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

U.S. Department of Transportation
Federal Highway Administration

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

U.S. Department of Transportation
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FHWA Research and Technology

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

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Topics to be Covered

- Goals
- Challenges and National Needs
- Current Program and Plans for New Research and Technology (R&T)

<u>Vision for Operations</u>

- Technology Enabled
- Proactive
- Connected
- Automated
- Accelerated
- Collaborative

Economic Competitiveness

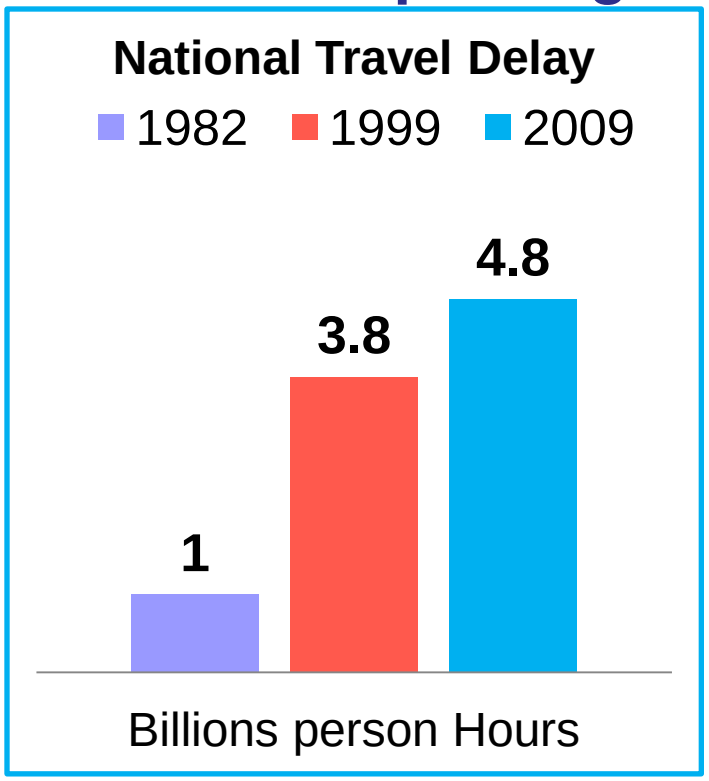
- Goals:
  - Achieve the greatest contribution of the transportation system to the United States' economy
  - Promote transportation policies and investments that bring lasting and equitable economic benefits to the Nation and its citizens

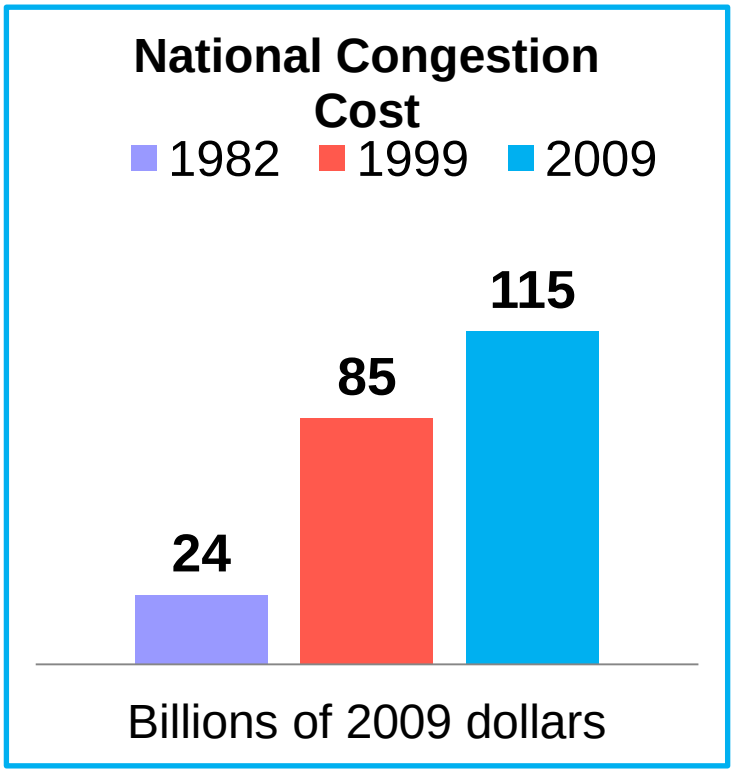
System Performance

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

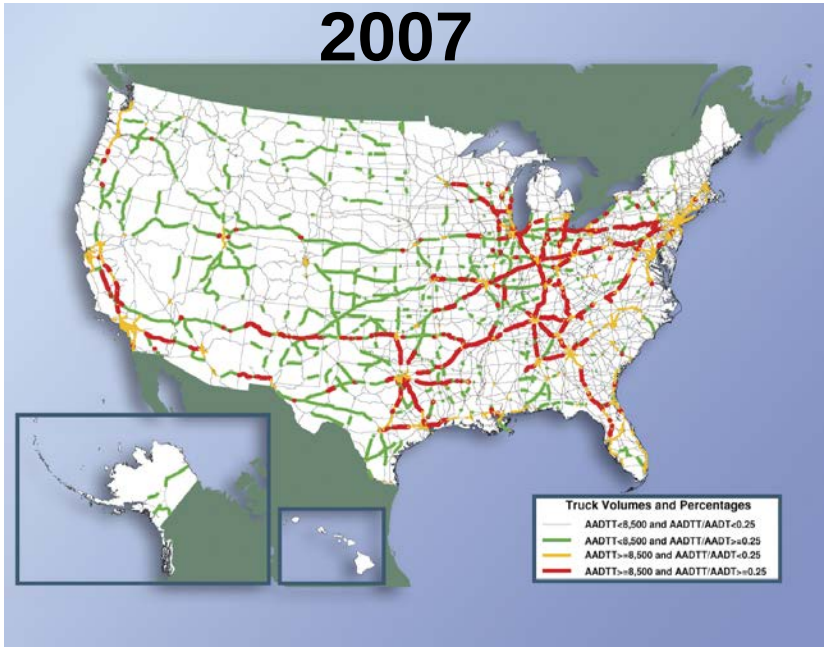
- Objective: Evaluate causes of congestion and develop deployable tools, options, and solutions that reduce congestion

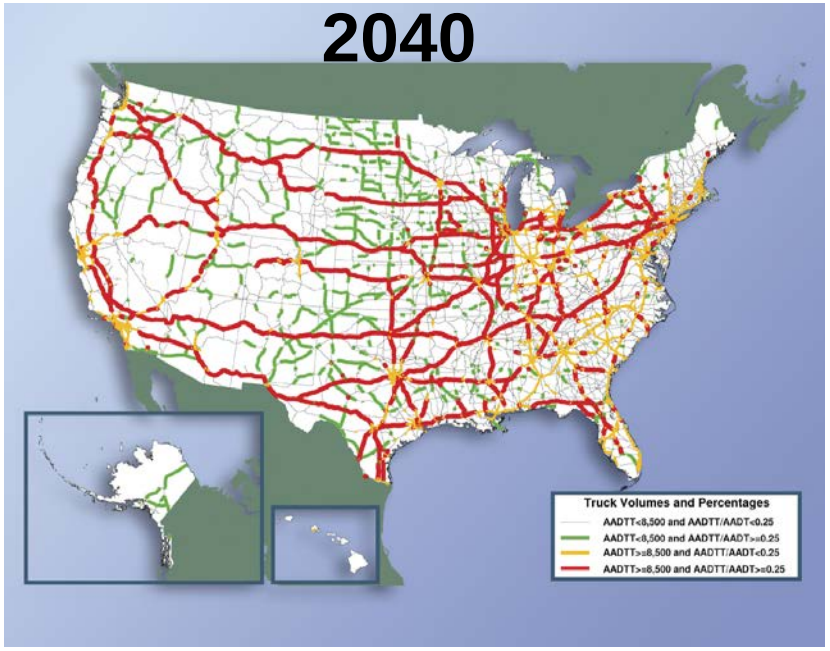
Grand Challenge to Improving US Competitiveness





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

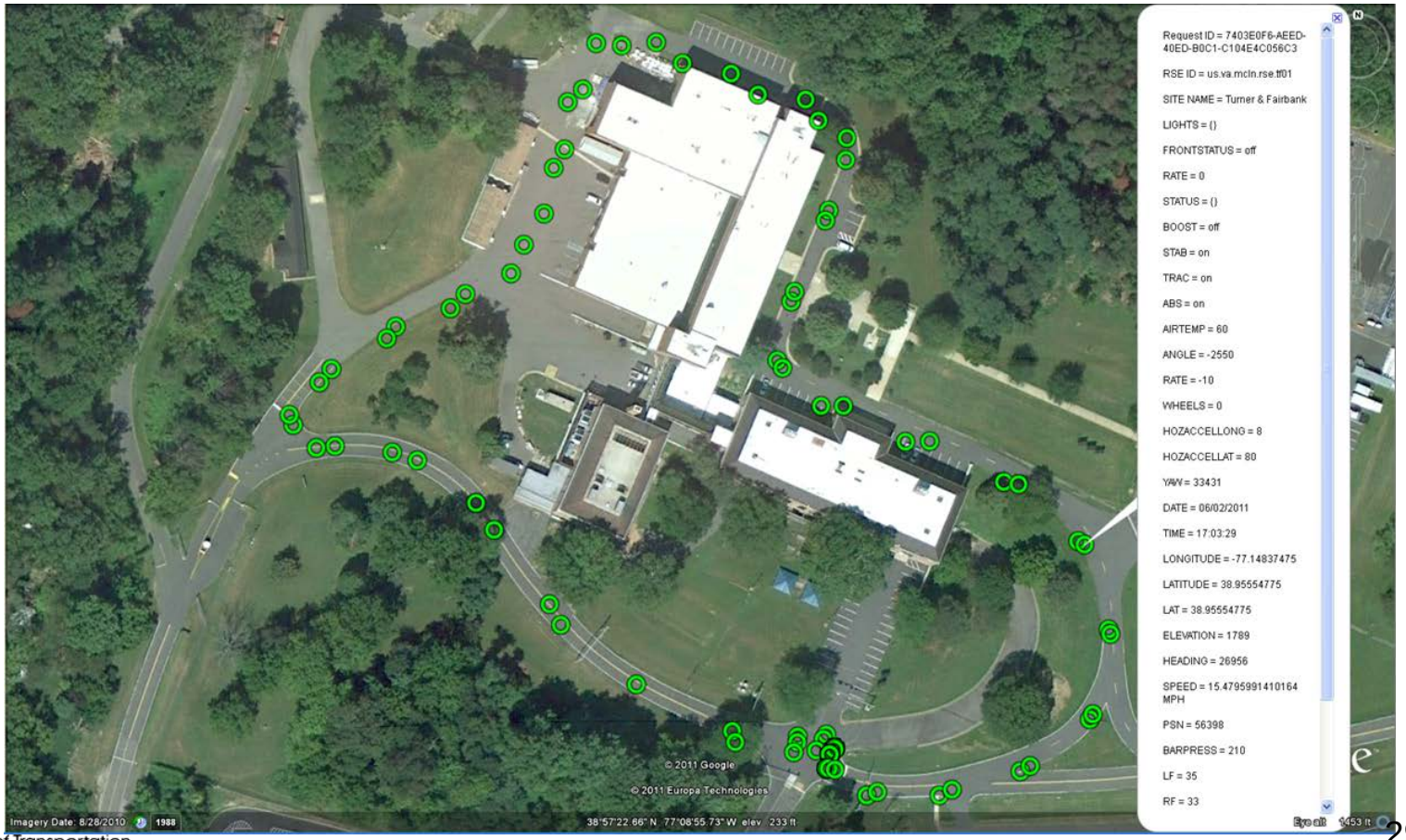
- Positioning, Navigation, Timing (PNT), and Mapping
- Wireless Communications
- Detection Technology
- Real-Time Data Capture and Management

Where is the vehicle? Vs. Where does it think it is?

GPS System Error: All the dots should be in the same lane!

Onboard Equipment Testing at TFHRC, 50 MPH, Westbound

Probe Data captured through live feed from Service Delivery Node to Prototype Data Environment



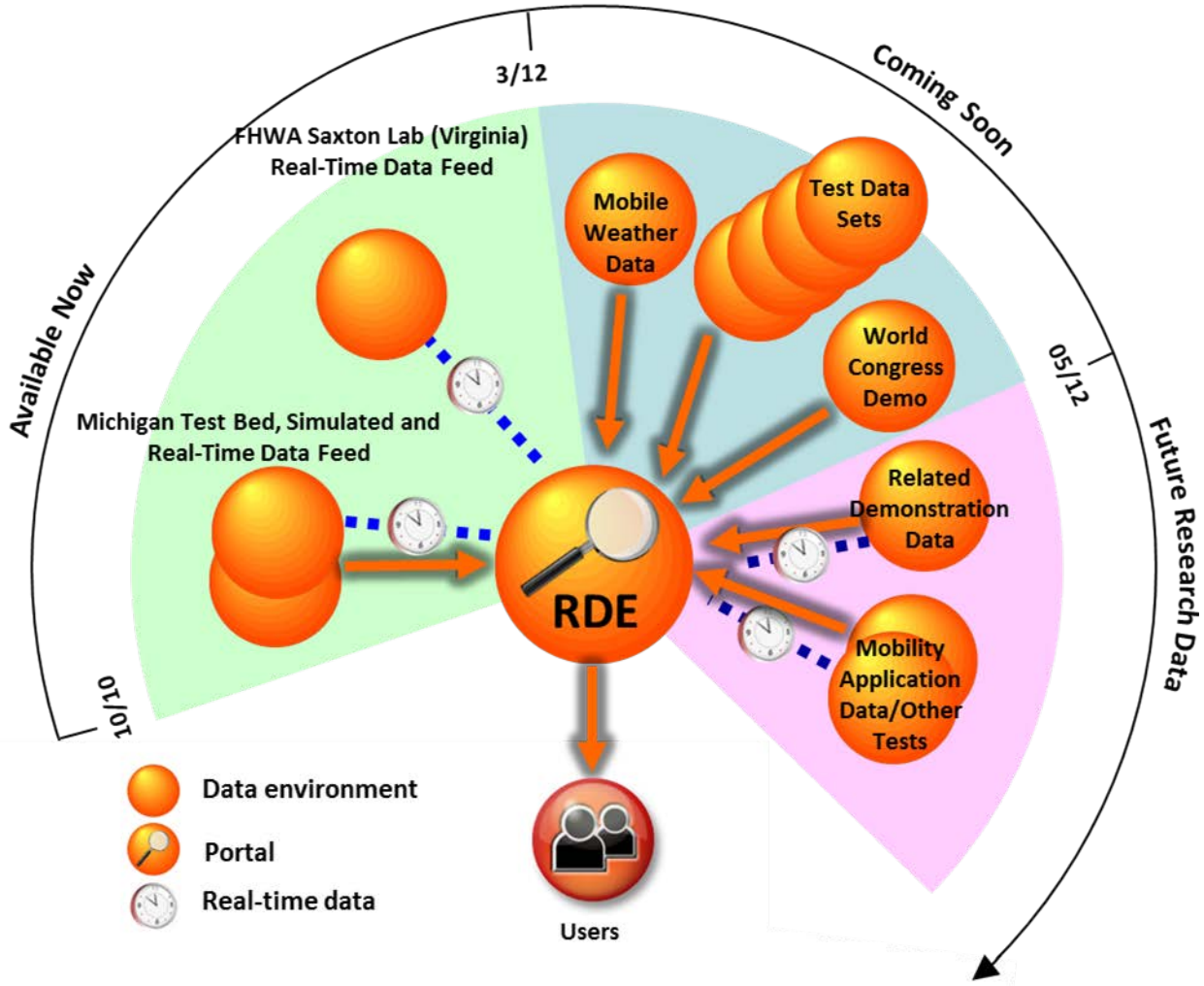
Areas of Innovation

- 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

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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
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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

FHWA Research and Technology

Cooperative Vehicle-Highway Testbed

Technology Testing

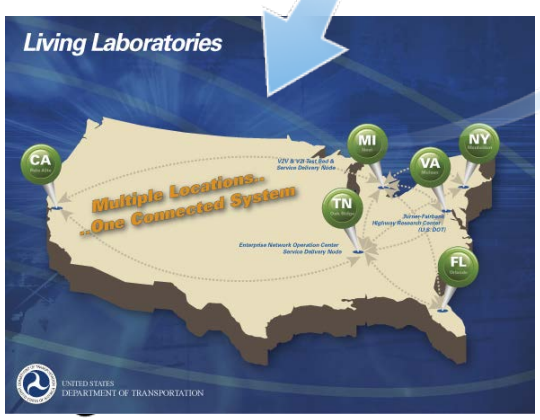
Real-World Performance Characteristics

Concepts and Analysis Testbed

'What-ifs'

Validation/Calibration Data

Living Laboratories



Data Resources Testbed

Data Analysis

Data Sets

External Stakeholders, Applications, and Data

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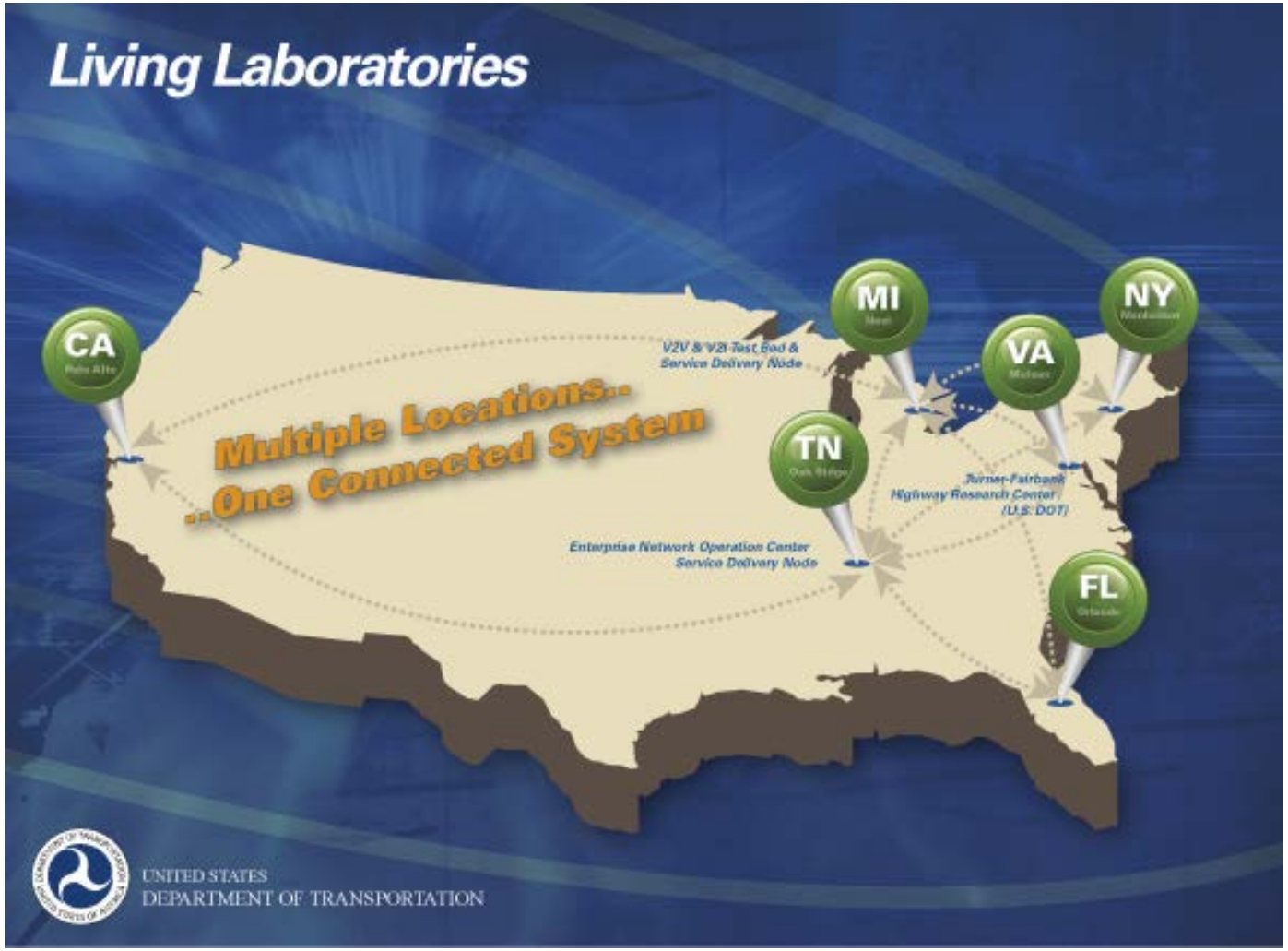

Living Laboratories
CA
MI
NY
VA
TN
FL
V2V & V2I Test Bed &
Service Delivery Node
Multiple Locations..
..One Connected System
Turner-Fairbank
Highway Research Center
(U.S. DOT)
Enterprise Network Operation Center
Service Delivery Node
UNITED STATES
DEPARTMENT OF TRANSPORTATION

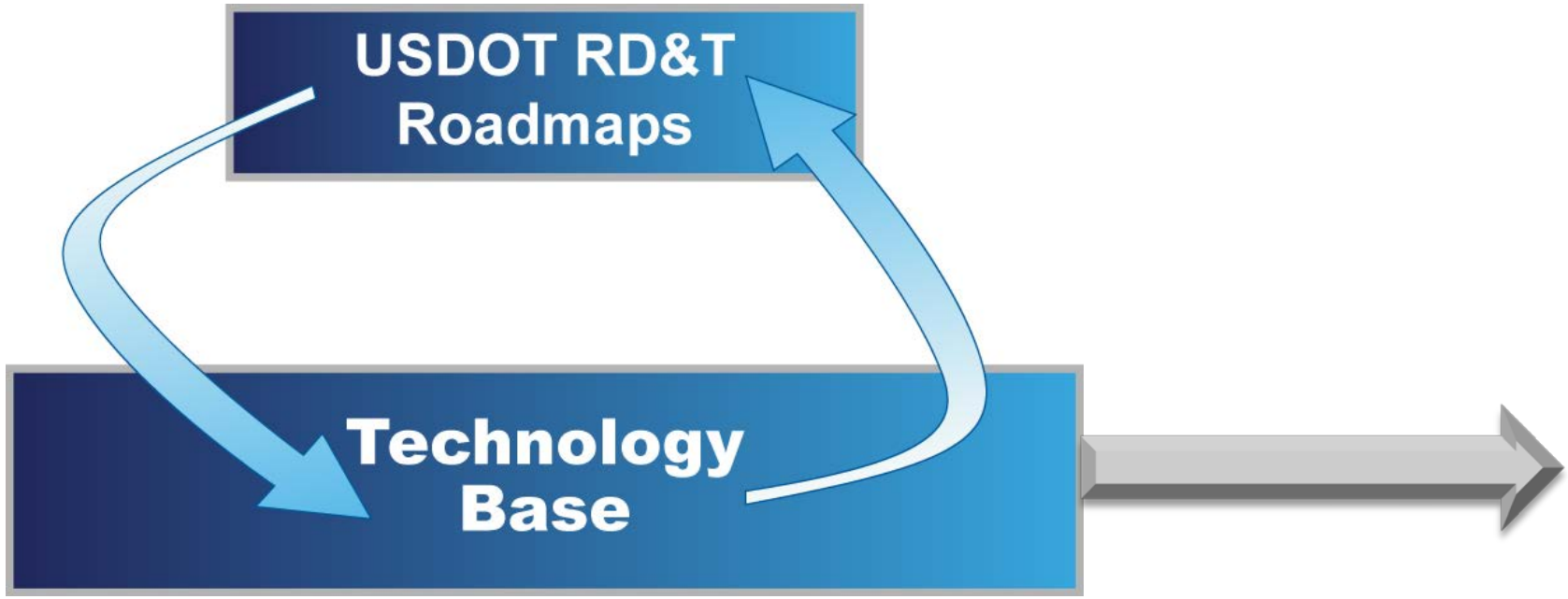
Relevant Exploratory Advanced and Transformational Research Projects

(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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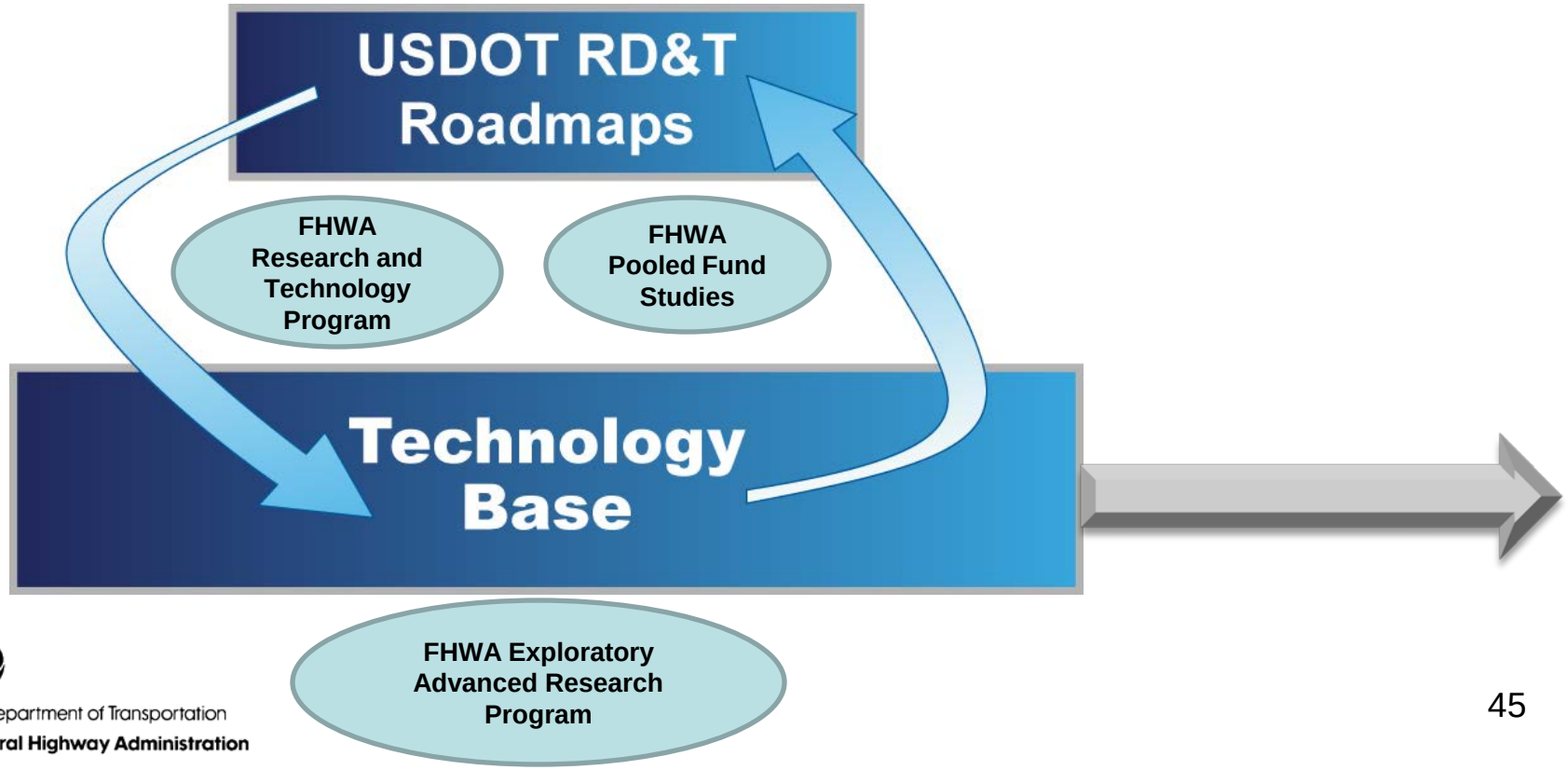

The Technology Base: A Foundation for the Future

(1 – 20 Years)

USDOT RD&T Roadmaps

Strategic Highway Research Program

Small Business Innovation Research

FHWA Research and Technology Program

FHWA Pooled Fund Studies

National Cooperative Research Programs

Technology Base

FHWA Exploratory Advanced Research Program

RITA University Transportation Research

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