Data Science Challenges and Opportunities in Highway Transportation

IEEE Big Data

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Presentation Outline

• EAR Program Background
• Investments in Data Science for Highway Research
• Opportunities and Challenges
What is the EAR Program?
Key Processes

- Focus on high-risk, high payoff research
- Merit review is used to enhance the quality of research processes and results
- Research stakeholders are involved throughout
- Commitment to successful project handoff
Program Status

• 200+ Initial stage investigations
• Seven solicitations resulting in
  – 75 projects awarded; 36 ongoing
  – $72M federal, $26M match
• 8th closed in 2014
  – Topics: Structural assessment, safety data, freight data, freight modeling
Focus Areas

Connected highway system concepts
Breakthrough concepts in material science
Human behavior and travel choices
New technology and advanced policies for energy and resource conservation
Technology for assessing performance
Connected Highway Systems

• New Data
  – Real time data, data fusion, data analytics

• New Communications
  – DSRC, Cellular, etc.

• Enabling Technologies
  – Localization and mapping
  – Extended situational awareness
  – Adaptive control systems
Human Behavior

• Massive New Data
  – Naturalistic driving studies
  – Communications metadata
  – Social networking

• Enabling Technologies
  – Automation
  – Predictive modeling
  – Real time, large scale markets
Assessing Performance

• Massive New Data
  – Roadside sensors
  – Vehicle based sensors
  – Structural monitoring

• Predictive Modeling
  – Actionable information
Opportunities

• Use of data to improve
  – Highway safety
  – Asset conditions
  – System reliability, efficiency
  – Energy, resource sustainability
Challenges

- Scientific
  - Valid
  - Reproducible

- Operational
  - Actionable
  - Efficient
  - Accessible
  - Secure
  - Flexible
Thank You

EAR Program website
www.fhwa.dot.gov/advancedresearch

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