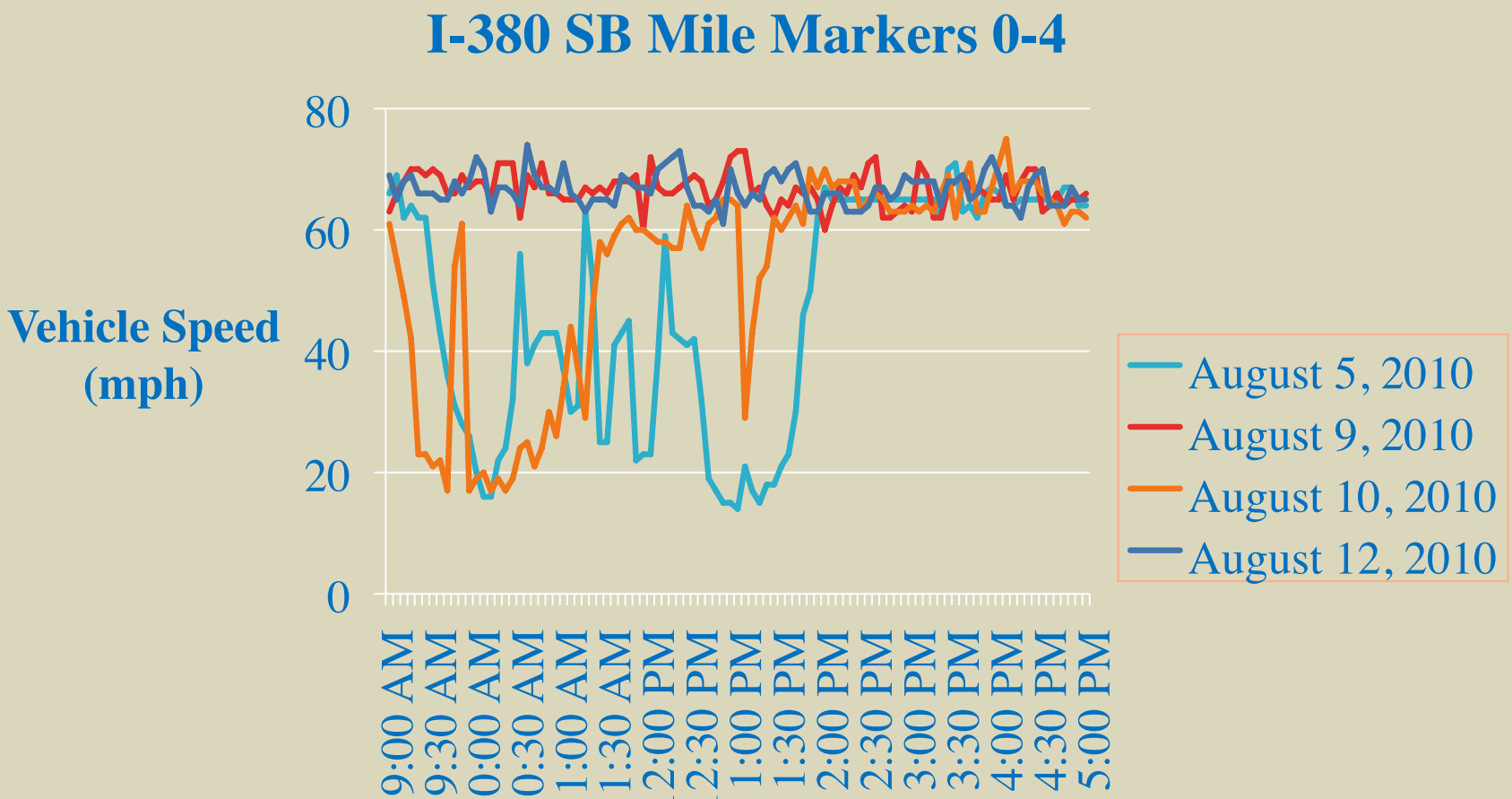
# of lanes/rural vs. urban/hwy vs. expy, fwy, or arterial/segment #

Metadata Analysis

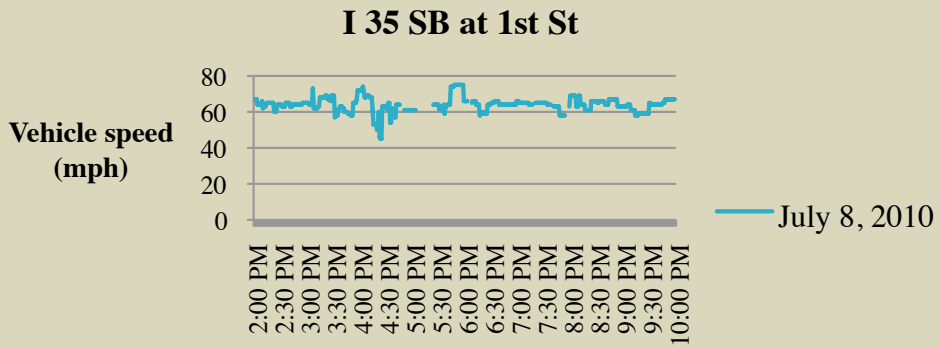


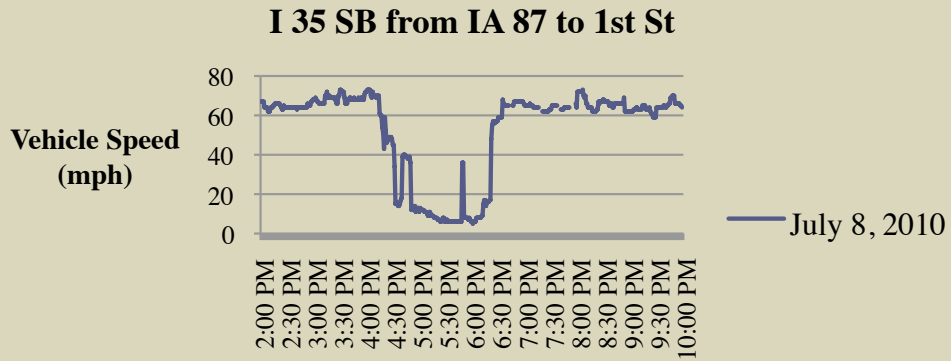


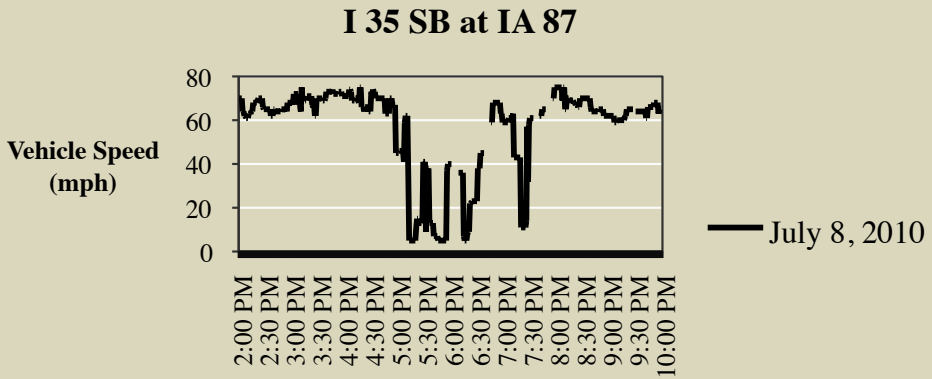
Work Zone Condition



Traffic Incident – July 8, 2010

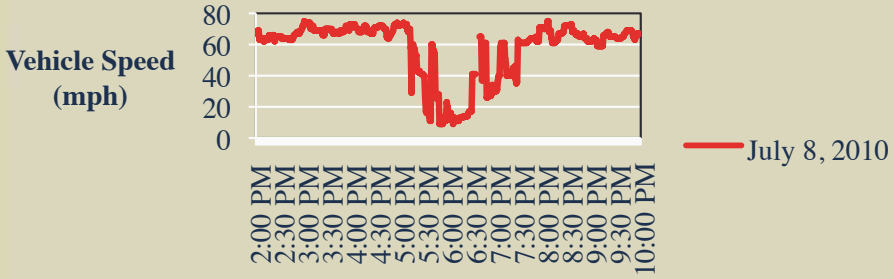




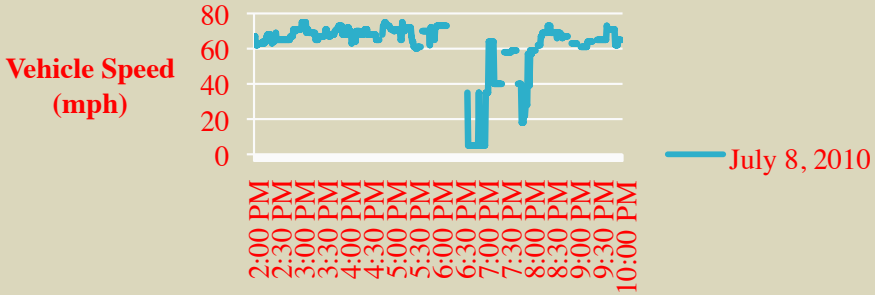


Traffic Incident (cont.)

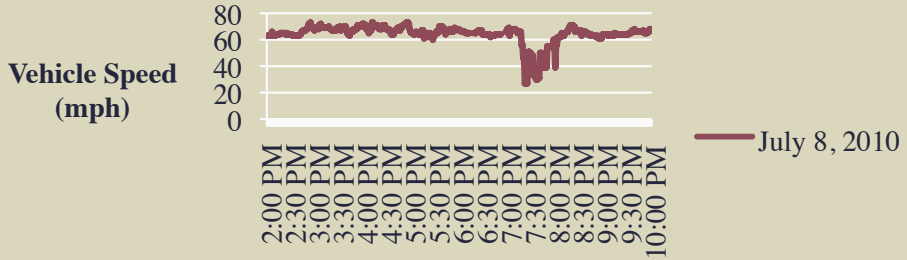
I 35 SB from IA 210 to IA 87



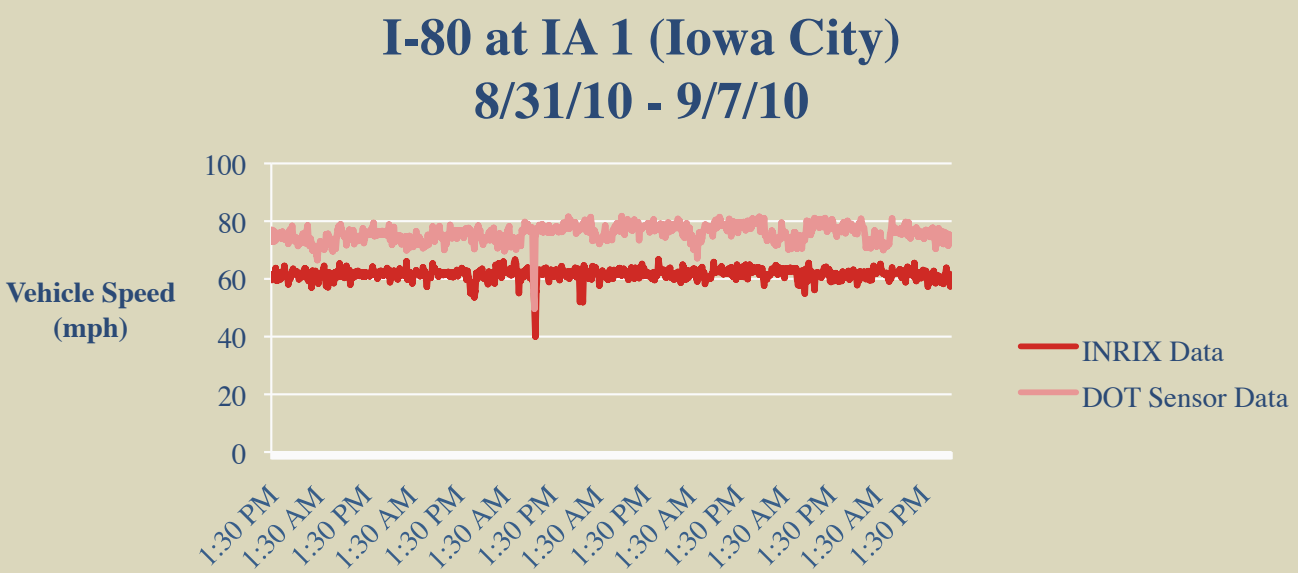
I 35 SB at IA 210

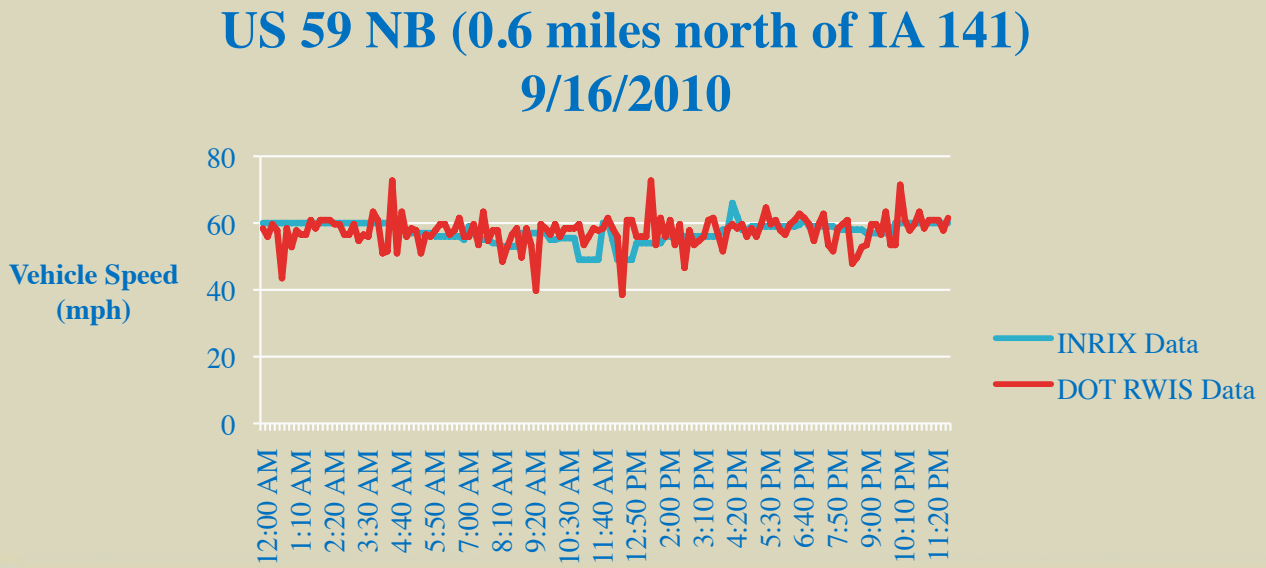


I 35 SB from US 30 to IA 210



Comparison with Existing Sensor Data





INRIX Evaluation Summary

- Amount of real time data correlates with volume
- Speeds reduced by work zones and major traffic incidents
- Speed correlates with roadway detector stations

Potential Non-Technical Issues with Probe Approaches

- **Administrative issues**
  - Changes in data quality
    - Changes in data source
    - Changes in data frequency
    - Changes in method of aggregation/synthesis
  - Business model / contract changes
  - Bankruptcy
- **Political issues**
  - Loss of control over data management
    - Difficulties with anonymity
    - Difficulties in data security
  - Public reaction
  - Potential for abuse

Privacy Concerns

The New York Times

It's Tracking Your Every Move and You May Not Even Know

By NOAM COHEN

Published: March 26, 2011

Malte Spitz was surprised by how much detail Deutsche Telekom had about his whereabouts.

Recommendations & Conclusions

- Engage DOT stakeholders to explore use and value of mobile probe data
- Review metadata analysis to see if they meet DOT's needs for various uses
- Consider potential non-technical issues
- Monitor marketplace

Questions/Comments?

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