Coordination of Highway Research with University Transportation Centers

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Federal Highway Administration
Webinar on National Highway Research Priorities
April 5, 2012 – Economic Competitiveness
Webinar Series Topics and Dates

• 1- State of Good Repair, March 28th
• 2- Economic Competitiveness, April 5th ← today
• 3- Safety, May 8th
• 4- Livability and Sustainability, May 9th
• 5- Policy and Innovative Financing, May 10th
Invited Participants

- New University Transportation Centers (UTCs)
- State Research Managers
- Federal Highway Administration (FHWA) Division Office Research Coordinators

Host and Presenters

- FHWA Research and Development (R&D) Offices and Program Offices
Webinar Purpose

• Provide FHWA perspectives on *national challenges and highway research priorities*

• Opportunity for UTCs to consider highway research priorities in their research plans and initiatives

• Inform State Research Managers on priorities

• Provide FHWA contacts for followup communications and coordination
Thanks for Your Participation

Thanks to the Research and Innovative Technology Administration (RITA) for this opportunity to communicate priorities to the UTCs

For more information about UTC participation, contact:
Debra Elston, 202-493-3181
www.fhwa.dot.gov/research
Visit our Web Site at www.fhwa.dot.gov/research
Economic Competitiveness

Joseph I. Peters, Ph.D.
Director, Office of Operations Research and Development
Federal Highway Administration

Coordination of Highway Research with University Transportation Centers
April 5, 2012
Topics to be Covered

• Goals
• Challenges and National Needs

Current Program and Plans for New Research and Technology (R&T)

Vision for Operations
– Technology Enabled
– Proactive
– Connected
– Automated
– Accelerated
– Collaborative
Economic Competitiveness

• Goals:
  – Achieve the greatest contribution of the transportation system to the United States’ economy
  – Promote transportation policies and investments that bring lasting and equitable economic benefits to the Nation and its citizens
System Performance

• FHWA Goal: The Nation's highway system provides safe, reliable, effective, and sustainable mobility for all users

• Objective: Evaluate causes of congestion and develop deployable tools, options, and solutions that reduce congestion
Grand Challenge to Improving US Competitiveness

**National Travel Delay**
- 1982: 1
- 1999: 3.8
- 2009: 4.8

(Billions of person hours)

**National Congestion Cost**
- 1982: 24
- 1999: 85
- 2009: 115

(Billions of 2009 dollars)
Congestion Getting Dramatically Worse Especially on Truck Routes

(Freight Facts and Figures 2011)
Satisfying National Needs with Operations Research and Technology

• Technology transfer and technical assistance (Today)
• Improving day-to-day operations (1 – 5 Years)
• Innovation for tomorrow’s operations (5 – 10 Years)
• Exploratory advanced research (5 to 20 years)
• Developing a technology base of foundational research (1 – 20 Years)

There’s a role for UTC’s in all of the above
Why Does FHWA Focus on Improving Operations?

• To reduce/manage impacts of congestion
• To keep people and commerce moving – a healthy economy needs a **reliable** transportation system
• To improve the safety and sustainability of the highway system
• To make more cost effective investment of limited resources
• To promote a more proactive approach
Three FHWA Operations Themes
Guiding the Current Program
(1 – 5 Years)

1. Managing Congestion by Improving Reliability and Operating the System at Peak Performance

2. Improving Reliability Through Efficient Movement of Freight

3. Building a Strong Foundation for Proactive Operations
Three FHWA Operations Themes Guiding the Current Program

1. Managing Congestion by Improving Reliability and Operating the System at Peak Performance
Managing Congestion by Improving Reliability and Operating the System at Peak Performance

- Active Transportation and Demand Management
- Arterial Management/Traffic Signal Operations
- Congestion Pricing
- Real-Time Transportation Information
- Road Weather Management
- Traffic Incident and Events Management
- Work Zone Mobility and Safety
Three FHWA Operations Themes Guiding the Current Program

1. Managing Congestion by Improving Reliability and Operating the System at Peak Performance

2. Improving Reliability Through Efficient Movement of Freight
Improving Reliability Through Efficient Movement of Freight

• Commercial Vehicle Size and Weight
• Freight Data and Analysis
• Freight Operations and Technology
• Freight Professional Development
Freight Management Strategies

• Reduce vehicle travel while delivering the goods
• Shift freight movement to less congested hours
• Improve enforcement size and weight laws with less disruption to freight flows
• Mitigate the negative consequences of freight movement on local communities
• Plan and administer projects for multi-state freight corridors
Three FHWA Operations Themes Guiding the Current Program

1. Managing Congestion by Improving Reliability and Operating the System at Peak Performance

2. Improving Reliability Through Efficient Movement of Freight

3. Building a Strong Foundation for Proactive Operations
Building a Strong Foundation for Proactive Operations

- Accelerating Implementation of Operations and Intelligent Transportation Systems (ITS) Technologies and Strategies
- Providing Operations and Freight Performance Measurement and Management
- Organizing and Planning for Operations
- Developing Traffic Analysis Tools
- Improving Traffic Control (MUTCD)
FHWA Operations Themes
Guiding the Current Program

For more information:
www.ops.fhwa.dot.gov
Operations Innovation Strategies
(5 to 10 Years)

• Create an information-rich environment and enable connectivity

• Develop and advocate innovations to improve transportation operations
Areas of Innovation

- Enabling Technologies
- Data Environment
- Concepts and Analysis
- Applications and Living Laboratories
Transportation Enabling Technologies

- Positioning, Navigation, Timing (PNT), and Mapping
- Wireless Communications
- Detection Technology
- Real-Time Data Capture and Management
Where is the vehicle? Vs. Where does it think it is?
GPS System Error: All the dots should be in the same lane!
Probe Data captured through live feed from Service Delivery Node to Prototype Data Environment
Areas of Innovation

- Enabling Technologies
- Data Environment
- Concepts and Analysis
- Applications and Living Laboratories
Establishing a Data Environment for Real-Time Data Capture and Management

– Developing a Research Data Exchange (RDE) to host and provide access to multi-source, multi-modal data

– Data archives and data feeds

– Supports connected vehicle application development and testing
Incrementally Constructing the Research Data Exchange (RDE)
Areas of Innovation

- Enabling Technologies
- Data Environment
- Concepts and Analysis
- Applications and Living Laboratories
Concepts and Analysis

• “What if?”
  – New Technologies, New Ideas, New Strategies
• New Data, New Models, New Simulations
• Examples:
  – Adaptive Signal Control Technologies
  – Work Zones
  – Integrated Corridor Management
Future Activities

- Alternative Speed Harmonization Technologies and Strategies
  - Cooperative Cruise Control
  - Traffic management algorithms

- Assessment of a Dedicated Lane(s) for Passenger Cars and Heavy Vehicles Platoons

- Benefit – Cost Analysis of Actual Deployment Scenarios
Areas of Innovation

- Enabling Technologies
- Data Environment
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- Applications and Living Laboratories
Transportation Operations Applications

• Partnering with Connected Transportation System Pooled Fund Study to Develop and Test Signal Applications
  – University of AZ and UC PATH are phase 1 contractors
  – Testing to occur in AZ and CA in phase 2
• Some testing at TFHRC’s Cooperative Vehicle Highway Testbed
Traffic Signal System Applications

- Adaptive Signal Timing
- Transit Signal Priority
- Freight Signal Priority
- Emergency Vehicle Preemption
- Pedestrian Signal Optimization
Intelligent Network Flow Optimization

• Deployment likely to occur on freeways first and then possibly arterials

• Applications Include:
  – Cooperative Adaptive Cruise Control (CACC)
  – Speed Harmonization
  – Queue Warning
Wide Array of Other Applications Being Developed

- Eco-Traffic Signal System
- Eco-Adaptive Cruise Control
- Enable Advanced Traveler Information Systems
- Freight Advanced Traveler Information Systems
- Integrated Dynamic Transit Operations
Validation/Calibration Data

Real-World Performance Characteristics

Concepts and Analysis

Data Sets

External Stakeholders, Applications, and Data
Living Laboratories

Multiple Locations... One Connected System

V2V & V2I Test Bed & Service Delivery Node

Enterprise Network Operation Center Service Delivery Node

Turner-Fairbank Highway Research Center (U.S. DOT)

U.S. Department of Transportation
Federal Highway Administration
Relevant Exploratory Advanced and Transformational Research Projects (5 – 20 Years)

- **Enabling Technology** - Intersection Reservation Systems

- **Concepts and Analysis** – Integrating micro-meso-macro-scale models

- **Cooperative Vehicle-Highway Applications** - Completed major assessment of Cooperative Adaptive Cruise Control Technologies and Driver Acceptance Testing
The Technology Base: A Foundation for the Future (1 – 20 Years)
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There’s a role for UTC’s in all of the above!
Technical Support and Tasks for the Saxton Transportation Operations Laboratory

Solicitation Number: DTFH61-12-R-00022

Agency: Department of Transportation
Office: Federal Highway Administration (FHWA)
Location: Office of Acquisition Management
Any questions?

For more information, contact:
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Federal Highway Administration Research and Technology

Visit our Web Site at www.fhwa.dot.gov/research