

**THE RESEARCH AND DEVELOPMENT PORTFOLIO  
REQUIRED TO SUPPORT THE PRIORITIES OF  
THE DEPARTMENT OF TRANSPORTATION**

---

---

**HEARING**  
BEFORE THE  
SUBCOMMITTEE ON TECHNOLOGY AND INNOVATION  
COMMITTEE ON SCIENCE AND  
TECHNOLOGY  
HOUSE OF REPRESENTATIVES  
ONE HUNDRED ELEVENTH CONGRESS

FIRST SESSION

NOVEMBER 19, 2009

**Serial No. 111-64**

Printed for the use of the Committee on Science and Technology



Available via the World Wide Web: <http://www.science.house.gov>

U.S. GOVERNMENT PRINTING OFFICE

53-445PDF

WASHINGTON : 2010

---

For sale by the Superintendent of Documents, U.S. Government Printing Office  
Internet: [bookstore.gpo.gov](http://bookstore.gpo.gov) Phone: toll free (866) 512-1800; DC area (202) 512-1800  
Fax: (202) 512-2104 Mail: Stop IDCC, Washington, DC 20402-0001

COMMITTEE ON SCIENCE AND TECHNOLOGY

HON. BART GORDON, Tennessee, *Chair*

JERRY F. COSTELLO, Illinois	RALPH M. HALL, Texas
EDDIE BERNICE JOHNSON, Texas	F. JAMES SENSENBRENNER JR., Wisconsin
LYNN C. WOOLSEY, California	LAMAR S. SMITH, Texas
DAVID WU, Oregon	DANA ROHRABACHER, California
BRIAN BAIRD, Washington	ROSCOE G. BARTLETT, Maryland
BRAD MILLER, North Carolina	VERNON J. EHLERS, Michigan
DANIEL LIPINSKI, Illinois	FRANK D. LUCAS, Oklahoma
GABRIELLE GIFFORDS, Arizona	JUDY BIGGERT, Illinois
DONNA F. EDWARDS, Maryland	W. TODD AKIN, Missouri
MARCIA L. FUDGE, Ohio	RANDY NEUGEBAUER, Texas
BEN R. LUJÁN, New Mexico	BOB INGLIS, South Carolina
PAUL D. TONKO, New York	MICHAEL T. MCCAUL, Texas
PARKER GRIFFITH, Alabama	MARIO DIAZ-BALART, Florida
STEVEN R. ROTHMAN, New Jersey	BRIAN P. BILBRAY, California
JIM MATHESON, Utah	ADRIAN SMITH, Nebraska
LINCOLN DAVIS, Tennessee	PAUL C. BROUN, Georgia
BEN CHANDLER, Kentucky	PETE OLSON, Texas
RUSS CARNAHAN, Missouri	
BARON P. HILL, Indiana	
HARRY E. MITCHELL, Arizona	
CHARLES A. WILSON, Ohio	
KATHLEEN DAHLKEMPER, Pennsylvania	
ALAN GRAYSON, Florida	
SUZANNE M. KOSMAS, Florida	
GARY C. PETERS, Michigan	
VACANCY	

---

SUBCOMMITTEE ON TECHNOLOGY AND INNOVATION

HON. DAVID WU, Oregon, *Chair*

DONNA F. EDWARDS, Maryland	ADRIAN SMITH, Nebraska
BEN R. LUJÁN, New Mexico	JUDY BIGGERT, Illinois
PAUL D. TONKO, New York	W. TODD AKIN, Missouri
DANIEL LIPINSKI, Illinois	PAUL C. BROUN, Georgia
HARRY E. MITCHELL, Arizona	
GARY C. PETERS, Michigan	
BART GORDON, Tennessee	RALPH M. HALL, Texas

MIKE QUEAR *Subcommittee Staff Director*

MEGHAN HOUSEWRIGHT *Democratic Professional Staff Member*

TRAVIS HITE *Democratic Professional Staff Member*

HOLLY LOGUE *Democratic Professional Staff Member*

DAN BYERS *Republican Professional Staff Member*

VICTORIA JOHNSTON *Research Assistant*

# CONTENTS

November 19, 2009

	Page
Hearing Charter .....	2
<b>Opening Statements</b>	
Statement by Representative David Wu, Chairman, Subcommittee on Technology and Innovation, Committee on Science and Technology, U.S. House of Representatives .....	4
Written Statement .....	6
Statement by Representative Adrian Smith, Ranking Minority Member, Subcommittee on Technology and Innovation, Committee on Science and Technology, U.S. House of Representatives .....	7
Written Statement .....	8
Prepared Statement by Representative Harry E. Mitchell, Member, Subcommittee on Technology and Innovation, Committee on Science and Technology, U.S. House of Representatives .....	9
<b>Witnesses:</b>	
Hon. Polly Trottenberg, Assistant Secretary for Transportation Policy, U.S. Department of Transportation	
Oral Statement .....	9
Written Statement .....	11
Biography .....	12
Hon. Peter H. Appel, Administrator, Research and Innovative Technology	
Oral Statement .....	13
Written Statement .....	15
Biography .....	16
Neil J. Pedersen, P.E., Administrator, Maryland State Highway Administration	
Oral Statement .....	16
Written Statement .....	18
Biography .....	27
Ann Flemer, Deputy Executive Director, Policy, Metropolitan Transportation Commission (MTC)	
Oral Statement .....	27
Written Statement .....	29
Biography .....	36
Alan E. Pisarski, Independent Consultant	
Oral Statement .....	37
Written Statement .....	38
Biography .....	47
Robert E. Skinner, Jr., Executive Director, Transportation Research Board of the National Academies	
Oral Statement .....	48
Written Statement .....	50
Biography .....	62

**Appendix 1: Answers to Post-Hearing Questions**

Hon. Polly Trottenberg, Assistant Secretary for Transportation Policy, U.S. Department of Transportation; and Hon. Peter H. Appel, Administrator, Research and Innovative Technology Administration .....	78
Neil J. Pedersen, Administrator, Maryland State Highway Administration .....	85
Ann Flemer, Deputy Executive Director, Policy, Metropolitan Transportation Commission (MTC) .....	96
Alan E. Pisarski, Independent Consultant .....	100
Robert E. Skinner, Executive Director of the Transportation Research Board, The National Academies .....	104

**THE RESEARCH AND DEVELOPMENT PORT-  
FOLIO REQUIRED TO SUPPORT THE  
PRIORITIES OF THE DEPARTMENT OF  
TRANSPORTATION**

---

**THURSDAY, NOVEMBER 19, 2009**

HOUSE OF REPRESENTATIVES,  
SUBCOMMITTEE ON TECHNOLOGY AND INNOVATION  
COMMITTEE ON SCIENCE AND TECHNOLOGY  
*Washington, DC.*

The Subcommittee met, pursuant to call, at 10:05 a.m., in Room 2325 of the Rayburn House Office Building, Hon. David Wu [Chairman of the Subcommittee] presiding.

HEARING CHARTER

**SUBCOMMITTEE ON TECHNOLOGY AND INNOVATION  
COMMITTEE ON SCIENCE AND TECHNOLOGY  
U.S. HOUSE OF REPRESENTATIVES**

**The Research and Development Portfolio  
Required to Support the Priorities of the  
Department of Transportation**

THURSDAY, NOVEMBER 9, 2009  
10:00 A.M.—12:00 P.M.  
2325 RAYBURN HOUSE OFFICE BUILDING

**I. Purpose**

This hearing will focus on the components of a surface transportation R&D portfolio to support the U.S. Department of Transportation's goals of safety, economic competitiveness, environmental sustainability, and community livability. The hearing will also address the necessary steps for the DOT to implement its R&D agenda and the most effective practices for ensuring the latest R&D is utilized.

**II. Witnesses**

**The Honorable Polly Trottenberg**, Assistant Secretary for Transportation Policy, U.S. Department of Transportation.

**The Honorable Peter Appel**, Administrator, Research and Innovative Technology Administration

**Mr. Neil J. Pedersen**, Administrator, Maryland State Highway Administration, Vice Chair, AASHTO Standing Committee on Highways

**Ms. Ann Flemer**, Deputy Executive Director, Policy, Metropolitan Transportation Commission, Oakland, California; Vice Chair, Intelligent Transportation Society of America

**Mr. Alan E. Pisarski**, Independent Consultant

**Mr. Robert E. Skinner**, Executive Director of the Transportation Research Board, The National Academies

**III. Brief Overview**

At his Senate confirmation hearing on January 21 of this year, Transportation Secretary Ray LaHood identified four priorities for his time at the Department of Transportation: safety, the economy, sustainability, and community livability. While the DOT has not yet issued an official strategic plan around these goals, they are already reflected in DOT policy. For example, these priorities are reflected in the selection criteria for the TIGER Discretionary Grants,<sup>1</sup> a DOT-wide Livability Initiative, and a joint DOT-HUD task force to guide the development of Sustainable Communities. Safety, the economy, and environmental considerations have long been historic goals for transportation investment. Livability, however, is a new policy initiative for the DOT. However, it is also a subjective term, open to many different interpretations. The same concern is also present for the terms of sustainability and economic competitiveness. Without more specificity to these goals, it is difficult to assess the impact of federal investment toward achieving them.

Annually, the budget for surface transportation research, development, and technology transfer activities is over \$600 million.<sup>2</sup> The purpose of this hearing is to discuss the specific components of a surface transportation R&D agenda that will sup-

---

<sup>1</sup>The Transportation Investment Generating Economic Returns, authorized by American Recovery and Reinvestment Act.

<sup>2</sup>Approximate per fiscal year total for the RD&T activities of the Research and Innovative Technology Administration, the Federal Highway Administration, the Federal Transit Administration, and the National Highway Traffic Safety Administration. The research budget for the Federal Motor Carrier Safety Administration was not available.

port the DOT's priorities. As required under SAFETEA-LU, the highway reauthorization bill of 2005, the Research and Innovative Technology Administration (RITA) issued *The Transportation Research, Development, and Technology Strategic Plan for 2006 to 2011*. The plan listed research activities within the Department associated with strategic objectives, such as safety, environmental stewardship, or congestion reduction. However, the plan fell short of offering justifications for the R&D priorities or specific information on how the research would further the DOT's strategic goals.<sup>3</sup> The pending surface transportation reauthorization presents an opportunity to ensure transportation R&D activities are aligned with DOT priorities and to examine how the priorities will further the Department's strategic goals. To determine the elements of an R&D agenda needed to support the goals, the terms must be well defined.

#### IV. Background

##### *DOT Priorities*

Although the Secretary's priorities discussed above are not yet in an official DOT strategic plan, they are already reflected in significant policy initiatives as described below.

- **LIVABILITY.** On March 18 before Congress, the Secretary stated that many DOT activities already foster community livability, including the promotion of transit-oriented development, bicycle and pedestrian programs, and congestion mitigation initiatives. However, he argued that a Livability Initiative was necessary to accomplish goals such as, integrating transportation and land-use planning, fostering multi-modal transportation, and increasing access to housing, jobs, and other services.<sup>4</sup> In furtherance of many of these goals, the DOT's partnership with the Department of Housing and Urban Development (HUD) for Sustainable Communities will focus on integrating regional housing, transportation, and land-use planning. Part of this will include the development of livability measures and tools to track the progress of areas in meeting these measures. As noted above, livability is one of the evaluation criteria for the TIGER Discretionary Grants, which seek to fund projects that will, for example, significantly enhance user mobility through the creation of more convenient transportation options for travelers or projects that are the result of a planning process which coordinated transportation and land-use planning decisions and encouraged community participation in the process.
- **SUSTAINABILITY.** Environmental Stewardship is currently a DOT strategic goal, the objectives of which are two-fold: (1) to reduce the pollution and adverse environmental effects from transportation; and (2) to streamline the environmental review of transportation projects. The DOT has not yet detailed the scope envisioned for sustainability and how it might differ from Environmental Stewardship. The DOT's current department-wide strategic plan<sup>5</sup> identifies activities supporting these two objectives, including the National Strategy to Reduce Congestion on America's Transportation Networks and the implementation of the President Bush's Executive Order to expedite the environmental reviews of high-priority transportation projects. In testimony before Congress,<sup>6</sup> Secretary LaHood cited fuel standards and transportation efficiency as important DOT activities in mitigating transportation's impact on climate change, as well as the need to stem the growth in vehicle-miles-traveled (VMT). Sustainability is also part of the evaluation criteria for the TIGER Discretionary grants, which will support projects that reduce energy consumption or carbon emissions, as well as those that maintain, protect or enhance the environment. As these different initiatives show, sustainability is a broad term, covering energy and resource conservation, preventing air, water, and noise pollution, and reducing greenhouse gas emissions. Defining the scope of sustainability will enable transportation decision makers to better assess if their investments are meeting these environmental objectives.
- **ECONOMIC COMPETITIVENESS.** In his March 12 testimony before the Senate Committee on Banking, Housing and Urban Affairs, Secretary LaHood stated that "improving the efficiency and reliability of our surface transpor-

<sup>3</sup>Comments of the Transportation Research Board, Appendix A of the 2006 Strategic Plan.

<sup>4</sup>March 18, 2009 hearing, before the House Appropriations Committee, Subcommittee on Housing, Transportation, and Urban Development.

<sup>5</sup>Strategic plan.

<sup>6</sup>July 14 testimony before the Senate Committee on Environment and Public Works.

tation system will be vital in enhancing the Nation's productivity and competitiveness in an increasingly global economy." The DOT estimates that Recovery Act funding has resulted in the immediate creation of thousands of jobs, but the DOT intends to make additional investments that "contribute over the long-term to growth in employment, production, or other high-value economic activity." The goal of such projects would improve long-term competitiveness in the movement of goods or to expand hiring and growth in the private sector. However, there is no guidance on how such goals would be planned or measured.

- **SAFETY.** The current DOT Strategic Plan describes safety as the "premier goal of the DOT." To that end, the Department has invested in the research, development, and deployment of surface transportation safety measures. Such investments include improved design for roads and roadside barriers, as well as behavioral research and intervention to improve driver safety. The DOT recently announced that it will be promoting education and awareness to combat distracted driving, and the Administration has also announced an executive order that will prohibit any federal employee from sending text messages while driving if they are driving a government-owned vehicle or engaged in government business. While safety is the most concrete of the DOT's four key themes, defining its scope is also necessary to measuring the impact of safety investments.

*DOT RD&T Activities.*

**Federal Highway Administration (FHWA)**

FHWA's total RD&T request is over \$200 million per fiscal year. Major focus areas for that funding in FY2009 included:

Research Area	FY2009 Request (000)
Safety	\$13.6
Operations (Congestion Mitigation)	\$7.8
Pavements	\$80.9
Infrastructure (Bridges)	\$25.6
Planning, Environment, and Realty (Asset Management, Travel Modeling, Environmental Research, and Geographic Information System applications)	\$19.5

**Research and Innovative Technology Administration (RITA)**

RITA is responsible for the coordination of all research and development at the DOT, and it also oversees the following programs. In addition to the \$13.2 million FY2010 request for the planning and coordination aspects of RITA, RITA also oversees:

Research Area	FY2010 Request (000)
Bureau of Transportation Statistics	\$28.0
Intelligent Transportation Systems Joint program Office	\$110
University Transportation Centers	\$76.7
Transportation Safety Institute*	(\$20.0)
Volpe National Transportation Systems Center*	(\$250.0)

\*The Transportation Safety Institute and the Volpe National Transportation Systems

Center are fee for service entities that support education and research, respectively.

**Federal Transit Administration (FTA)**

In FY2009, FTA requested \$59.6 million for its R&D programs, which included:

- \$14.1 million to improve capital and operation efficiencies, through projects such as the development and evaluation of small transit vehicles and clean fuels and the identification of transit benchmarks critical to the success of public transportation systems.



- \$8.4 million to improve safety and emergency preparedness through activities such as drug and alcohol compliance and the development of methods and technologies to increase the safety of transit.
- \$5.2 million to for research related to energy and the environment.

The FTA request also includes the Transit Cooperative Research Program, the National Transit Institute, and the transit University Transportation Centers.

#### **Federal Motor Carriers Administration (FMCSA)**

The breakdown for the amount spent by the FMCSA on research activities not available. However, the website describes several RD&T initiatives, such as Large Truck Crash Causation Study Analysis Series, the 100 car Naturalistic Driving Study, and the development of technologies for the trucking industry.

#### **National Highway Traffic Safety Administration (NHTSA)**

The National Highway Traffic Safety Administration's research activities for FY2009 included: \$29.2 million for vehicle safety research and analysis and \$105 million for Highway Safety Research and Development to reduce highway fatalities and injuries.

#### **The Transportation Research Board (TRB)**

The TRB, part of the National Academies, manages the National Cooperative Highway Research Program and the Strategic Highway Research Program II.

- Strategic Highway Research Program II. This program focuses on four areas of research: Safety, Infrastructure Renewal, Reliability, and Transportation Capacity. FHWA has provided a total of \$170.8 million since FY2006 to TRB for SHRP II. Funding for the program from FHWA ended in FY2009, and TRB expects the results and products developed from this research to be available over the next several years.
- National Cooperative Highway Research Program (NCHRP). NCHRP addresses surface transportation problems raised directly by state departments of transportation. Total funding for NCHRP is approximately \$36 million per fiscal year.

### **V. Issues & Concerns**

- Secretary LaHood's policy goals of safety, economic competitiveness, environmental sustainability, and community livability are broad terms. Providing definitions and performance measures will help ensure that the federal investment achieves the targeted results. Understanding the scope of these terms in particularly important in prioritizing a research agenda to support the policy objectives.
- States and local governments are responsible for the Nation's transportation systems. Therefore, it is crucial that federally funded research addresses the problems faced by these transportation officials. Understanding how the DOT's goals will affect state and local transportation agencies, and what types of knowledge and research they will need to advance goals of safety, competitiveness, sustainability, or livability, is key to ensuring that the intended benefits of the goals are realized by taxpayers.
- Particularly as policymakers look toward requiring more performance measures for the transportation system, it is important that the DOT goals have discernable metrics and methods to assess whether the policy investments are creating the intended benefits.

Chairman WU. The hearing will come to order. Good morning. Welcome, everyone, to today's hearing on the Department of Transportation's [DOT] research portfolio and the best ways of establishing and supporting the Department's priorities.

Earlier this year, Secretary LaHood laid out four key priorities that would guide DOT policies: safety, economic competitiveness, environmental sustainability, and community livability. I think that we can all agree that these are laudable goals. However, as Chair of the Subcommittee that oversees the National Institute of Standards and Technology, the federal agency charged by the Constitution with maintaining the Nation's systems of weights and

measures, I constantly repeat a couple of things: if you cannot define something, you don't know whether you are doing it or not, and if you can't measure it for economic or technologic purposes, it doesn't really exist.

This is the focus of today's hearing. I want to better understand the definitions of Secretary LaHood's key priorities, the main elements of an R&D agenda that support these priorities, the metrics required to ensure that we are making a difference, and finally, what is necessary to ensure that R&D results are actually used in the field. This examination is very, very important because the public expects to reap real benefits, not just hear terms or terminology from Washington D.C.

The DOT supports research on a wide array of surface transportation topics, from improved paving materials to runoff reduction methods, and I am interested in hearing from all the witnesses today about how the over half-a-billion dollars per year that DOT spends on research is supporting the agency's proposed priorities. For example, with new priorities like livability, perhaps there may be a need for broader research into the kinds of payoffs that we might expect from our investment in this field and into additional means of data collection.

This is the third transportation hearing this Subcommittee has held in the 111th Congress. The first hearing looked at the need to bring better planning and coordination to the DOT surface transportation agenda, and I continue to have a strong interest in this and particularly how the various research components coordinate and actually make their research relevant to the operating units. The second examined the research needed to mitigate the impact of surface transportation on carbon emission and climate change.

Both of these hearings emphasized the need for better technology transfer and improved efforts to ensure that federally funded R&D meets the need of state and local transportation officials. These two issues go hand in hand: if the research does not address the problems of the people managing our transportation system, it will not be transferred into practice. I am pleased that today that we have state and local representation with us to discuss their challenges and the types of research that will actually meet their needs.

The pending surface transportation reauthorization, which most of us hope will happen sooner rather than later, gives us an opportunity to examine the research programs of the DOT. I am hopeful that this hearing will shed light on DOT priorities and bring specific recommendations on the types of R&D investment needed to support these priorities.

Chairman WU. I would like to invite the Ranking Member, my good friend, Mr. Smith, to make his opening statement.

[The prepared statement of Chairman Wu follows:]

PREPARED STATEMENT OF CHAIRMAN DAVID WU

Good morning. I would like to welcome everyone to today's hearing on how the Department of Transportation's research portfolio can best support its established priorities.

Earlier this year, Secretary LaHood laid out four key priorities that would guide DOT policies: safety, economic competitiveness, environmental sustainability, and community livability. I think we can all agree that these are laudable goals. How-

ever, as chair of the subcommittee that oversees the National Institute of Standards and Technology, the federal agency charged by the Constitution with maintaining the nation's systems of weights and measures, I've learned two things: one, if you cannot define something, you don't know you're doing it, and two, if you can't measure it, it doesn't exist.

This is the focus of today's hearing. I want to better understand the definition of Secretary LaHood's four key priorities, the main elements of an R&D agenda that will support these priorities, the metrics required to ensure we are making a difference, and finally, what is necessary to ensure that R&D results are utilized in the field. This examination is important because the public must reap actual benefits, not just hear more Washington jargon.

The DOT supports research on a wide array of surface transportation topics, from improved paving materials to runoff reduction methods. I am interested in hearing from today's witnesses about how well the over \$600 million per year that DOT spends on research is supporting the agency's proposed priorities. For example, with new priorities like livability, perhaps there is a need for research in social science and investment in different types of data collection.

This is the third transportation hearing this subcommittee has held in the 111th Congress. The first hearing looked at the need to bring better planning and coordination to the DOT surface transportation research agenda. The second examined the research needed to mitigate the impact of the surface transportation system on the climate.

Both of these hearings emphasized the need for better technology transfer and improved efforts to ensure that federally funded R&D meets the needs of state and local transportation officials. These two issues go hand-in-hand: if the research does not address the problems of the people managing our transportation system, it will not be transferred into practice. I am pleased today that we have state and local representation with us to discuss their challenges and the types of research that will actually meet their needs.

The pending surface transportation reauthorization gives us an opportunity to examine the research programs of the DOT. I am hopeful that this hearing will shed light on the DOT priorities and bring specific recommendations on the types of R&D investment needed to support those priorities.

Mr. SMITH. Thank you, Mr. Chairman. Thank you to the witnesses for sharing your time and expertise, as we examine the R&D portfolio and policy priorities of DOT.

As Committee action on DOT R&D legislation has been pushed back due to delays and progress on the overall highway bill, this hearing does present a great opportunity to examine R&D priorities in advance of Full Committee consideration of reauthorization.

This hearing is intended to focus specifically on the R&D needed to support department-wide goals of safety, economic competitiveness, environmental sustainability, and community livability. I hope we can also consider economic survivability. In order to do this, I believe it is important that we examine the goals themselves, understand their purpose and meaning and evaluate whether they are appropriate for guiding future R&D activities.

To this end, I am particularly concerned with the appropriateness of the Administration's "community livability goal," again, maybe getting back to the economic survivability, and at a minimum it represents a concept difficult to define and measure progress toward.

More troubling, however, key aspects of a livability agenda appear to involve significant Federal Government intrusion into the manner in which Americans travel and live in general. Obviously, the automobile is central to our identity and quality of life. In fact, the government even subsidizes the new purchase of an automobile. Almost 95 percent of Americans get around by cars. In a district such as mine in rural Nebraska, I am sure this figure is closer to 100 percent, or at least very close. Even in urban areas,

Americans have demonstrated a great willingness to accept heavy traffic congestion and long commutes in exchange for the opportunity to live in a larger home with a yard in a neighborhood with good schools and low crime and also feed the world. In this sense, it seems the Administration's vision of this livable community is quite different from that of what I would call an average American.

While these policy concerns do tend to go beyond the Committee's jurisdiction, they are important and relevant because the Department's R&D agenda will be shaped and driven by the DOT-wide strategic goals. Accordingly, I hope we can exercise close scrutiny of these goals as we consider further changes to the R&D legislation at the Full Committee level.

Again, I thank the panelists. Maybe we will hear like we did two weeks ago that climate change can be solved in part by reducing the amount of red meat consumption or beef consumption. I hope that is not really the case. I am a little bit selfish in saying that. But I do thank you for sharing your expertise and look forward to your testimony.

Thank you, Mr. Chairman.

[The prepared statement of Mr. Smith follows:]

PREPARED STATEMENT OF REPRESENTATIVE ADRIAN SMITH

Thank you, Mr. Chairman, for calling this hearing this morning to examine the R&D portfolio and policy priorities of the Department of Transportation.

As committee action on DOT R&D legislation has been pushed back due to delays in progress on the overall highway bill, this hearing presents a good opportunity to examine DOT R&D priorities in advance of full committee consideration of reauthorization.

This hearing is intended to focus specifically on the R&D needed to support department-wide goals of safety, economic competitiveness, environmental sustainability, and community livability. In order to do this, I believe it's important that we also examine the goals themselves to understand their purpose and meaning and evaluate whether they are appropriate for guiding future R&D activities.

To this end, I am particularly concerned with the appropriateness of the administration's "community livability" goal. At a minimum, it represents an amorphous concept difficult to define and measure progress toward. More troubling, however, key aspects of the livability agenda appear to involve significant Federal government intrusion into the manner in which Americans to travel and live.

Secretary LaHood has summarized this succinctly, characterizing the administration's livability initiative as "a way to coerce people out of their cars." While the candor is refreshing, needless to say I find this statement troubling.

The automobile is central to our identity and quality of life. Almost 95 percent of Americans get around by cars, and in districts such as mine in rural Nebraska I'm sure this figure is closer to 100 percent. Even in urban areas, Americans have demonstrated a great willingness to accept heavy traffic congestion and long commutes in exchange for the opportunity to live in a larger home with a yard, in a neighborhood with good schools and low crime.

In this sense, it seems the Administration's vision of a "livable community" is quite different from that of average Americans.

While these policy concerns tend to go beyond the committee's jurisdiction, they are important and relevant because the Department's R&D agenda will be shaped and driven by the DOT-wide strategic goals. Accordingly, I hope we can exercise close scrutiny of these goals as we consider further changes to DOT R&D legislation at the full committee level.

I thank the panelists for being here, and I look forward to a productive discussion.

Chairman WU. Thank you, Mr. Smith, and I think that we will always depend on good Nebraskan beef.

If there are Members who wish to submit additional opening statements, statements will be added to the record at this point.

[The prepared statement of Mr. Mitchell follows:]

## PREPARED STATEMENT OF REPRESENTATIVE HARRY E. MITCHELL

Thank you, Mr. Chairman.

Today we will discuss the specific components of the surface transportation research and development agenda to support the priorities at the Department of Transportation. We will also examine how the DOT can implement its research and development agenda and identify effective practices to ensure the latest research and development is utilized.

Surface transportation research and development is critical as the population continues to grow and congestion continues to increase.

Take Arizona, for example, which is one of the fastest growing states in the nation. Since 1970, our population has more than tripled. The Phoenix metropolitan area, long the largest in our state, is now one of the largest in the nation.

Not surprisingly, all this growth has created an urgent need for new transportation infrastructure and congestion mitigation efforts.

The Arizona Department of Transportation (ADOT) has been a leader in transportation research and technology and has engaged in several research efforts to improve infrastructure problems such as monitoring and managing congestion and experimenting with pavement materials.

I look forward to hearing from our witnesses about this important issue.

I yield back.

And now, it is my pleasure to introduce our witnesses. Ms. Polly Trottenberg is the Assistant Secretary for Transportation Policy at the United States Department of Transportation. Mr. Peter Appel, who is the Administrator of the Research and Innovative Technology Administration, also at DOT. Mr. Neil Pedersen is the Administrator of the Maryland State Highway Administration and the Vice Chair of the Standing Committee on Highways at the American Association of State Highway and Transportation Officials (AASHTO). And that is why we say that in acronym almost all the time. Ms. Ann Flemer is the Deputy Executive Director of Policy with the Metropolitan Transportation Commission [MTC] in Oakland, California, and she is also the Vice Chair of the Intelligent Transportation Society of America. Mr. Alan E. Pisarski is an independent consultant. And our final witness is Mr. Robert Skinner, the Executive Director of the Transportation Research Board [TRB] at the National Academies of Science.

You will each have five minutes for your spoken testimony, and your written testimony will be included in the record in the hearing. When you all complete your testimony, we will begin with questions, and each Member will have five minutes to question the panel.

Ms. Trottenberg, please proceed.

**STATEMENT OF HON. POLLY TROTTEBERG, ASSISTANT SECRETARY FOR TRANSPORTATION POLICY, U.S. DEPARTMENT OF TRANSPORTATION**

Ms. TROTTEBERG. Thank you, Mr. Chairman. Chairman Wu, Ranking Member Smith, on behalf of Secretary Ray LaHood, I would like to thank you for the opportunity to appear before this Subcommittee today with my colleague, Peter Appel, to discuss the research and policy priorities in the U.S. Department of Transportation. U.S. DOT greatly appreciates the leadership that this Committee has shown on transportation research, and we appreciate the guidance and oversight you have given the Department over the years.

As this Committee has recognized, research is a critical component to accomplish the goal that we all share of creating a national

transportation system that is transparent and accountable, data-driven, focused on achieving strategic outcomes and on maximizing the value of public investment.

Having had the opportunity to work on many transportation bills myself during my 12 years as a Senate staffer, I know firsthand how important timely and targeted research is for Congressional decision makers and for other stakeholders.

As such, the Office of Policy and DOT has made it a top priority to provide accessible and relevant research and strengthen the ongoing dialogue with leaders in Congress, the Administration, and the larger national transportation community. This is particularly important as we consider the next surface transportation bill at a time that our Nation's transportation system faces profound economic, social and environmental challenges. And as we all know and the Chairman mentioned, our transportation system also faces unprecedented fiscal challenges, with dedicated revenue sources no longer adequate to maintain our existing infrastructure or to fund the future investments that we need.

At U.S. DOT we are currently developing our 2010–2015 strategic plan, which will outline our strategic goals and priorities. The plan is not yet complete, but it will focus on key priorities that the Chairman mentioned and that Secretary LaHood has articulated with, I think, one more added to the list: creating a national transportation system that improves safety and public health, fosters livable communities, promotes a state of good repair and long-term economic competitiveness, while achieving a state of environmental sustainability.

This Administration believes we must create a truly multi-modal transportation system that provides the traveling public and U.S. businesses with safe, convenient, affordable and environmentally sustainable transportation choices, and the research we conduct is central to achieving that goal.

Improving safety remains the top priority of U.S. DOT. Secretary Ray LaHood has tasked all DOT employees with fostering a safety culture in our daily work and encouraging our partners, stakeholders, and the public to redouble their efforts to reduce transportation-related fatalities and injuries. As this Committee knows, we conduct and support significant research in the safety area, and Administrator Appel will describe that in more detail.

Creating livable communities that provide residents with affordable transportation options is another key U.S. DOT priority. As you all know, DOT has formed a partnership with the Department of Housing and Urban Development [HUD] and the Environmental Protection Agency [EPA] to integrate transportation, housing, economic development and environmental planning and research. This innovative and cross-cutting effort seeks to promote increased access to jobs, school, health services, and other activities, and we hope this effort will have important results in urban areas, in suburban areas, and in rural areas. We think it can work in all parts of the country. The three agencies will be engaging in joint research and data collection, developing appropriate analytic tools and performance matters that we hope will produce better livability policies and investments.

The U.S. must also maintain our existing infrastructure in a state of good repair. Our Nation has built one of the world's most extensive and productive transportation systems, representing trillions of dollars of public and private investment. It is essential that we adequately maintain and modernize this vast, existing infrastructure to maximize its reliability, capacity and performance, and reduce operational and replacement costs to extend the system's useful life.

We also seek to achieve the maximum economic impact from our transportation investments and lay the groundwork for long-term economic growth and prosperity. It is essential to determine which investments on both the passenger and the freight side will yield the greatest benefits to the transportation network, especially during this period of economic hardship and with difficult budget choices at all levels of government.

Finally, the Obama Administration is committed to a comprehensive national energy and environmental policy that emphasizes reducing carbon emissions and consumption of fossil fuels as well as protecting and enhancing natural resources.

U.S. DOT is committed to advancing transportation policies and investments that reduce energy use and foster protection of critical watersheds and ecosystems.

Clearly, achieving these ambitious priorities will require U.S. DOT to accelerate the rate at which we convert research into data-driven policies and outcomes. Too often in the past, we have done a good job of funding cutting-edge research, but have not done a good enough job of making sure that the research is translated by policymakers and practitioners into better, safer, more efficient transportation. We intend to focus on the entire innovation process, from research to policy development to analyzing the outcomes of existing programs to make sure that the American people are getting their money's worth from the research that they support.

Thank you very much. I look forward to your questions.

[The prepared statement of Hon. Trottenberg follows:]

PREPARED STATEMENT OF HON. POLLY TROTTENBERG

*DOT's Research and Development to Support the Department of Transportation's Strategic Goals*

Chairman Wu, Ranking Member Smith, and Members of the Subcommittee:

On behalf of Secretary Ray LaHood, I'd like to thank you for the opportunity to appear here today with my colleague Peter Appel to discuss the research and policy priorities for the U.S. Department of Transportation.

U.S. DOT greatly appreciates the leadership this Committee has shown on transportation research and we value the guidance and oversight you have provided the Department over the years.

As this Committee has recognized, research is a critical component to accomplish the goals we all share of creating a national transportation policy that is transparent and accountable, data-driven, focused on achieving strategic outcomes and on maximizing the value of public investment.

Having had the opportunity to work on many key transportation bills during my 12 years as a staff member in the Senate, I know firsthand how important timely and targeted research is for Congressional decisionmakers.

As such, the Office of Policy has made it a top priority to provide accessible and relevant research to leaders in Congress, the Administration, and the larger national transportation community. This is particularly important as we consider the next surface transportation bill at a time that our Nation's transportation system faces profound economic, social and environmental challenges. Our transportation system also faces unprecedented fiscal challenges, with dedicated revenue sources

no longer adequate to maintain our existing infrastructure or to fund the future investments we will need.

At U.S. DOT we are currently developing our 2010-2015 Strategic Plan, which will outline our strategic goals and priorities. The Plan is not yet complete, but it will focus on key priorities that Secretary LaHood has publicly articulated—namely, creating a National transportation system that improves safety and public health, fosters livable communities, promotes a state of good repair and long-term economic competitiveness, while achieving environmental sustainability.

This Administration believes that we must create a safe, truly multimodal transportation system that provides the traveling public and U.S. businesses with safe, convenient, affordable and environmentally sustainable transportation choices.

Improving safety is the top priority of U.S. DOT. Secretary Ray LaHood has tasked all DOT employees with fostering a safety culture in our daily work and encouraging our partners, stakeholders and the public to redouble their efforts to reduce transportation-related fatalities and injuries. As this Committee knows, we conduct and support significant research in the safety area, which Administrator Appel will describe in more detail.

Creating livable communities that provide residents with affordable transportation options is another key U.S. DOT priority. DOT has formed an interagency livability partnership with the Department of Housing and Urban Development (HUD) and the Environmental Protection Agency (EPA) to integrate transportation, housing, economic development and environmental planning and research. This innovative, cross-cutting effort seeks to promote increased access to jobs, school, health services, and other activities for our citizens while improving the quality of life in their communities.

The U.S. must also maintain our existing infrastructure in a state of good repair. Our nation has built one of the world's most extensive and productive transportation systems, representing trillions of dollars of public and private investment. It is essential that we adequately maintain and modernize this vast, existing infrastructure to maximize its reliability, capacity and performance, to reduce operational and replacement costs and to extend the system's useful life.

We also seek to achieve the maximum economic impact from our transportation investments and lay the groundwork for long-term economic growth and prosperity. It is essential to determine which investments yield the greatest benefits to the transportation network especially during this period of economic hardship and with difficult budget choices occurring at all levels of government.

Finally, the Obama Administration is committed to a comprehensive national energy and environmental policy that emphasizes reducing carbon emissions and consumption of fossil fuels as well as protecting and enhancing natural resources. Thus, U.S. DOT is committed to advancing transportation policies and investments that reduce energy use and foster protection of critical watersheds and ecosystems. Our work on livable communities also helps us move towards clean energy and sustainable environment.

Clearly achieving these ambitious priorities will require U.S. DOT to accelerate the rate at which we convert research into outcomes. Too often in the past, we have done a good job of funding cutting-edge research, but have not done a good enough job of making sure that the results of that research were translated by policymakers into better, safer, more efficient transportation. We intend to focus on the entire innovation process—from research to policy development—to make sure that the American people are getting their money's worth from the research that we support.

Thank you and I look forward to your questions.

#### BIOGRAPHY FOR HON. POLLY TROTTEBERG

Ms. Trottenberg is currently the Assistant Secretary for Transportation Policy at the U.S. Department of Transportation.

She was previously the Executive Director of Building America's Future, a new non-profit organization dedicated to bringing about a new era of U.S. investment in infrastructure that enhances our nation's prosperity and quality of life. BAF was created by Pennsylvania Governor Edward G. Rendell, California Governor Arnold Schwarzenegger and New York Mayor Michael R. Bloomberg.

Ms. Trottenberg also worked in the United States Senate for 12 years, most recently as Deputy Chief of Staff and Legislative Director for California Senator Barbara Boxer, Chairman of the Senate Environment and Public Works Committee. Ms. Trottenberg also served as Legislative Director for New York Senator Charles Schumer and as Legislative Assistant to New York Senator Daniel Patrick Moynihan. She has worked extensively on transportation, public works, energy and environmental issues during her congressional career.



Before starting her career on Capitol Hill, Ms. Trottenberg worked at the Port Authority of New York and New Jersey, the Massachusetts State Senate, and the Massachusetts Port Authority.

Ms. Trottenberg received her undergraduate degree from Barnard College and her Master's in Public Policy from the Kennedy School of Government.

Chairman WU. Thank you very much, Secretary Trottenberg. You have done a great job of squeezing your oral testimony into 5 minutes. I think you would make a good member of the House speaking on the floor.

Mr. Appel, please proceed.

**STATEMENT OF HON. PETER H. APPEL, ADMINISTRATOR,  
RESEARCH AND INNOVATIVE TECHNOLOGY**

Mr. APPEL. Chairman Wu, Ranking Member Smith, thank you for the opportunity to appear before you today to discuss U.S. DOT's multi-modal research. I personally always welcome the opportunity to talk about transportation research, and I am thrilled by the interest this Committee has in it.

The Research and Innovative Technology Administration, RITA, has a unique role within DOT. We are charged with coordinating collaborative multi-modal research and development. We look across the modes of transportation and to our partners to identify synergies and opportunities for collaboration in support of the Department's priorities to help make critical investment and policy decisions based on sound science and rigorous analysis.

We do this in a variety of ways. One way is through the Research, Development and Technology Planning Team, which is chaired by RITA staff, and through the RD&T [Research, Development, and Test] Planning Council, which I chair and includes the leaders of each of the operating administrations of DOT. The team consists of the heads of the research organizations of the modes within the Department and meets to discuss ongoing research activities, to convene clusters of researchers in specific science-based disciplines, and to ensure research alignment with DOT priorities.

The planning team will work to ensure not just that our research is aligned with our priorities but that we have a clear strategy to facilitate the adoption of these research results. We need to consult with stakeholders such as state DOTs, transit authorities, private companies, and other key transportation players.

Another way we do this is via the University Transportation Center program, the UTC program, which consists of more than 100 universities nationwide conducting multi-modal research and educating the next generation of transportation leaders.

Our National Transportation Library uses new media tools to reach across stakeholder communities. Along with TRB's Research in Progress databases, it enhances real-time information sharing, helps identify potential needs and collaboration opportunities, and makes innovative research products available to those who can implement research results.

Of course, one of the most important components of RITA is the Bureau of Transportation Statistics. Good research relies on good data. BTS's key data programs support research and analysis that will be needed to achieve the President's transportation goals. We must and will focus on how to continually improve both the effectiveness and the efficiency of these programs moving forward.

Assistant Secretary Trottenberg has laid out Secretary LaHood's priorities. Let me give some examples of research that relate to those.

In the area of safety, the Department recently hosted a Distracted Driving Summit which has led to a wide array of specific actions and a multi-modal research agenda. We have participation from every part of the Department recognizing that distracted driving is an area of scientific research that affects every aspect of transportation.

The Secretary has recently launched a DOT Safety Council which will prioritize cross-modal safety research, and RITA is taking the lead in supporting the Secretary on that effort.

The Strategic Highway Research Program 2, SHRP 2, is performing the largest naturalistic driving study ever conducted, which will evaluate the causes and consequences of crashes and near-crashes, including those where distracted driving was a factor.

Our ITS [Intelligent Transportation Systems] Program's IntelliDrive initiative is laying the groundwork for a future highly connected and safe environment for vehicles and our infrastructure.

In the area of livable communities, our partnership with HUD and EPA helps us to develop a research agenda and performance metrics for our livable communities efforts. These should also include safety metrics and research to improve pedestrian and bicyclist safety, which are critical to the advancement of livable communities.

DOT is evaluating a pilot program in four communities to demonstrate the contributions of non-motorized transportation toward achieving health, environmental, and energy goals.

In the area of environmental sustainability, the FRA, Federal Railroad Administration, has partnered with industry to launch fuel cell and bio-diesel locomotives, aiming at zero emissions. The Federal Transit Administration is demonstrating hybrid bus technologies and continues the national Fuel Cell Bus Program. Green research is being conducted at some of our UTCs. For example, the University of Wisconsin is analyzing consumer adoption and grid impact for plug-in hybrids. The FAA [Federal Aviation Administration] is supporting aviation climate research in coordination with NASA [National Aeronautics and Space Administration] and NOAA [National Oceanic and Atmospheric Administration] and making progress on renewable fuels.

In the area of economic competitiveness, the Next Generation Air Transportation System, NextGen, uses 21st-century technologies to ensure future safety, capacity and environmental needs are met. Through the Small Business Innovation Research program, SBIR, DOT is stimulating technological innovation in areas such as green transit, traffic signal analysis and human factors associated with NextGen deployment.

In the area of state of good repair, our expanding research to develop new materials that provide greater durability and reliability, provide enhanced tools for asset condition inspection, and deliver more environmentally-friendly construction techniques. The Highway Administration is also looking at materials such as high-performance composites to reduce cracking, water penetration, and premature deterioration of structures.

So we are continuing to look and explore ways to not only enhance this research but pursue broad dissemination of this knowledge and these products. Many of our colleagues at this table are partners in the effort to get this out to the people that really use this technology and research.

I thank you, and I look forward to answering your questions.  
[The prepared statement of Hon. Appel follows:]

PREPARED STATEMENT OF HON. PETER H. APPEL

Chairman Wu, Ranking Member Smith, and Members of the Subcommittee, thank you for the opportunity to appear before you today to discuss U.S. DOT's multimodal research.

The Research and Innovative Technology Administration (RITA) has a unique role within DOT—we are charged with coordinating collaborative multi-modal research and development. We look across the modes and to our partners to identify synergies and opportunities for collaboration in support of the Department's priorities to help make critical investment and policy decisions based on sound science and rigorous analysis. We do this in a variety of ways.

One way is through the Research, Development and Technology (RD&T) Planning Team, which is chaired by RITA staff and through the RD&T Planning Council, which I chair. The Team consists of the heads of the research organizations of the modes within the Department and meets to discuss ongoing research activities, to convene clusters of researchers in specific science-based disciplines, and to ensure research alignment with DOT priorities.

The Planning Team will work to ensure not just that our research is aligned with our priorities, but that we have a clear strategy to facilitate the adoption of these research results. We need to consult with stakeholders such as state DOTs, transit authorities, private companies, and other key transportation players.

Another way is via the University Transportation Center (UTC) program, which consists of more than 100 universities nationwide conducting multi-modal research and educating the next generation of transportation leaders.

Our National Transportation Library uses new media tools to reach across stakeholder communities. Along with TRB's Research in Progress database, it enhances real-time information sharing, helps identify areas of potential need and collaboration, and makes innovative research products available to those who can implement research results.

Of course, one of the most important components of RITA is the Bureau of Transportation Statistics. Good research relies on good data. BTS' key data program support research and analysis that will be needed to achieve the President's transportation goals. We must and will focus on how to continually improve these programs moving forward.

Assistant Secretary Trottenberg has laid out Secretary LaHood's priorities. Let me give some examples:

Safety:

- The Department recently hosted a Distracted Driving Summit which has led to a wide array of specific actions and a multimodal research agenda.
- The Secretary has recently launched a DOT Safety Council which will prioritize cross-modal safety research.
- The Strategic Highway Research Program 2 (SHRP 2) is performing the largest naturalistic driving study ever conducted, which will evaluate the causes and consequences of crashes and near-crashes, including those where distracted driving was a factor.
- Our Intellidrive initiative is laying the groundwork for a future highly connected and safe environment for vehicles and our infrastructure.

Livable communities:

- Our partnerships with HUD and EPA help us to develop a research agenda and performance metrics for our livable communities efforts. These should also include safety metrics and research to improve pedestrian and bicyclist safety, which are critical to the advancement of livable communities.
- DOT is evaluating a pilot program in four communities to demonstrate the contributions of non-motorized transportation toward achieving health, environmental, and energy goals.

Environmental sustainability:

- The Federal Railroad Administration (FRA) has partnered with industry to launch fuel cell and bio-diesel locomotives, aiming toward zero emissions. The Federal Transit Administration (FTA) is demonstrating hybrid bus technologies and continues the national Fuel Cell Bus Program.
- ‘Green’ research is being conducted at some of our UTCs. For example, the University of Wisconsin is analyzing consumer adoption and grid impact for plug-in hybrids.
- The FAA is supporting aviation climate research in coordination with NASA and NOAA, and making progress on renewable fuels.

Economic competitiveness:

- The Next Generation Air Transportation System (NextGen) uses 21st century technologies to ensure future safety, capacity and environmental needs are met.
- Through the Small Business Innovation Research (SBIR) program, DOT is stimulating technological innovation. Through topics as varied as crash avoidance monitoring systems for road and rail; green transit; expert systems for traffic signal analysis; and human factors tools for NextGen deployment.
- Economic competitiveness depends on an effective freight transportation system, and data from the Commodity Flow Survey and other BTS programs are important to measuring and advancing that effectiveness.

State of good repair:

- Our expanding research to develop new materials that provide greater durability and reliability, provide enhanced tools for asset condition inspection, and deliver more environmentally-friendly construction techniques.
- The FHWA is sponsoring research on new materials, such as developing high-performance composites to reduce cracking, water penetration, and premature deterioration of structures.

RITA will continue to identify and explore ways to not only enhance research, innovation, and technology but also to pursue rapid and broad dissemination of the knowledge and products being generated as we work collaboratively towards solutions for our transportation system.

Thank you. I look forward to answering your questions.

BIOGRAPHY FOR HON. PETER H. APPEL

**RITA Administrator**

Peter H. Appel was confirmed by the U.S. Senate as Administrator of the Research and Innovative Technology Administration on April 29, 2009. Before joining RITA, Mr. Appel was with the global management consulting firm of A.T. Kearney, Inc. He has led business improvement initiatives for clients in the private and public sectors, with a focus on Transportation and Infrastructure.

Mr. Appel has over 20 years of experience in Transportation, and has supported organizations in the railroad, trucking, airline, and ocean shipping

industries with growth strategy, supply chain improvement, post-merger integration, public-private partnerships, and other key business and policy issues. Previously, he served as the Special Assistant to the Administrator of the Federal Aviation Administration, and as Assistant Director for Pricing and Yield Management at Amtrak. Mr. Appel earned his bachelor’s degree from Brandeis University in Economics and Computer Science with Highest Honors, and received his Master of Science in Transportation from the Massachusetts Institute of Technology.

Chairman WU. Mr. Pedersen.

**STATEMENT OF NEIL J. PEDERSEN, P.E., ADMINISTRATOR,  
MARYLAND STATE HIGHWAY ADMINISTRATION**

Mr. PEDERSEN. Thank you, Mr. Chairman, Ranking Member Smith. It is a pleasure to be here today on behalf of the American Association of State Highway Transportation Officials, otherwise known as AASHTO.

On behalf of AASHTO, I want to express my appreciation for your focus on transportation research needs in the United States.

In my testimony today and in my written testimony, there are four main points that I would like to cover. One, it is critical that we retain the current, multi-tier transportation research structure that has worked very well for us. Number two, U.S. DOT should take the lead in conducting national policy-level research in support of the emphasis areas of the Administration. Current research activities conducted by states, universities and Transportation Research Board can complement and support this research. Third, AASHTO representing state DOTs has identified a number of research needs in each of U.S. DOT's four priority areas that are contained in my written testimony, and I will cover a few examples. And fourth, it is critical to ensure that the discoveries made through the research are communicated and transferred into practice.

First, on our current research structure, there are numerous levels and layers to the current research structure funded by federal, state and local dollars. From ongoing policy research at U.S. DOT, the technical research carried out by the Transportation Research Board and the states to research and training conducted by our universities, there is substantial cooperation, collaboration and communication regarding research. These multi-layered and integrated structures worked well in delivering strategic research that responds to the needs of our transportation industry.

The relatively small amount that we spend on research helps to leverage the rest of the transportation program by providing us with solutions that improve the quality and efficiency of our investments. Thus, in any considerations of future federal transportation research programs, this multi-layered approach should be continued and supplemented.

Second, the secretary has articulated four areas of policy emphasis that we have heard about. It is an appropriate role for the U.S. DOT to undertake strategic research in support of these policy areas. Through the existing multi-layered research structure, others, including TRB in the states can support and complement the strategic research with their own research efforts.

It is also very important that U.S. DOT has the broadest level of flexibility in undertaking research priorities it has identified in support of its policy emphasis areas.

Third, regarding four areas of policy focus, I would like to highlight a few examples of needed research. In the area of safety, key research on understanding the myriad of reasons why crashes occur will be invaluable in our efforts to cut traffic fatalities in half over the next two decades. We also need better evaluation data on effectiveness of countermeasures, particularly those targeted at driver behavioral issues. Ninety-three percent of crashes are estimated to be attributed to driver error.

In the area of sustainability, I will offer the following definition which is a slight modification of one state DOT's definition. Sustainability is the provision of safe, effective and efficient access and mobility into the long-term future while sustaining the long-term economic, social and environmental viability, the so-called triple bottom-line. Sustainability requires that we change our frame of

reference for decisions, to think about their implications 80 to 100 years into the future or even longer.

Research focusing on life cycle costs and long-term environmental impacts and benefits would be very helpful to the state DOTs as we attempt to incorporate sustainability considerations into our everyday decision-making.

Livability is a term that means different things to different people. We consider it to be a critical element of the social component of the triple bottom-line. It is essential that any definition developed for livability be broad enough and flexible enough to reflect the needs of all of our communities from rural to suburban and urban areas. Human behavioral research will assist us in understanding why people choose to live where they do and why they choose to travel the way they do.

In the area of economic competitiveness, AASHTO urges that research focus on defining a national freight transportation system, how to define public benefits of investments and public dollars in privately owned freight facilities, and how to address multi-state planning and investments in the freight system.

Finally, but certainly not least, is the importance of transferring the findings of our research to transportation planners, engineers, designers and contractors. U.S. DOT should embrace the latest methods to assist technology transfer and implementation and be provided with the funding needed to share this information. Web-based technologies including webinars and interactive web pages, on-line training and other mechanisms can ensure that new research ideas get out to practitioners and be implemented more quickly.

We already know that research properly transferred into practice can make a difference in the way Americans and their goods move about the country. State DOTs stand ready to collaborate with you on this crucial effort.

Again, thank you for this opportunity to testify before you today, and I will be happy to answer questions as well.

[The prepared statement of Mr. Pedersen follows:]

PREPARED STATEMENT OF NEIL J. PEDERSEN, P.E.

### **Introduction**

Mr. Chairman and distinguished members of the Committee, my name is Neil Pedersen and I am the Administrator for the Maryland State Highway Administration. I am also the Vice Chair of the Standing Committee on Highways of the American Association of State Highway and Transportation Officials (AASHTO), and I am a registered Professional Engineer in the State of Virginia. On behalf of AASHTO, I want to express my appreciation for your focus on transportation research needs in the United States.

### **Overview of the Current Transportation Research Program in the U.S.**

State transportation agencies share a mission to deliver safe, long-lasting highways and bridges, as well as rail, transit, and maritime facilities, for passengers and freight customers alike. To accomplish this mission, especially in today's fiscally challenging circumstances, state DOTs turn to research for solutions to their toughest problems.

However, by any measure—across industries or countries—the U.S. transportation community invests very modest resources in research and innovation. Nevertheless, we have gained tremendous benefits in terms of lives saved, more durable infrastructure, and improved operations. But we are continually challenged by growing passenger and freight vehicle-miles of travel (VMT), changing demographics of system users, shifting economies, and the anticipated effects of global climate

change. Meeting these challenges will require new and better ways of doing business. It will also require many resources: financial, political, and human. One of our best investments is in research and technology.

As you are likely aware, there are several components to our national transportation research effort that are supported with federal surface transportation funds.

1. The most obvious component is the federal research carried out directly by U.S. DOT, including research directed by the Policy Office, as well as by agencies such as the Federal Highway Administration (FHWA), Federal Transit Administration (FTA), National Highway Traffic Safety Administration (NHTSA), Federal Motor Carrier Safety Administration (FMCSA), Federal Railroad Administration (FRA), and the Research and Innovative Technology Administration (RITA).

2. The second component is research conducted by each State DOT, managed by the individual members of AASHTO's Research Advisory Committee and coordinated with national research programs. The majority of this funding comes from the federally-sponsored State Planning and Research (SPR) program, which will be discussed in more detail later.

3. The third component consists of the various cooperative research programs managed by the Transportation Research Board (TRB), such as the National Highway Cooperative Research Program (NCHRP), Transit Cooperative Research Program (TCRP), the Freight Cooperative Research Program (FCRP), and the Hazmat Cooperative Research Program. Most of these programs determine their research agenda on an annual basis. The largest of these programs—NCHRP—is funded through an annual voluntary contribution of state SPR funds and has been carried out since the early 1960s.

4. A fourth component is policy research carried out by TRB.

5. A fifth component consists of special research authorized by Congress, such as the Strategic Highway Research Program 2 (SHRP2), which is focusing on four critical issues in transportation—safety, infrastructure renewal, travel-time reliability, and capacity needs.

6. A sixth component is the research carried out by the 70 or so University Transportation Research Centers housed in individual universities, or in consortia of universities, across the country.

Each of these components plays a vital role in the overall research effort and, while the efforts are independent, there is considerable collaboration and communication that exists between these research programs to ensure the development of cohesive, complementary, and significant research.

Each program, in its own way, can and will make contributions to the four goals outlined by the Secretary. However, I believe that the research carried out by the federal modal agencies and the U.S. DOT Policy Office would be the logical place to address the four priority areas of safety, environmental sustainability, livable communities, and economic competitiveness, since the research could be conducted under the direction of the Secretary. In addition, research such as this that is more strategic in nature—and on a more national scale—is typically more expensive than can be accomplished by the states on their own; thus, federal leadership is needed.

#### **The Federal Research Program**

Throughout its history, a core element of U.S. DOT's mission has been to promote innovation and improvement in American's transportation system. Over the course of the last few decades, this critical mission element has developed into a broad array of research and technology activities covering the spectrum of advanced research, applied research, technology transfer, and implementation. To maximize the effectiveness of these research and technology (R&T) activities, U.S. DOT also carries out or funds a host of activities necessary to support a vibrant R&T program, including research administration, communication, coordination, conferences, and partnerships with other national and international organizations.

Over the course of the last few authorization cycles, FHWA's R&T funding has been increasingly earmarked and designated until, under SAFETEA-LU, not a single discretionary R&T dollar was left to the agency. Because Congress authorized all the funds for R&T to be spent on particular projects or research areas (often earmarking the funds to particular universities), U.S. DOT was unable to fund a number of mission-related activities that the states depend upon. For example, there was no funding available for policy research, including infrastructure condition assessment; for updates to the Manual of Uniform Traffic Control Devices; for TRB core support; and for a host of other "orphaned programs."

In addition, the lack of flexibility prevents U.S. DOT from responding to changing national needs and crises—for example, the increased need for transportation security since September 11, 2001.

U.S. DOT needs to have the resources to carry out appropriate research to achieve their mission—including the four priority areas of safety, livability, sustainability and economic competitiveness—and the flexibility to carry it out in a responsive manner. The states and others can complement U.S. DOT's research program through the research we are conducting in our ongoing programs.

#### **The States' Research Program**

As I mentioned earlier, one of our best investments has been and continues to be in research and technology. The relatively few dollars we spend on research leverage the rest of the highway program by providing us with solutions that improve the quality and efficiency of diverse agency activities.

For decades, federal-aid funding has been a key resource for research, with the states and federal government jointly investing in innovation. Each state receives federal-aid funding through the State Planning and Research (SPR) program to address the transportation needs that they deem the most critical, including, among others: engineering and economic surveys; planning and financing of future highway programs; studies on the economy, safety, and convenience of surface transportation systems; and research, development, and technology transfer activities. The variety of activities carried out and products produced by this program is crucial to the advancement of the transportation system in our country.

SPR funds are made available to the states by formula and consist of two percent (2%) of each states federal apportionment for the six core highway programs. Since this program is dependent upon the organization of the core programs for its funding, any changes to the current structure could have a tremendous effect on the states' research programs and, subsequently, what can be accomplished.

States are required to expend at least one-fourth of the total SPR funding specifically on research, development, and technology transfer activities, including training. This research component of SPR can include highways, public transportation, and intermodal transportation systems; infrastructure renewal (including pavement, structures and asset management); activities relating to safety, operations and maintenance; environmental and real estate planning; and management, policy analysis, and systems monitoring.

The states' transportation needs and critical issues are unique and constantly changing, and the SPR program affords states the opportunity and flexibility to address those research and technology needs that are most vital to maintaining and improving their transportation systems, including emerging transportation research needs. States give high priority to applied research to address state and regional challenges, to the transfer of technology from researcher to user, and to research that supports the development of standards and specifications.

The State DOTs also collaborate on research projects with other federal, state, regional, and local transportation agencies, academic institutions, foundations, and private firms through the Transportation Pooled Fund program. The Federal Highway Administration administers this program and approves the projects that are selected. The program allows groups to combine resources to support the project, which may consist of research, planning, and/or technology transfer activities.

In addition, states co-fund the National Cooperative Highway Research Program through the Transportation Research Board of the National Academy of Sciences. Support for this program is voluntary and funds are drawn from the states' SPR funds. Projects are selected annually by the AASHTO Standing Committee on Research, and the funds can be spent only for research projects approved by at least two-thirds of the states. Each states allocation amounts to 5½ percent of its SPR apportionment.

As noted above, the States' research efforts are decentralized, with priorities determined by experts in their fields, i.e., the stakeholder and user groups who deal directly with transportation issues day-in and day-out. Its flexibility allows the states to deal with new and emerging needs that bubble up from those on the front lines of the transportation industry. Research can be conducted by a single state, pooled among several states with a common need or concern, or conducted through a national program such as NCHRP.

Frequently, key research efforts start in one or more states—through the SPR program—and other states and/or U.S. DOT expand upon that research and it becomes more national in perspective. Advanced searchable databases such as the Transportation Research Information Service (TRIS) and the Research in Progress (RIP) database help to ensure that overlap and redundancy do not occur by allowing researchers to determine what has been accomplished thus far and what may be un-



derway related to their topic of interest. This decentralized organization of research programs has been working well for many years and should be continued in its present form to ensure that ongoing research continues and that the flexibility exists to meet new demands.

### **Technology Transfer and Implementation**

The final, and possibly most important, steps in the research process consist of technology transfer and implementation. Technology transfer and implementation can be explained best by a fishing analogy: technology transfer provides the information on what pole to buy and where to find the lures; implementation involves showing someone how to fish.

Research is useless if it sits on a shelf. Thus, the need for effective and continual technology transfer and implementation cannot be overemphasized. For most people, and by extension most agencies, change is difficult. New ideas may get nods of approval but may not get implemented without assistance, such as champions to get the ball rolling, presentations and webinars to get the message out, and pilot projects to show practitioners how the new ideas can be incorporated into the current business model.

Programs such as the Local Technical Assistance Program, which provides information and training to local governments and agencies across the country; the National Highway Institute and National Transit Institute, which provide training, education, and information clearinghouse services; and the National Transportation Library, which maintains a robust transportation knowledge base for researchers and practitioners; provide critical assistance in ensuring that research becomes reality.

### **Research Needs Within U.S. DOT's Four Priority Areas**

It is important to note that the potential scope of the research that could be done in each of the four priority areas is immense. To be effective, U.S. DOT needs to coordinate efforts with the transportation community to ensure that their research agenda is focused on the facets of these four goals that they consider the most urgent priorities, and that the various research programs complement, as opposed to overlap, each other.

#### *Safety*

For safety, we know what the goal is—reducing deaths and injuries on our nation's transportation system—but we do not necessarily know how effective we have been in achieving that goal because we don't have much-needed data to tell us what works and what doesn't. Data is an extremely important part of the research effort that is often overlooked, but research is only as good as the data it is based upon. Some individual states, such as Iowa, have extensive safety databases, but to address key national challenges, we need more national-level data beyond what is currently available.

Key safety research needs are focused on developing a better understanding of the factors contributing to crashes, developing new strategies for addressing highway safety, and evaluating the effectiveness of strategies currently in use. Examples include the following:

- **Understanding Crash Causation.** Human factors play a part in the occurrence of crashes and need to be better understood in order to develop appropriate countermeasures. Two specific contributing factors for which additional research is needed are distracted driving and drugged driving. While distracted driving has received significant attention recently and is a growing highway safety concern, some of the details are not clear. In the instance of cell phone use, for example, it has not been shown that there is less risk associated with hands-free use than with hands-on use. Also, drunk driving has been studied extensively, but additional information is needed on driving under the influence of drugs. A recent NHTSA report showed that 16 percent of nighttime drivers in a roadside survey tested positive for one of a variety of legal or illegal drugs. Since drugs are absorbed by and act on the body differently from alcohol, additional research is needed to determine which drugs impair driving, and the dosage levels that are associated with impaired driving and a higher crash risk.
- **Countermeasure Development.** New and promising strategies are needed to address highway safety from the engineering, enforcement, education, and emergency medical response perspectives. Reducing roadway departure and vehicle collisions, improving the effectiveness of enforcement activities, strengthening public information campaigns, and reducing emergency response times will contribute to the reduction of highway fatalities. New coun-

countermeasures could include infrastructure improvements related to better signing and marking, work zone safety improvements, and median barrier improvements; vehicle technologies such as crash avoidance, rollover avoidance, and occupant protection; and communication technologies that allow vehicle-to-vehicle and vehicle-to-infrastructure communication as well as automated communication of crashes to emergency responders.

- **Evaluation.** State, local, and federal agencies with responsibilities for addressing highway safety are continuously implementing strategies and programs, but additional information on the effectiveness of these countermeasures is needed to enable highway agencies to better direct their limited funds. The National Cooperative Highway Research Program (NCHRP) has published a series of over 20 guides that provide detailed information on a wide range of highway safety strategies, but the effectiveness of many of these infrastructure and driver behavioral strategies is unknown. The effectiveness of behavioral programs, such as public information and education campaigns, is especially difficult to evaluate, and methodologies for performing these evaluations need to be developed. Legislation, such as handheld cell phone bans and ignition interlock requirements for first time drunk/drugged driving offenders, need to be evaluated for effectiveness in changing the behaviors—in the short and long term—that are contributing to serious crashes.
- **Data and Data Collection Technologies.** Without comprehensive and high quality data, it is difficult to determine the nature of our highway safety problems, where the problems are, how to best to treat the problems, and how successful treatments have been. Extensive roadway networks, interaction of and communication between the various highway agencies with jurisdiction in the states, and limited resources for collecting data are the main challenges related to obtaining data for highway safety analyses. With the increased focus on new highway safety analysis tools and on the need for measuring performance, data are constantly becoming more of a limitation and data improvements are becoming more of a crucial need. Technologies are needed that automate data collection on all public roads, including lesser traveled and rural roads, and to significantly reduce the time needed to transfer data to a database and make it available to users.

### **Environmentally Sustainable Transportation/Sustainability**

Sustainability means different things to different people. One State DOT defines sustainable transportation as “the provision of safe, effective, and efficient access and mobility into the future while considering the economic, social, and environmental needs of society.” The transportation network must meet the needs of a growing population and an expanding economy while simultaneously reducing the environmental footprint of the system.

Sustainability has also been defined as:

- An overarching conceptual framework that describes a desirable, healthy, and dynamic balance between human and natural systems.
- A system of policies, beliefs, and best practices that will protect the diversity and richness of the planet’s ecosystems, foster economic vitality and opportunity, and create a high quality of life for people.
- A vision describing a future that anyone would want to inhabit.

Central to these definitions is sustainability’s applicability to three elements of life: economic and/or financial considerations, environmental protection and stewardship, and community and individual human well-being—the “triple bottom line” of sustainability. This means improving the economic and social quality of life while limiting impacts on the environment. In this framework, ideal solutions to any type of challenge will generate long-term benefits in all three areas.

Today, the transportation sector’s mission goes beyond ensuring mobility to achieving the larger societal goal of economic, social, and environmental sustainability. Approaches such as context sensitive solutions and integrated planning provide transportation agencies with the tools to consider economic, social, and environmental factors as they develop transportation solutions. A few examples of research that will help us achieve the goal of a sustainable transportation system include the following:

- **Life Cycle Cost Analysis Techniques.** New and enhanced economic tools hold the promise of helping transportation agencies choose the most cost-effective project alternatives and communicate the value of those choices to the

public. These agencies could benefit from the identification, development and enhancement of life cycle cost methods to estimate and evaluate the full costs of transportation investments over a long period of time such as 80 to 100 years.

- **Long Term Environmental Impacts and Benefits.** Related to life cycle cost analyses, evaluation of transportation alternatives could be enhanced with additional information and research regarding long term impacts (beyond 20 years) and benefits of various transportation investments and strategies.
- **Transportation Pricing.** Proponents promise that pricing can deliver smarter use of existing capacity, reduce congestion, and avoid costly expansion needs while expanding the menu of options for raising money to pay for system preservation and capacity improvements. Research is needed to objectively evaluate the case for economic, environmental, and social sustainability benefits of road pricing—in other words, what level of fees would be required to alter driver behavior and generate substantive benefits from an environmental, economic, and social context.
- **New Structural Systems.** The use of “greener” structural systems to meet environmental stewardship objectives is an intriguing possibility. Materials such as recycled steel, or concrete with recycled aggregated and other recycled materials to replace the cement, could be used to meet the objectives of using recycled materials and reducing carbon emissions. In addition, using composite structural components (such as concrete filled tubes or walls) to replace traditional structural steel or reinforced concrete components greatly reduces the labor and material needed, thereby meeting the objective of accelerated bridge construction that is so important in today’s marketplace. A research program investigating the use of these components in highway construction would require experimental testing of the material, components, and connections. The experimental results could be used to develop robust design methods, and analytical modeling would be required to develop engineering expressions appropriate for bridge designers. Finally, a complementary life-cycle assessment would be required.
- **Management Tools.** Many existing tools might also be applied to help determine or enhance the “sustainability” of a project or program. For example, life-cycle analysis could be used as a tool to assess long-term sustainability; optimization could be used to assess and balance trade-offs for maximizing sustainability; and infrastructure preservation and asset management strategies could be applied to promote longer-life facilities, which is an important aspect of sustainable transportation.
- **Climate Change and Adaptation.** The threats that climate change may pose to transportation systems, including for example, flooding, changes in average temperatures, and extreme weather events, are well documented. The impacts on transportation systems may include, for example, accelerated pavement deterioration; flooded roadways; bridge damage; increased maintenance; and increased storm water and drainage issues. Research to assist state transportation agencies in planning for adaptation and to assist in the states’ developing guidelines for design, construction and maintenance is necessary.

#### *Livable Communities/Livability*

Livability is another term that means different things to different people. For AASHTO, the notion of livable communities consists of more than development patterns and promoting non-motorized transportation—it is a broader idea that includes providing mobility and access to opportunities and social services. Livability can be thought of as the “social” aspect of AASHTO’s definition of “sustainability.”

In addition, there appears to be a strong correlation between the idea of fostering a “livable community” and the transportation project development process known as Context Sensitive Solutions, or CSS. CSS is a process for developing transportation solutions *by* and *for* communities, where the community itself defines what is needed to solve its transportation challenges. Individual communities define what is a “livable community” to them by developing a vision and goals for their future, and then the community-defined vision and goals drive the appropriate transportation solutions.

Washington State DOT is one transportation agency that has developed a Livable Communities Policy. Their model suggests that a balance of the three key societal goals leads to livability: a vibrant community, a vital economy, and a sustainable

environment. The two desirable outcomes from the Washington State Transportation Plan that they feel will indicate that they are contributing to the goal of fostering livable communities are “effective community-based design” and “collaborative decision making.”

States such as Oregon, Maryland, and Florida have also incorporated “livability” into their transportation policies. Their general “livability” policy themes include: (1) encouraging balanced transportation systems to assure mobility through a mixture of modal choices, especially at the community and neighborhood level; (2) facilitating locally driven community-based and partnership-based projects; and (3) identifying funding sources that transportation partners can use to enhance livable communities.

As indicated by the local involvement promoted within these examples, it is clear that a single livability solution does not fit all situations. The differences between rural, urban, and suburban needs, as well as differences between neighborhoods, need to be accounted for individually. Research in this area needs to acknowledge that what constitutes a “livable community” in one part of the country—for example, a high-density northeastern urban area—may be very different from what is considered “livable” in another area—such as a rural southwestern community. Any definition of livable communities that is developed needs to be broad enough to encompass the variety of desires within our nation’s communities, and also needs to acknowledge the roles and responsibilities of the local community in making land use decisions, which contribute to the livability of the community and the transportation needs that emerge from those decisions.

Thus, research in the area of livable communities as it relates to the transportation system could cover a wide spectrum of topics, including:

- **Public Policy Studies.** Land use and transportation are inextricably tied together in the discussion on livable communities, which adds to the complexity of achieving success. Multiple levels of government with competing objectives can conspire to undo the good that each has accomplished, such as when a municipality allows unrestricted access along an arterial facility meant to move traffic, thus necessitating the construction of another facility to achieve the initial objective. Research can help determine such things as: how to encourage infill development in downtowns and inner suburbs (which would also lead to reduced congestion and increased capacity); what is the appropriate use of mixed-use, transit-oriented development; and what modal shifts can be achieved through the use of parking design, policy, and pricing.
- **Human Behavioral Research.** How people respond when given a multitude of options is an area of continual evolution and transformation. The American Dream for most of the country is still the single-family house with the two-car garage. Additional research is needed to investigate the values people hold near-and-dear to their hearts and determine how they make decisions regarding where they live and how they travel.
- **Hard-side Engineering Research.** In addition to public policy and behavioral research, engineers need tools to help ensure that the reality lives up to expectation and that the infrastructure they design and construct produces the intended results. Turning abstract thoughts into a reality is a tremendous challenge, and some of the tools planners and engineers will need include: guidance on street and transit designs that contribute to biking, walking, and the success of transit service; model policies for land use and transportation interactions that encourage local trips to be made on local streets, thus preserving capacity on arterials for longer-distance trips; and best practices for incorporating community-based design into the transportation planning and design process.

#### *Economic Competitiveness*

One important thing to note is that these priority areas are not mutually exclusive. There are research needs specifically related to economic competitiveness, but there are others that are directly connected with the priority areas of sustainability, livability, and safety.

The range of projects underway as part of the National Cooperative Freight Research Program (NCFRP) at the Transportation Research Board demonstrates the interrelation between these areas. NCFRP was established through SAFETEA-LU to develop a “national research agenda addressing freight transportation and for implementation of a multi-year strategic plan to achieve it.” Projects currently underway that relate to the other priority areas include:

- *Representing Freight in Air Quality and Greenhouse Gas Models (Sustainability)*
- *Promoting Environmental Goals in Freight Transportation through Industry Benchmarking (Sustainability)*
- *Separation of Vehicles—CMV Only Lanes (Safety)*
- *Understanding Urban Goods Movements (Livability)*
- *Truck Idling Scoping Study (Livability)*

Projects focused more specifically on Economic Competitiveness include:

- *Freight-Demand Modeling to Support Public-Sector Decision Making*
- *Identifying and Using Low-Cost and Quickly Implementable Ways to Address Freight-System Mobility Constraints*
- *Framework and Tools for Estimating Benefits of Specific Freight Network Investment Needs*

AASHTO has developed recommendations for the next surface transportation authorization that support continuation and increased funding for the NCFRP. These AASHTO proposals also include freight policy and program recommendations that need additional research as a foundation for effective implementation. AASHTO's proposals are consistent with those made by the Freight Stakeholders Coalition, which is comprised of the national associations representing the major elements of the freight transportation industry, including both carriers and shippers.

The following are several research priorities related to AASHTO's authorization recommendations that are important for transportation's contribution to economic competitiveness:

- **Defining the National Freight Transportation System.** There is consensus, but not unanimity, on the importance of investing in the national freight transportation system in support of economic competitiveness. Unfortunately, there is not consensus on a definition or description of that system as a guide for productive investment. We must have a firm foundation of research and analysis to guide a freight investment program that is intended to generate economic competitiveness benefits for the nation.
- **Freight Chokepoints.** We know the freight chokepoints on the interstate system that are the most costly. However, we do not know how to translate that into a program of improvements that results in improved system performance that is feasible and cost effective.
- **Calculating Public Benefits.** It is important to justify all public investments made in transportation in terms of public benefits. It is especially important for freight transportation investments where there may be private profit on the same balance sheet and where we want to document regional and national benefits, as well as local. Currently there is no standard, widely-accepted approach for doing this.
- **Measuring Performance.** Knowing where to invest and whether or not the investment has been productive requires performance measurement. What you can't measure, you can't manage. AASHTO has invested considerable effort to advance this objective, but more analysis is required to know not only what the appropriate measures are, but how to apply them for policy, program, and project purposes.
- **Financing.** At present we do not have the funding necessary to simply maintain our core freight transportation systems. We will not get that funding from the traditional sources. We need to figure out how to generate new revenues for this purpose—directly or indirectly—from the beneficiaries of freight improvements that do not have adverse consequences for specific industries, modes, or regions.
- **Multi-State Planning and Investment.** Freight moves across state lines, but for the most part our processes for planning and financing do not. There are projects important for economic competitiveness for which benefits are widespread but costs are concentrated. These projects cannot be realized, without immense effort, because our institutions or planning and financing are not organized for this purpose. We need to know how to build on the strength of our existing institutions to develop mechanisms for doing these projects.

Without research in these areas, we cannot hope to have a transportation program that meets the nation's economic competitiveness needs.

There is another important category of research that often gets lost in the high-level policy, sometimes abstract, discussions related economic competitiveness. This research is related to simply making sure that the condition, performance, and capacity of the basic transportation systems are adequate to meet the need. Virtually all freight moves on systems that are shared with passengers—road, rail, and water. Continuing research that addresses basic elements of these systems is essential.

And, even more specifically, there are many operational objectives for State DOTs that are important for economic competitiveness for which we do not currently have well-grounded standard practices. These include:

- Incorporating freight factors into the project selection process
- Assessing the adequacy of secondary freight routes for large truck traffic
- Experience with highway improvements to support intermodal terminals
- Guidelines for adequacy of connector roads to seaports
- Translating highway engineering and construction experience into the rail arena
- Engineering issues related to truck-only lanes
- Procedures for managing a rail-crossing program to maximize efficiency on rail and road
- Standardizing bridge analysis among the states relative to vehicle weight

### **Summary of Recommendations**

As you know, the focus of U.S. DOT's programs shifts over time as administrations change and new secretaries take charge. This shift in focus is necessary and advantageous as the agency realigns itself with the emerging challenges in the transportation arena.

Thus, to pursue the four additional priority areas that the Secretary has proposed, AASHTO recommends that the Secretary first align U.S. DOT's research program to focus in these areas. The States can then help U.S. DOT achieve its vision by determining where there are opportunities within our research programs to complement these focus areas. For example, an existing research effort that could contribute to the sustainability focus area is the climate change mitigation and adaptation research that is ongoing.

We also recommend expanding the total funding for research so that additional complementary research can be accomplished. As discussed in AASHTO's Authorization Recommendations, U.S. DOT must have sufficient, flexible funding to carry out its core program in support of its national mission in research and technology. If Congress chooses to authorize additional research programs of a national priority, these should be funded over and above the core funding for the R&T program, which we recommend at \$200 million per year for FHWA. Strategic national R&T programs, such as SHRP 2 and cooperative research programs, should also be funded over and above the core R&T program.

Within that funding, the full range of R&T activities comprising the innovation cycle need to be eligible, including advanced research, applied research, technology transfer, research administration, communication and coordination, international outreach, and other R&T support activities. The support of ongoing training, data, and knowledge-related activities, such as the Bureau of Transportation Statistics, the National Highway Institute, the Local Technical Assistance Program, the National Transportation Library, and others, increases the overall effectiveness of core R&T activities.

A critical part of the research equation that is sometimes overlooked is the transfer of information to transportation planners, engineers, designers, and contractors who can actually implement the results. AASHTO recommends that U.S. DOT be provided with needed funding to invest in the further development and increased use of web-based technologies, such as webinars, interactive web pages, online training, and discussion forums, to ensure that information and education on new research ideas gets out to practitioners in the field where it can be deployed more quickly than with traditional technology transfer methods, such as brochures and presentations.

Finally, we strongly recommend against earmarking existing research funding, such as SPR, specifically to the four priority areas, as this will shortchange our ongoing research efforts in areas such as structures, pavements, planning, environment, policy, operations, safety, and research and innovation support.

### **Conclusion**

Ultimately, AASHTO cannot stress enough the importance of research implementation, transfer of research into practice, and technology transfer. Multiple and var-

ied efforts are underway to move research into practice, and the variety of methods to do this are dependent on the actual results and specific solutions.

To use a potentially overused phrase, "it takes a village" to accomplish all of the research objectives within transportation, including developing the data, establishing the needs, conducting the research, sharing the results, and implementing the best ideas. And through coordination and collaboration, leveraging time and money, utilizing the combined knowledge and expertise, our village is making significant contributions to the advancement of our nation's transportation system.

#### BIOGRAPHY FOR NEIL J. PEDERSEN, P.E.

Administrator of the Maryland State Highway Administration since January 2003, Neil J. Pedersen is responsible for an agency that maintains and operates nearly 17,000 lane miles of roadway and 2,500 bridges; employs more than 3,200 professionals in a variety of disciplines; and is responsible for an annual budget of \$1.7 billion. In that position, he also serves as the Governor's Highway Safety Representative and Chair of the Maryland State Roads Commission. A registered professional engineer, he previously served for two and a half years as SHA's Deputy Administrator/Chief Engineer for Planning and Engineering—a position that oversees all of the agency's planning, design, environmental, and real estate functions. Prior to that, he was SHA's Director of Planning and Preliminary Engineering for 16 years. Mr. Pedersen led SHA in the delivery of two mega projects: the \$2.4 billion Woodrow Wilson Bridge, which is nearing completion, and the \$2.5 billion Inter-county Connector, which has begun construction.

Mr. Pedersen believes in working with other transportation professionals to advance the practice of both engineering and, public administration. His involvement with the American Association of State Highway and Transportation Officials includes being Vice Chair of the Standing Committee on Highways, being a member of the Standing Committees on Research; and being on its Board of Advisors for the Center on Environmental Excellence. He is also a member of the Executive Committee of the Transportation Research Board and chairs the Executive Committee of the I-95 Corridor Coalition, a consortium of transportation organizations from sixteen states along the eastern seaboard. He also serves on the Board of Visitors of the University of Maryland's Department of Civil and Environmental Engineering.

Mr. Pedersen has received numerous awards for his service, including most recently the 2007 Thomas H. MacDonald Memorial award from AASHTO and the 2006 George S. Bartlett award, which is given by the Transportation Research Board, AASHTO and ARTBA.

A native of Massachusetts, Mr. Pedersen holds two undergraduate degrees from Bucknell University and a Master's degree in Civil Engineering from Northwestern University. He lives in Silver Spring, Maryland with his wife, Barbara.

Chairman WU. Thank you, Mr. Pedersen. Ms. Flemer, please proceed.

#### **STATEMENT OF ANN FLEMER, DEPUTY EXECUTIVE DIRECTOR, POLICY, METROPOLITAN TRANSPORTATION COMMISSION (MTC)**

Ms. FLEMER. Good morning. Chairman Wu, Ranking Member Smith, and distinguished Members of the Subcommittee, I am honored to be here today. My name is Ann Flemer. I am the Deputy Executive Director for Policy at the Metropolitan Transportation Commission which is a metropolitan planning organization for the San Francisco Bay Area. I also serve as the board chair of the ITS America which is an association of public- and private-sector entities that are brought together by a common vision for advancing, development and deployment of intelligent transportation systems to improve safety, mobility and the environment.

You are all very well aware of the challenges facing our Nation's transportation system. In past decades we focused on building infrastructure to alleviate the increasing traffic in our communities, but today we need to utilize that infrastructure more effectively and make better use of technologies to actively manage our trans-

portation system, both to reduce congestion and emissions, make our roads safer, and provide the traveling public with better transportation options.

At ITS America we believe the key to a sustainable transportation future lies in transitioning into a more performance-based approach to managing our transportation investments, including better use of technology to measure and improve system performance.

We also believe that national performance goals can and should be established to encourage states and MPOs [Metropolitan Planning Organizations] to set the short- and long-range, mode-neutral performance targets for transportation investments.

So our first recommendation is that the U.S. DOT identify a set of performance measures related to the four priority strategic goals of safety, livable communities, economic competitiveness and environmental sustainability. This would include the difficult task of reaching consensus on appropriate national performance goals but as well an effective process for measuring progress toward these goals at the state and metropolitan level.

By way of an example, I have included in my testimony a list of specific performance measures that my agency has most recently used in the development of our long-range plan.

The second recommendation for priority for the research agenda is to address the challenge of collecting quality data needed to establish baseline performance levels to set meaningful performance targets and to measure changes in performance over time. There are technologies already being used today to collect real-time data, but these technologies are not typically deployed consistently on a state-by-state or a metro-by-metro area basis. And there is no national program for gathering and disseminating this data in a form that is useful to the practitioners. Such a system was authorized in Section 1201 of SAFETEA-LU [Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users] but has yet to be implemented.

The third priority for the U.S. DOT research program should be to identify and if possible quantify the environmental benefits of developing and deploying the transportation strategies and technologies that can cost-effectively reduce greenhouse gas emissions. The Department should broadly disseminate research and data to state and local agencies on how to accurately measure emission levels and the costs, benefits, challenges and best practices associated with deploying technologies to achieve an absolute reduction in emissions and fuel consumption.

The fourth area of research would be to implement a two-pronged strategy that both encourages more rapid deployment of existing transportation technologies that can improve safety in driver awareness, reduce the number and severity of traffic crashes and improve emergency response. But that should happen at the same time as we accelerate efforts to advance the research and development of future safety solutions that are well within reach. The U.S. DOT-sponsored IntelliDrive program does hold significant promise for reducing traffic accidents by providing high-speed wireless connectivity and sensing capability between moving vehicles and between vehicles, intersections and other roadside sensors.



A significant co-benefit of that work is that this smart network would also provide traffic managers with real-time information to operate their systems more efficiently, also give state and local officials comprehensive data to measure system performance, and enable innovative financing options should we move in that direction as a Nation.

The ITS JPO [Joint Program Office] has provided tremendous leadership in the development and testing of IntelliDrive technologies and now proposes to conduct the policy, institutional and operational research necessary to accelerate its deployment. We think the federal research program should provide sufficient resources to complete this work.

In order to advance the real-world deployment of transportation technologies and encourage more aggressive investment by the public and private sectors, we do recommend that there be a large-scale testing and model deployment program focusing on smart cities and communities. This would have the dual purpose of providing the public with tangible safety, mobility, and environmental benefits while also generating real-world data on costs, benefits, challenges and lessons learned. Each model city or community would establish clear multi-modal performance objectives and provide real-time information to travelers for smart travel decisions. It would also define performance measures and rigorous data collection and analysis methodologies in order to report out their results.

I note that an approach similar to this has provided the foundation for the widespread implementation of the 511 Traveler Information System throughout the country.

And finally, in conjunction with the smart cities and communities initiative, at least one city or community should include a test of user fee-based pricing programs that could vary by time of day, by zone, by congestion levels and other factors that would be interoperable with other tolling, pricing and transportation systems. This conduct of complementary research and development program would help address challenges associated with any deployment of a user fee-pricing system. Specific additional recommendations are included in my written testimony.

I thank you for inviting me to join you today, and I will be happy to answer questions.

[The prepared statement of Ms. Flemer follows:]

PREPARED STATEMENT OF ANN FLEMER

Chairman Wu, Ranking Member Smith, and distinguished Members of the Subcommittee, I am honored to join you today to examine the role of research and development in supporting the priorities of the U.S. Department of Transportation (DOT).

My name is Ann Flemer, and I am Deputy Executive Director for Policy at the Metropolitan Transportation Commission (MTC). MTC is the metropolitan planning organization for the San Francisco Bay Area, which includes the cities of San Francisco, San Jose and Oakland. With a combined population of 7.3 million people residing in 101 cities and 9 counties, the Bay Area ranks as the 6th-largest metropolitan area in the United States. Our region's \$487-billion economy has long benefited from the technological leadership of Silicon Valley; if the Bay Area were its own nation, we would rank as the world's 22nd-largest economy.

MTC allocates more than \$1 billion a year to help fund the operation, maintenance and expansion of the Bay Area's diverse transportation system. MTC also serves as the Bay Area Toll Authority (BATA), which is responsible for allocating

all toll revenue from the seven state-owned toll bridges that span the Bay. BATA has issued over \$5 billion in toll revenue bonds to finance bridge, highway and transit construction projects.

I also serve as vice chair of the board of directors at the Intelligent Transportation Society of America (ITS America). ITS America is a 501(c)(3) nonprofit association which represents several hundred member organizations—including state and local transportation, transit and planning agencies, research institutions, and private sector firms from the automotive, transit and commercial vehicle sectors to information and communications technology manufacturers and providers—who are all working to advance the development and deployment of intelligent transportation systems to improve safety, mobility and the environment.

### **The Challenges**

When President Eisenhower launched the Interstate Highway System in 1956, he opened up a new era of commerce and mobility that enabled rapid economic expansion and solidified our nation as the land of opportunity and prosperity.

But today, that opportunity and prosperity are at risk. Traffic is grinding our communities to a halt for hours each day, stifling commerce, polluting our environment, wasting fuel and taking away precious time that we could be spending with family and friends. The economic cost of congestion in our major metro areas exceeds \$87 billion per year, including 4.2 billion hours of delay and 2.8 billion gallons of wasted fuel. Some estimates place the total cost closer to \$200 billion. And who can put a price tag on the personal toll to our families and our quality of life from spending a full work week sitting in traffic each year?

Before the day is over more than 100 people will die in traffic crashes, the equivalent of five fully-loaded 737 airplanes crashing every week. The human tragedy of this epidemic is beyond calculation, but we know that the economic cost alone from traffic fatalities and injuries exceeds \$230 billion each year. The combined cost of traffic crashes and congested roadways—which leads to many of these accidents—totals more than \$1 billion per day!

In addition, the transportation sector contributes nearly a third of our nation's human-caused CO<sub>2</sub> emissions and generates other pollutants that harm health and quality of life in cities and communities across the country. This is a growing problem that cannot be ignored.

In past decades we built more transportation infrastructure to alleviate the increasing traffic in our communities. But today, with budget shortfalls, a shrinking Highway Trust Fund, limited room for additional roads and bridges, and growing public demand for cleaner and more convenient transportation alternatives, we can no longer simply continue to build our way into a cleaner, safer and more efficient transportation future.

Today, we need to utilize our existing capacity more effectively and make better use of smart technologies to actively manage our transportation system to reduce congestion and emissions, make our roads safer, and provide the traveling public with better transportation options. The good news is that with bold policies, new technologies and smart investments, we can overcome these challenges. But this will not happen if we continue business as usual.

### **Performance-Based Planning and Investment**

The key to a sustainable transportation future lies in transitioning to a more aggressive, performance-based approach to managing and investing in our transportation system, including better use of intelligent transportation systems (ITS) that are vital for measuring and improving system performance and reducing traffic congestion, emissions, and vehicle fatalities and injuries. We are excited that your committee has taken a strong interest in advancing research and technology programs to help make these goals a reality.

### **San Francisco Bay Area—A Performance Management Case Study**

In the San Francisco Bay Area, at the Metropolitan Transportation Commission, we have several years' experience in performance-based planning and in deploying intelligent technologies to improve system management and performance. (See Attachment A: T-2035 Performance Assessment) Simply stated, a performance-based planning approach focuses on the measurable outcomes of potential investments and the degree to which they support stated policies. It provides a decision support tool to evaluate both transportation policies and investments relative to desired outcomes. Performance-based planning is systematic and analytic in that it:

- expresses policy in terms of quantifiable objectives;
- relies on analytic methods to predict the impacts of different types of investments on system performance;

- sets up an analytic framework for periodic monitoring of system performance; and
- assesses performance trends and provides the opportunity to make adjustments in either the performance measure or the investment priority when needed.

Using this process, MTC evaluated the cost-effectiveness of potential investments with respect to specific performance objectives and measured the degree to which our financially constrained program of investments contributed toward these objectives in our long-range transportation plan. The key was to focus on specific quantitative and qualitative measures that were readily understandable to the public, were able to be evaluated using reasonably available data, and provided a baseline for continuous and accurate measurement over time. Our experience may be useful to the U.S. DOT's efforts to achieve national strategic goals of safety, livable communities, economic competitiveness, and environmentally sustainable transportation.

#### **Federal Research Priority: Establish National Performance Goals and Measures**

At ITS America, we believe that national performance goals can and should be established that align state and metropolitan planning, and that the U.S. DOT should support a state and metropolitan performance management process that sets short- and long-range mode-neutral performance targets for transportation programs. Based on our work in the San Francisco Bay Area, Attachment A sets forth possible measures that the U.S. DOT could use to further define a research agenda related to measuring the performance of the nation's transportation system related to safety, efficient freight movement, metropolitan mobility and congestion relief, transportation asset management, environmental quality and energy conservation.

However, establishing performance goals and measures is easier said than done, which is why the federal research program is so important. The first challenge is to reach consensus on appropriate national performance goals and an effective process for measuring progress toward these goals at the state and metropolitan level.

#### **Federal Research Priority: Cost-Effective Data Collection**

The second and perhaps more difficult challenge is in collecting the uniform, accurate and userfriendly data needed to establish baseline performance levels, set meaningful performance targets, and measure changes in performance categories over time. Intelligent transportation systems—including fixed sensors, GPS-enabled devices such as cell phones and navigational systems, electronic toll tags, cameras, and vehicle probe data—are being used today to collect real-time data to determine congestion levels, average speeds and travel times, incident duration, and other environmental, mobility and safety measures. But these technologies are not typically deployed consistently on a state-by-state and metro-by-metro basis, and there is no national program for gathering system performance data from agencies that have available data or to assist other state and local agencies to collect data that does not exist today.

Programs like the Research and Innovative Technology Administration's (RITA) *SafeTrip-21* partnerships with Caltrans and the I-95 Corridor Coalition are leveraging private sector innovation to provide real-time information along parts of the east and west coasts. But to be effective on a nationwide scale, the U.S. DOT needs to determine how best to gather the data through a robust real-time information system that would provide uniform data by which to measure and monitor the performance of the entire multimodal transportation network. Such a system was authorized in Section 1201 of SAFETEA-LU, but has yet to be implemented.

The same technologies that are needed to gather performance data are already in use today. The private sector and state and local agencies currently gather real-time information to better manage their transportation networks to reduce traffic delays, improve commercial transport, reduce emissions and fuel consumption, improve incident response, and provide the public with timely information about traffic conditions and transportation alternatives. But we are missing the opportunity to capture this real-time data and process it for use in long range planning, for more informed policy and investment decisions, as well as by the general public.

One option to ensure data uniformity and reduce costs that is well-suited to the U.S. DOT research agenda would be to create a National Surface Transportation Performance Service, in partnership with public and private sector data providers, from which state and local agencies, private companies, and the public could access national, state, regional or local system performance data based on their specific needs. The technologies are here today, but we need national leadership if we hope to create a performance-based transportation system.

As U.S. DOT considers performance measures, a key priority of the transportation research program should be to provide guidance about what performance objectives are measurable and achievable based on the state of the art in data collection techniques, as well as technologies and strategies that can be used to improve system management and performance. Maximum consultation among stakeholders and the private sector will be necessary. The research program should also partner with state and local agencies and private sector leaders to develop standards for real-time data collection that will promote uniformity and ensure that the data meets the needs of state, regional and local officials in both urban and rural areas. The program should make the data publicly accessible, which will unleash private sector innovation to meet the public's demand for better and more convenient real-time information on traffic, transit and roadway conditions, as well as their demands for more accountability in long-range planning and decisions affecting investment priorities.

#### **Federal Research Priority: Environmental Data and Technologies**

The U.S. transportation sector contributes an estimated 28 percent of our nation's carbon dioxide emissions. Strategies for reducing greenhouse gas (GHG) emissions from the transportation sector are often thought of as a "three-legged stool": (1) improving the fuel economy of vehicles; (2) reducing the carbon content in fuels, e.g., the reformulated fuel standards and alternative fuels; and (3) improving the efficiency of the transportation system, which includes maximizing system operations, facilitating mode shifts (i.e., increased transit options), changing driver behavior, and system planning. Intelligent transportation systems, which are part of the third leg of the stool, can play a significant role in reducing emissions in the near term because they can be deployed more quickly, and can help improve the efficiency and mobility of the transportation system, thereby reducing fuel consumption and GHG emissions. Deployment of transportation technologies may also strengthen the second leg of the stool by supporting creation of the infrastructure for alternative energy sources, such as plug-in hybrids or hydrogen fuels.

As state and local governments—either of their own initiative or in response to federal policy changes—work to establish environmental performance goals and achieve greater efficiency improvements and emissions reductions, a key priority for the federal research program should be to identify and, if possible, quantify the environmental benefits of developing and broadly deploying a suite of transportation technologies that help reduce GHG emissions through efficiency gains in system operations, reductions in vehicle miles traveled, and/or use of alternative, cleaner fuels. The Department should broadly disseminate research and data to state and local agencies on technologies and strategies for measuring emissions levels and other environmental performance metrics, as well as research and data on the costs, benefits, challenges and best practices associated with deploying and operating technologies and strategies to improve system efficiency and reduce emissions and fuel consumption.

ITS technologies like synchronized and adaptive traffic signals, smart transit and parking systems, active traffic management systems, electronic toll collection, weigh-in-motion truck inspections, GPS-enabled devices, and real-time traffic and transit information are creating new opportunities for state and local officials and the public to reduce their environmental footprint. In addition to a recommended toolkit of technologies and strategies that have proven effective at both measuring environmental performance and achieving efficiency improvements, state and local officials would benefit from readily accessible guidance on how to effectively deploy, operate and maintain these systems to achieve optimal results. The program should also encourage multimodal and multijurisdictional cooperation to meet system performance goals and create more livable, sustainable communities.

#### **Federal Research Priority: Advancing Existing and Next Generation Safety Technologies**

Traffic accidents take the lives of nearly 40,000 Americans each year, leave more than 2 million people injured, and cost our nation an estimated \$230 billion annually. The problem is particularly acute on rural roads, where traffic accidents account for more than half of all U.S. traffic fatalities, despite only a quarter of the U.S. population living in rural areas.

As public and private sector leaders and safety advocates seek ways to reduce driver distraction and find other solutions to the epidemic of traffic accidents on our nation's roads, the ITS Joint Program Office (JPO) should work with the public and private sectors to encourage more rapid deployment of existing intelligent transportation systems that can improve driver awareness, reduce the number and severity

of traffic crashes, and improve emergency response, while redoubling its efforts to advance the research and development of future safety solutions.

As a result of cooperative research efforts and private sector innovation, vehicle-based technologies exist today that enable cars and trucks to detect other vehicles in their blind spot, warn drivers if they are drifting out of their lane or off the road, detect pedestrians and even large animals on the side of the road, and assist drivers in braking to avoid an accident. Many of these crash avoidance features are already being offered on higher end cars and commercial vehicles, with additional safety features being offered through aftermarket devices that provide drivers with critical real-time information about traffic, roadway and weather conditions.

Additional infrastructure-based safety systems that do not rely on in-vehicle sensors are also starting to be deployed across the country, including high-tech cameras and sensors at intersections that can detect speeding vehicles and other dangerous situations and adjust traffic signals or warn drivers to prevent potential collisions. Key obstacles to the more widespread deployment of these quick, often low-cost solutions is the lack of dedicated funding for ITS deployment and operations, and the lack of performance-based policies that incentivize agencies to improve system management to meet performance goals.

A system that holds significant promise for reducing traffic accidents—*IntelliDrive<sup>SM</sup>*—is the result of cooperative research between the U.S. DOT, automotive and other industry leaders, state and local officials, and associations like ITS America to develop high-speed wireless connectivity and sensing capability between moving vehicles, and between vehicles, intersections and other roadside sensors. Using spectrum which has been designated for this purpose by the Federal Communications Commission, the system would gather anonymous traffic data such as vehicle speed, direction and location, providing a 360 degree early warning system to help drivers avoid crashes, while also reading data from other vehicles and sensors to alert drivers to icy patches, accidents or stopped traffic ahead, a speeding car about the run the red light, and the fastest or most eco-friendly route to work based on real-time traffic conditions.

This smart network would provide traffic managers with real-time information to operate their transportation systems more efficiently, give state and local officials the comprehensive data they need to measure system performance, provide emergency personnel with the tools they need to respond more quickly to traffic incidents, and even enable innovative financing options like a VMT-based user fee that could vary by pricing zone, time of day or congestion level.

The ITS JPO has provided tremendous leadership in the development and testing of vehicle-to-vehicle and vehicle-to-infrastructure communications capability, and should now focus on conducting the research necessary to accelerate the deployment of an *IntelliDrive<sup>SM</sup>* network. This includes research into expected installation and operational costs, governance structure, privacy standards, potential liability issues, regulatory research to support possible rulemakings, potential commercial applications, and anticipated safety, mobility, environmental benefits.

While much of the focus of the *IntelliDrive<sup>SM</sup>* program has been on collision-avoidance and other advanced safety applications, the initiative has been expanded over the past couple of years to include mobility applications that have significant near-term potential for reducing traffic congestion and providing transportation agencies and the public with real-time traffic and multimodal travel information. These mobility solutions, which collect and disseminate critical traffic-related information using a variety of technologies including cell phones and other consumer devices, do not require the roadside instrumentation or vehicle-to-infrastructure communications systems required for advanced collision avoidance, and as such are already beginning to be deployed in places like the San Francisco Bay Area. In addition to the mobility benefits, these technologies can provide vital information to transportation managers and emergency responders to improve system operations and incident response, as well as to drivers in order to avoid potentially dangerous traffic situations and road and weather conditions.

The Department should continue working with its public and private sector partners to advance the *IntelliDrive<sup>SM</sup>* program, with the goal of achieving real-world deployment as soon as possible. In addition, as the U.S. DOT, Congress, and many state legislatures are considering policies to combat distracted driving, including bans on certain electronics devices, the ITS JPO should quickly compile and disseminate research results, cost-benefit projections, and other relevant data to policymakers about current and emerging technologies and devices that impact the driver experience, with a particular focus on helping policymakers distinguish between technologies that can improve driver awareness, provide vital information and enhance public safety, and those devices that cause significant driver distraction but do not (and are not anticipated in the future to) have measureable safety benefits.

### **Proposed Safety, Mobility and Environmental Solution: Smart Cities and Communities**

A critical next step in advancing the real-world deployment of smart technologies and encouraging more aggressive investment by the automotive, information and communications technology industries, and state and local agencies is through a large-scale operational testing and model deployment initiative that will begin providing the public with safety, mobility and environmental benefits while also generating real-world data on deployment costs, benefits, challenges, and lessons learned.

ITS America has been joined by state, city and local transportation officials, industry leaders, university researchers, and safety and environmental advocates in proposing a Smart Cities and Communities initiative that would aggressively deploy and provide for real-world testing of smart infrastructure, connected vehicles, and other intelligent technology solutions in several model cities and communities.

Smart Cities and Communities would be selected by U.S. DOT through a competitive process to establish clear performance objectives, based on multi-modal investments and advanced transportation management systems, including systems like IntelliDrives<sup>4</sup>, to make measurable progress toward reducing traffic accidents, congestion and emissions, to provide real-time information to travelers for smarter travel decisions, to optimize system performance for supporting travel by all modes (auto, transit, commercial vehicles, pedestrian, bicycling, etc.), and to provide a real-world test bed for innovative financing alternatives like VMT-based user fees and congestion pricing.

This initiative is consistent with the *National Surface Transportation Infrastructure Financing Commission* conclusion that using technology to improve how people pay for their transportation usage, when integrated with existing ITS technologies and systems like *IntelliDrive<sup>SM</sup>*, “will enable the delivery of a host of other benefits, including real-time information to vehicle drivers to help reduce congestion, improve safety, and reduce emissions, to transit operators to improve the convenience and reliability of public transit, and to system managers to better monitor and manage the system and improve the allocation of transportation infrastructure resources.”

The Smart Cities and Communities initiative would provide U.S. DOT with the opportunity to support the deployment of new technologies and operational strategies in real-world settings in order to advance key goals such as safety, livability, environmental sustainability and economic competitiveness. As part of the program, participating cities and communities would be required to perform rigorous data collection and analysis, and regularly report back on deployment and operational costs, safety, mobility and environmental benefits, challenges and lessons learned, and recommendations for future research areas and deployment strategies.

#### **Federal Research Priority: Innovative Financing Options**

In conjunction with the Smart Cities and Communities initiative, at least one selected city or community should include a model VMT-based user fee pricing program that could vary rates by time of day, pricing zone, congestion levels and other factors; be interoperable with other tolling, pricing, and intelligent transportation systems; and accommodate multiple forms of payment including cash, credit and debit cards, the Internet, and other integrated payment systems. Smart Cities and Communities would also have flexibility to pursue other innovative financing options, including congestion pricing systems.

The U.S. DOT—with leadership from the ITS JPO—should conduct a complementary research and development program to address challenges associated with deployment of a VMT-based user fee as a potential transportation financing mechanism. The research program should work closely with the public and private sectors and stakeholder associations to explore policy and technical issues and make recommendations regarding the best option(s), system design, required technologies, implementation plan, and challenges and benefits associated with the system. To effectively implement the research program, U.S. DOT could utilize the expertise of member-based research and technology organizations like ITS America to explore issues such as:

- Necessary protocols and systems to accommodate concerns regarding personal privacy;
- Impacts of such a system on rural drivers who have no choice but to drive long distances;
- Options related to the method and point of collection of a national VMT fee;
- Methods to ensure the feasibility of multiple forms of payment;
- The administrative costs associated with such a national program;

- Whether it is more logical to transition all vehicles simultaneously or some vehicle classes first as early adopters;
- How to ensure individuals are not paying both the gas tax and the VMT fee under any phased-in transition approach;
- Impacts of a voluntary or mandatory use of the system;
- Whether different systems for different vehicle types will be necessary or appropriate, including pilot programs for automobiles and different classes of trucks;
- How to provide the positioning accuracy and availability necessary to support state, local, or private charges based on specific areas or lanes traveled; and
- Other benefits that could be gained through integration of a VMT-based user fee system with other intelligent transportation systems and technologies.

### Conclusion

The goal of the federal research program should be to help solve state and local challenges, with a specific focus on supporting national goals and informing policy decisions. And if this isn't a great enough task, the combined challenges of implementing a performance-based system, addressing critical safety, mobility and environmental problems, and Ending innovative financing mechanisms, calls for strong a federal leadership role and a robust research agenda that will work to advance the deployment of intelligent technologies and system management tools, improve the availability of quality data for performance measurement and investment decisions, and leverage private sector innovation to help state and local agencies solve critical challenges.

Thank you again for inviting me to join you today. I will be happy to answer any questions that you have regarding these recommendations.

### Attachment A: Performance Measures for the U.S. DOT's Strategic Priorities

(Source: Transportation 2035 Plan, Metropolitan Transportation Commission)

*For illustration purposes, the numbers in parentheses represent the 2035 performance targets set by MTC against which alternative investment strategies were tested in the long range plan.*

#### Maintenance and Safety Measures

- Reduction in fatalities from motor vehicle collisions (15% reduction from 2008)
- Reduction in bicycle and pedestrian fatalities attributed to motor vehicle collisions (25% from 2000 levels)
- Reduction in bicycle and pedestrian injuries attributable to motor vehicle collisions (25% from 2000 levels)
- Maintain pavement condition index of X or higher (annual index of 75 or better over 25 year period)
- "Distressed" lane miles no more than \_\_\_% of state highway system (no more than 10%)
- Average transit asset no more than \_\_\_% of useful life (average no more than 50%)
- Average distance between vehicle service calls no less than \_\_\_miles (minimum 8000 miles between service calls)

#### Measures for Livable Communities (targets still under discussion) Transportation Availability and Choices

- Transit Availability
- Transit Service Frequency
- Change in Transit Service Coverage over time
- Walkability (destinations reachable by walking)
- Auto availability (households with at least one vehicle)

#### Accessibility

- Access to essential destinations by 30-minute auto trip

- Access to essential destinations by 30-minute transit trip
- Access to essential destinations by 15-minute walk

#### **Mobility**

- Average transit travel time to work vs. auto travel time

**Affordability** (*10% reduction from today of earnings spent on housing and transportation costs by low and moderately-low income households*)

- Transportation costs as a percent of household income
- Housing costs as a percent of household income
- Households with housing and transportation costs exceeding 50% of income

#### **Environmental**

- Emission density of diesel PM<sub>2.5</sub> from all transportation sources Economic

#### **Competitiveness**

- Reduce congestion as measured by per capita travel time delay (*reduce by 20% from 2008*)
  - Freight mobility as measured by delay (*reduce by 20% from 2008*) Environmentally Sustainable
  - Reduce daily per-capita vehicle miles traveled (VMT) \_\_\_% (*reduce by 10% from 2008*)
  - Reduce emissions of fine particulates (PM<sub>2.5</sub>) by \_\_\_% (*reduce by 10% from 2008*)
  - Reduce emissions of coarse particulates (PM<sub>10</sub>) by \_\_\_% (*reduce by 45% from 2008*)
- Reduce carbon dioxide (CO<sub>2</sub>) emissions to \_\_\_% below 1990 levels (*reduce by 40%*)

#### **BIOGRAPHY FOR ANN FLEMER**

- In July 2009, Ann assumed her current position of Deputy Executive Director, Policy for the Metropolitan Transportation Commission, the metropolitan planning organization for the San Francisco Bay Area. In this position Ann oversees the following agency functions:
    - Strategic financial planning and MTC's management of federal, state and regional fund sources for transit, highways, roadways and other modes
    - State and federal legislative advocacy, and public affairs and community outreach
    - Planning, including the long range plan, coordination of transportation and land use; air quality and climate change; and goods movement
    - Internal agency administration, human resources and information technology services
- +
- From 2001 to 2009, Ann served as MTC's Deputy Executive Director, Operations. In this position, Ann oversaw the agency's Traveler Coordination and Information Section and Highway and Arterial Operations Section, as well as internal administration and information technology services for MTC. Key projects under Flemer's direction included the TransLink© smart card universal fare collection system for transit, the 511 traveler information system, the Take Transit regional online transit trip planning system, the regional rideshare program, freeway system management and operations, regional signal timing, and incident management activities in partnership with the California Highway Patrol and Caltrans, including the Bay Area's Freeway Service Patrol and network of roadside call boxes.
  - From 1982 to 2001, Ann worked in public transportation planning, policy and finance at MTC, including managing interagency programs to improve transit accessibility, service marketing, employee development, and fare and schedule coordination, the region's transportation program for elderly persons and persons with disabilities, the region's welfare to work transportation program, and



the allocation of regional, state and local funds to local project sponsors and transit agencies.

- Ann serves on the Board of the Intelligent Transportation Society of America, the Transportation Research Board Committee on Transportation Management and Operations and the U.S. DOT ITS Program Advisory Committee.
- Ann earned her bachelor's degree in Urban Studies from UCLA (1980) and her master's degree in City and Regional Planning from UC Berkeley (1983).

Chairman WU. Thank you very much, Ms. Flemer. Mr. Pisarski, please proceed.

**STATEMENT OF ALAN E. PISARSKI, INDEPENDENT  
CONSULTANT**

Mr. PISARSKI. Good morning, Chairman Wu, Ranking Member Smith and distinguished Members. My name is Alan Pisarski. I am pleased to testify before you regarding transportation research needs.

Chairman WU. Mr. Pisarski, is your microphone switched on?

Mr. PISARSKI. Let me check. Thank you. Yes, that seems to be working better. I speak as an independent researcher representing no organization or interests. I will focus on just two aspects of the charge to us, first, the need for research on the strategic goals of the DOT, to make them more concrete, programmatic guides; and second, the information demands that these goals and the other parts of the reauthorization will generate.

In broad summary of this first area, research and policy analysis needs to be directed early on so to provide scoping and tangibility to the admirable but amorphous DOT strategic goals before they can provide the bases for programs or for investment. We will need to define their boundaries and their content. We will need to define and develop quantifiable means of performance measurement. Those performance measures will define the goals in ways that can be funded, pursued and measured.

Safety lends itself very directly to performance measures. The goals are clear and subscribed to by all. The objectives are quantified. The remaining three goals, livability, economic competitiveness, sustainability are nowhere near as concise or as shared in meaning.

The objective I would set for transportation in order to enhance economic competitiveness, livability and the other goals as well would be this: Design the transportation system of the future that will serve the needs of a population with a value of time double that of today's average traveler, roughly \$50 an hour, and serving an economy with an average value of goods moved double present average values in tons.

High-value workers and high-value goods movement will demand and be able to tolerate the cost of high-value transportation services. Transportation congestion angers and frustrates our users. Addressing congestion as a major priority serves to achieve all the four strategic goals identified. Research shows that relieving congestion improves safety, environmental damage, greenhouse gas emissions and economic competitiveness. Most Americans would certainly associate it with improved livability.

In the affluent society we all expect in the future, the value of time will be the ultimate driver of goals and activity. Time is the ultimate unrennewable resource.

Technological changes in fuels and vehicles will dominate the issues in surface transportation sustainability. Transportation agencies fail to recognize the technological opportunities that exist and instead tend to focus on seeking to force behavioral change. This has a long record of failure. The goal is to reduce greenhouse gas emissions, not to reduce vehicle miles of travel. Raising the cost of travel, trying to squeeze drivers out of their car, will only harm the lowest income groups and minorities, those on the fringes of vehicle affordability.

One of the great research-driven areas of potential success in the future, serving very effectively to meet every one of the aspirational strategic goals of the DOT, will be the increasing automation of highway travel. These technological opportunities will enhance safety, energy consumption, environmental impacts to effectively improving road capacity, traffic management, speed and reliability.

Turning to my second point about data needs, in SAFETEA-LU, Congress directed the DOT to conduct a comprehensive transportation information needs assessment. That study was never conducted by DOT. So in 2006 the data section of the Transportation Research Board, in an all-volunteer effort, produced this document as a volunteer effort called Transportation Information Assets and Impacts, substituting for what DOT was unable or unwilling to do.

My challenge to the DOT is to take responsibility and respond to the SAFETEA-LU request by the Congress. As the report calls for, they should assess the status of the data assets within their scope, identifying new data sources, new and unmet data needs, the expected value and cost of meeting those needs, and recommend priorities for enhancing both local and national transportation data assets.

Chairman Oberstar's legislation has 40 sections calling for new reporting requirements, performance measures, and performance targets. To say that the Department is not up to it is almost laughable but neither are the states or the MPOs or anyone else. We don't have the content, we don't have the methods, we don't have the institutions, and we don't have the money.

I would be happy to take questions. Thank you very much.

[The prepared statement of Mr. Pisarski follows:]

PREPARED STATEMENT OF ALAN E. PISARSKI

Good morning, Chairman Wu, Ranking Member Smith, and members of the subcommittee. My name is Alan E. Pisarski. I am pleased to be invited to testify before you regarding transportation research needs. I speak as an individual researcher representing no organization or interests. This is the fourth reauthorization, starting with ISTEA, in which I have been asked to assist the Congress in its deliberations. It is a privilege that I take most seriously.

I have chosen to focus on just two aspects of the charge put to us in your invitation: the first will specifically address the strategic goals of the DOT and the need for research to make them more concrete in order to make them effective programmatic guides; and the second will address the information demands these goals and the other proposed approaches under discussion in the reauthorization legislation will place on us. Much of my career's focus has been on designing and employing statistical sources to meet transportation policy needs at the metropolitan, state and national levels here and abroad.

## DOT's Strategic Goals and Research

### The Goals

*Safety*

*Livable Communities*

*Economic Competitiveness*

*Environmentally sustainable Transportation*

Of the four strategic goals, Safety, is the one we expect to see first—and pertinent to this discussion the most directly transportation related and the most tangible of the strategic goals. The most telling thing we can say about transportation safety in America is that it has been a great success in terms of improvement in the total death toll and in the rate of fatalities and crashes—we take great pride in that accomplishment—and yet when we examine world trends we see that many countries that had far worse records than America in past decades began catching us about a decade ago and, despite our improvements, have passed us by. Just one small example: the US's number of fatalities from 1980 to 2007 declined by almost 20%, of which we might feel justifiably proud—until we examine other countries and see that France and Germany saw fatality declines by more than 60%—about a two-thirds decline in the same period. Had we declined at that rate our annual fatalities would be on the order of 17,000 instead of above 40,000 in 2007. What do they know that we don't? What have they done that we can learn from?

Moreover, a compelling structural definition of the safety goal developed by the European Union, EU, bears consideration.

*Every EU citizen has the right to live and work in safety. So, when you are walking, cycling, biking or driving a car or a truck you should do so with a minimum risk to be hurt or killed. Likewise, other road users should not be damaged by your own participation in traffic.*

The Congress will need to assure that the research is done to determine where the successful approaches have occurred and then to act on the research findings that identify the policies and actions that can achieve such life-saving practices. We could find that these policies may be more draconian than we have been prepared to enact in the past. That trade-off should be made consciously—knowing full causes and effects. As we set national goals for safety we will find that many states have already surpassed it but others have long ways to go. In 2007 our national fatality rate was 1.36/100 million VMT with almost exactly half of the states above and below that level. If we set a commendable goal of 1.0/100 million VMT nine states would already be there and five would be more than double the goal.

Another point where safety teaches lessons about strategic goals and performance-based planning is that safety tends to lend itself most directly to performance measures because the goals are so clear and so definitely subscribed to by all: If we measure fatalities, crashes and crash costs, if we measure rates of these events, we have clearly quantified our goals. There are important sub-sets to be addressed—pedestrians, motorcycles, etc. We know that we get very different senses of performance when we measure rates based on measures per capita; per vehicle; or per vehicle mile, but the goals are eminently clear and international discussions, for example, can proceed with common perceptions of identical goals in mind. Could such a discussion of Livability occur internationally? The variations on meaning of that would make discussion interesting and perhaps even educational but certainly not comparable.

It harks back to a popular phrase of the 60's that went like this: "If we can put a man on the moon why can't we . . . the blank might be filled by . . . have a good school system; make a prettier city; a happier life, a more livable city. The simple answer is we can state the goal for men on the moon in one single English declarative sentence: "Place men on the moon in a life support condition and bring them home safely." Every thing else is engineering. There is no single sentence or paragraph that can define these other goals that more than a handful of people would subscribe to. Volumes have been written about them. They are constructs of each individual and different for each. They are human aspirations. Just as the livability goal is merely aspirational until given real substance.

One measure of this is gleaned via review of the work of the different Regional Economic Commissions of the UN. Those in Latin America, South Asia and Africa barely mention transportation in their goals statements about sustainability. Their focus is on sustainable food stocks, sustainable water supplies and sustainable

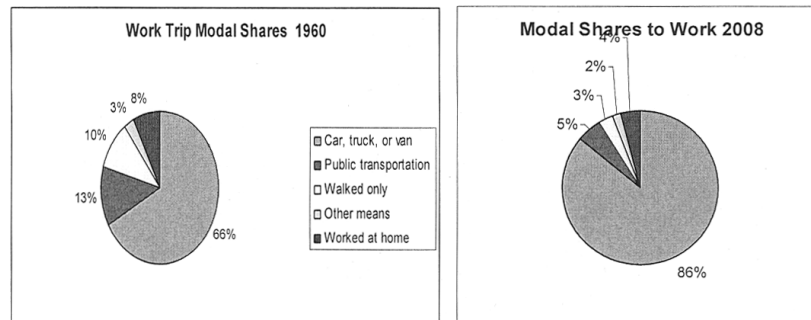
health conditions. The ECE (Economic Commission for Europe, of which the U.S. is a part) addresses transportation more fully.

I recently conducted a review of sustainability around the world for the Institute of Transportation Engineers and discovered references to close to 100 definitions of sustainability. In most cases they were merely aspirational political statements. The word began to become more useful in the European Union, where it was in fact written into the EU charter in the Maastricht Treaty of 1992.<sup>1</sup> In order to give substance to the term the statistical arm of the EU, Eurostat, has worked for almost two decades to define and refine the scope, the scale, and the content of that vision. They have developed measures to examine goal sets and subsets and established context measures to guide policy and to structure programs. They have a long way to go both programmatically and statistically.

While it may be worth monitoring the continuing efforts of the EU and also the OECD (Organization for Economic Cooperation and Development) to quantify these concepts, the U.S. must give them far greater tangibility than they now contain before considering programs or funding in these areas. It will take considerable research effort in both time and funding to create a sound programmatic environment. The potential for wasted effort and wasted resources is immense.

Certainly the term livability will need to be subjected to a far more rigorous delineation of its scope and content before tangible programs with measureable performance outcomes can be structured. Without these steps it would become perhaps the perfect federal program: almost anything could be funded under the rubric of livability; with such an amorphous goal there would be no real measure of success or failure; and funding could go on forever with no real accountability.

The present view seems to use livability as an umbrella term for walking, biking and living in access to close-by jobs and other opportunities, but most of all for increasing the densities at which we live and work. This seems a somewhat idyllic notion—a nostalgia for simpler times in the past. My years of research in commuting indicates that those goals fit nicely into somewhere about 1960.



In 1960 we had fewer than half the workers commuting that we do today. The transit share was more than double today's share (close to a million more than today in numbers); working at home was almost double today's share (lots of farmers then who "worked at home"); and walking to work was close to four times today's share. We didn't think that those were halcyon times then. The 1962 Highway Act, that mandated the metropolitan planning process, was enacted to address the problems of the era.

Numbers similar in terms of modal shares to 1960 can be seen for the population below the poverty line today. A great problem is that these heavily idealized visions of walking and working at home don't often comport with reality. When we think of increasing walking to work we have a vision of an executive or software designer leaving her town house and strolling to her office. If we recognize that a lot of walking is by low income people making trips to distant jobs—picture a Black mother walking several miles to town to work in the hospital then our benign vision

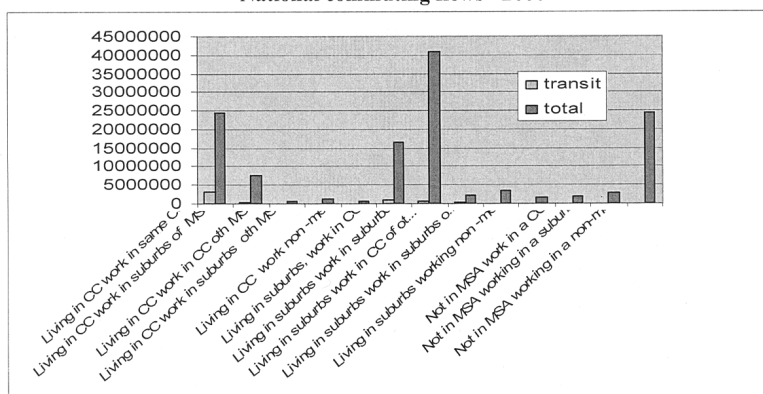
<sup>1</sup>The Union shall set itself the following objectives:

- to promote economic and social progress and a high level of employment and to achieve **balanced and sustainable development**, (emphasis added) in particular through the creation of an area without internal frontiers, through the strengthening of economic and social cohesion and through the establishment of economic and monetary union, ultimately including a single currency in accordance with the provisions of this Treaty, *ARTICLE 2 OF THE MAASTRICHT TREATY; 1992*

changes. Thus when I see walking declining in numbers and share as it has for forty years I see success not failure. That means access to transit or access to a van pool and a far greater opportunity sphere of potential employment for the low income population. This of course is not to suggest that we should not be supportive of those who do walk to work (about 2.8%) or bike to work (about .6%) and to increasing opportunities for it, but it does say that we must carefully measure and monitor what goals we set and their implications in the real world. They are certainly not sufficient to base the entire program on.

One of the real conflicts in the livability goal as it is commonly used is some of the inherent weaknesses that have trouble standing up to the realities of modern life style needs and preferences. Note in this chart from the Commuting in America III series the number of people who live and work in rural areas is just about identical to those who live and work in central cities (about 25 million) yet we somehow tend to expend the major part of our focus on those in central cities. I would think that the rural population has just as great a claim on our interest. In the future when jobs return and skilled workers become again a key issue, assuring employers access to a larger commuter shed spread over larger and larger areas will be the norm. I suggest in that environment work trip lengths will get longer not shorter—and that will be a good thing—one of the keys to greater economic competitiveness. It will mean workers with greater access to more jobs and employers with greater access to potential employees. It must be obvious that in our job short environment today with 10% unemployed, job seekers will be willing to travel greater distances than they might in the past to get the job they want or that they can get.

National commuting flows - 2000



In the longer term the prospects for working at home are great—it is the only “mode” to work that has grown in share each decade since 1980 along with driving alone, but growth prospects for walking and biking will be slimmer. Why?

- Increasing job specialization among the skilled in bigger and bigger metros will require/permit drawing workers from ever larger orbits.
- About 70% of workers live in a household with another worker(s). Whose job will they live next to? Will the average trip length to work improve?
- Job velocity is high—it is highly unlikely that workers will change home locations every time they change jobs—that is economically unrealistic.
- Our work force is aging; unlikely candidates for walking/biking.
- As incomes rise workers choose other things as important beyond optimizing the commute—amenities, safety, schools, etc.
- The commute is a small and declining share of travel (about 20%). Other factors are more important to household interests and to improving their travel situation.

In short, we don't live outside the factory gate anymore, for good reasons. As noted in the last bullet work is not the major travel factor it once was. If we consider all the other trips householders make, the notion of walking to them does not stand up to inspection. Trip purposes that are growing are social recreational travel and personal/family business. We see that super markets, shopping centers and schools are all getting larger, indicating larger market sheds for their customers and

longer trip distances as a result. This is a natural product of private and public efficiency goals and the growing specialization of goods and services the public desires. Consider the kinds of milk we buy today—50 or 60 years ago there was just milk—now markets will have a dozen kinds of milk, dozens of kinds of lettuce. Absolutely the same applies to doctors. In my childhood the three generations in our household had the same doctor who was a few blocks away. Today people don't have a doctor they have several or many—none selected on the basis of how close-by their offices are.

Conversely, the situation of being dependent on the single store you can walk to leads to lack of competition and monopoly-like pricing behavior. Research has established that low income neighborhoods often pay more for basics because of their immobility. Even the threat of being able to leave the neighborhood to reach competitive suppliers helps reduce prices.

Part of this links to the third goal of Economic Competitiveness. While competitiveness is again one of the “soft” words that is open to broad interpretation, it seems easier to attach sufficient tangibility to it to make it an effective guiding tool than some of the others. There is a tendency to link it strongly to freight movement. There is validity in that, but there is much more to it. Businesses and nations compete today based as much on their overall logistical capabilities as on their products. As products to be moved increase in value the demand for speed, control and reliability increase, generating greater increases in air freight and trucking. The US, being a high labor cost nation, must seek to reduce its disadvantages by more effective transportation and logistics services not just in and out of ports but throughout the entire logistical chain of production.

Beyond freight movement there is the movement of persons in business travel—which can be a major cost factor for services firms with high value personnel. While there are increasingly surrogates for travel in new technologies the need for continued travel will be with us for a long time. Increasingly effective means of communications may substitute for travel in specific occasions, but ultimately increases the prospect for travel and face to face interactions. Another element in competitiveness is tourism—both domestic and that of foreign visitors. Foreign visitation in the nation is a major source of export revenues. We have seen in this recession the impact that declines in business and leisure travel can have in many areas. Travel and tourism is the top industry in three states and in the top ten in all states except two—all of it synonymous with long distance travel.

The objective I would set for transportation in order to enhance economic competitiveness and livability and in fact the other two goals as well would be this:

*Design the transportation system of the future that will serve the needs of a population with a value of time double of that of today's average traveler (say \$50 an hour in current dollars) and serving an economy with an average value of goods moved double present average values per ton.*

High value workers and high value goods movement will demand and be able to tolerate the costs of high value transportation services. What the economy and the society will not be able to tolerate is lack of safety, lack of reliability, environmental damage, and congestion that eats time and energy resources. Research is needed on what the economic and other impacts would be of the development of a transportation system designed to serve a high income/high value society.

The aspect of transportation that most users express greatest anger and frustration about is congestion. It is significant that it is not mentioned in the strategic goals. I would like to think it is because it is seen as a symptom rather than an objective in itself. But addressing congestion as a major priority serves to achieve all the four strategic goals identified. Research has shown that relieving congestion improves safety, environmental damage, GHG emissions, and economic competitiveness. Most Americans would certainly associate it with livability as well. In the affluent society we all expect in the future, the value of time will be the ultimate driver of goals and activities. Time is the ultimate unsustainable resource.

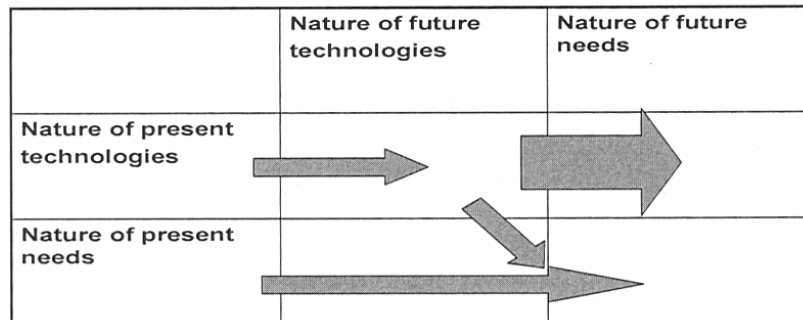
Failure to invest in the infrastructure and services that can support our economic competitiveness will be major detriment to our economy if transportation is seen only as a problem to be minimized rather than an integral part of our economic competitiveness and livability. We need research that demonstrates the connections between transportation investment and our economic progress. Great work has been done in Europe and confirmed here showing that increases in access to jobs within (say) 30 minutes adds immensely to productivity. We need more extensive research in these areas. Another area that grows out of research funded at TRB on the future of the Interstate system is the need for a national inventory of the physical state of the Interstate system and what the costs for reconstruction will be in the coming decade.

The strategic goal area of environmentally sustainable transportation suffers from a lack of effective research. The OECD in its Insights series, states:

*We see the expression “sustainable development” everywhere these days, but what does it actually mean? How do production and consumption influence sustainability? Is globalisation of the economy helping or hindering it? Can sustainability be measured using the traditional tools of economic analysis? What can governments, enterprises and citizens do to promote it?*<sup>2</sup>

It further makes the important point about sustainability that seeking to preserve resources to permit future generations to address their needs, requires us to better understand what future perceptions of needs might be and what resources and technologies might exist to serve those needs. The following chart lays out some of the elements of that understanding.

**The Sustainability Matrix**

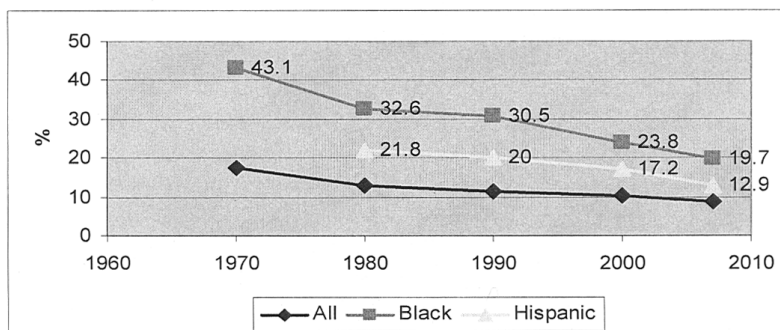


It suggests that present technologies lead the way to future technologies and that both have immense bearing of what the sense of needs in the future might be. In a sense technological possibility creates needs. One would expect that the concept of needs in the future would grow but technologies would reduce the resources required to meet those needs.

At present there are many assertions about the air quality attributes of modes, their GHG characteristics, and their relative subsidy costs. All of these areas need more dispassionate, more sound and more effective research. The pace of technological change in fuels and vehicles will easily dominate these issues in surface transportation. There seems to be a failure, research-driven or institutional, in which transportation agencies fail to recognize and incorporate the technological opportunities that exist, or that are in the offing, and instead tend to focus on seeking to encourage or mandate behavioral change. This has a long record of failure. If we look back at all the improvements in air quality of past decades, they occurred almost exclusively due to changes in vehicles and fuels and, if anything, behavioral change was a negative influence. With respect to GHG emissions, where the technological opportunities are even more clear, we should guide our policies accordingly. The goal is to reduce GHG emissions not to reduce VMT. Raising the cost of travel, making it more onerous, and trying to squeeze drivers out of their cars will only force the lowest income groups—those who are on the fringes of vehicle affordability out of their cars. The accompanying figure shows the dramatic increases in vehicle ownership by African-Americans and Hispanics over the past decades.

<sup>2</sup> OECD INSIGHTS-SUSTAINABLE DEVELOPMENT: LINKING ECONOMY, SOCIETY, ENVIRONMENT ISBN 978-92-64-055742 © OECD 2008

Percentage of Households without Personal Vehicles by Race and Ethnicity



ACS, Bureau of the Census

The percentage of African-American households without vehicles dropped from 43% in 1970 to just below 20% in 2008—a great increase in opportunities to access jobs and services for that group, but still more than twice the level of the rest of the nation. Hispanics enjoyed similar gains as seen in the figure. Who can possibly argue that those gains were a bad thing and would want to see it arrested? Do we want to make the disparities between the overall population and these Racial and Ethnic groups permanent?

Further, there are great low cost and rapidly implementable responses to creating environmentally sustainable transportation that do not seem to enjoy the public cache of some others. This includes intelligent transportation systems technologies that can increase throughput on existing systems, information technologies that can inform travelers of accidents and problems ahead and point out alternative routes. Using information to produce predictive traffic information, melding data and forecasting using both public and private tools is one of the future opportunities that we must be ready to seize.

One of the great research-driven areas of potential success in the future, serving very effectively to meet every one of the aspirational strategic goals of the DOT, will be the increasing automation of personal vehicle travel as well as buses and trucks. These technological opportunities will enhance safety, energy consumption, and environmental impacts through effectively improving road capacity, traffic management, speed and reliability. We can develop them here or import them later from Asia and Europe.

A final thought that this committee can champion. In the area of intended responses to GHG emissions reductions there is an equity—efficiency trade-off argument. In this case “equity” is portrayed as each sector of the economy being responsible for reducing, on an equivalent basis, that share of emissions that it produces—transportation is roughly responsible for 28% of U.S. man-made emissions and therefore should be responsible for about the same share of reductions. This is a very short-sighted sense of equity. Based on efficiency grounds, those areas that lend themselves best to improvements in GHG emissions such as electricity generation should be the focus of our research and policies—the so-called low hanging fruit approach.

To the extent the issue is petroleum it must be recognized that in the last energy crises of the early eighties every sector of the economy that could get out of oil did. Only transportation, heavily dependent on a portable, high energy per pound, high energy per cubic foot fuel, such as petroleum provides, stayed with it. It arguably should be one of the last places to look to for reductions. This does not mean being complacent—there are many opportunities for efficiency improvement that are and should be developed—but it does mean that it is reckless to insist on, and invest in, emission reductions that cost thousands of dollars per ton removed when reductions can be obtained more readily and more immediately at \$50 per ton. The Science and Technology Committee can champion the scientific approach to this challenge by supporting research and analyses that identify cost-effective trade-offs in the economy. The question “where will a billion dollars spent buy us the most GHG reductions?” should guide the research and the policies.

In broad summary of this first area, research and policy analyses need to be directed early on to provide some sound scope and tangibility to the very admirable but soft DOT strategic goals before they can provide the basis for programs or in-



vestment. We will need to define quantifiable means of performance measurement of the goals, defining their bounds, their scopes and their content. Those measures will in fact define the goals in ways that can be funded, pursued, achieved and success or failure measured.

#### **Research Needs—Scoping the Program and Data Needs**

About a year after the U.S. DOT was formed, the Congress addressed a letter to the new Secretary indicating its displeasure with DOT's lack of action on developing a statistical program. In response the DOT produced "The Red Book" a design for the Department's overall statistical program. I actually worked on that book. No further action was taken by the DOT or Congress. Now, 40 years later and we are not much farther ahead.

Nothing can be more telling about the state of statistical programs in DOT than the following: In late 2006 the TRB published a document: *Transportation Information Assets and Impacts—An Assessment of Needs*. This began as an effort by the Data Section of TRB in support of the congressional mandate in the current reauthorization SAFETEA-LU, directing the U.S. Department of Transportation to sponsor a comprehensive transportation information needs assessment (TINA). Our intent was to contribute to the identification of information needs, but the TINA study was never conducted nor funded by DOT, so our work broadened to substitute for the DOT failure to respond to Congress. The work was based on surveys of TRB committee members to identify data needs and examples of productive applications of data and information in transportation decision making. This was followed by interviews with a small number of decision makers to develop a better understanding of the attributes of information that are most useful in the policy process.

Let me point out Mr Chairman that while this was a product of the TRB Data Section while I was its chair, the work was the accomplishment of the many committee chairs and members of the section all on a volunteer basis. I just got to watch some very good people do some very good work—out of a sense of professional pride and recognition of the importance of the work. The only money spent to my knowledge was that TRB absorbed the cost of printing. So this volunteer effort substituted for what DOT was unable or unwilling to do. So here we are almost 40 years after the Red Book and the Department is still unresponsive to the Congress and the user community still lacks a sound, sustainable transportation information program.

My challenge now would be for the Department to finally take responsibility and respond to the SAFETEA-LU request by the Congress, albeit several years late. As the report calls for, I would ask them to assess the status of the data assets within their scope, identifying new data sources, new and unmet data needs, the expected value and costs of meeting those needs, and recommend priorities for enhancing local and national transportation data assets.

I understand that the prospective legislation of Chairman Oberstar has on the order of 40 sections calling for new reporting requirements, performance measures, and performance targets. To say the Department is not up to it is an almost laughable statement; but neither are the states, or MPO's, or anyone else. We don't have the content; we don't have the methods; we don't have the institutions; and we don't have the funding.

The Department's basic statistical reporting has suffered due to losses of skilled people to retirement, inability to recruit and train replacements, and the failure of leadership to recognize this area as a priority.

- The summary version of the problem: Our statistical capability is relatively good in interstate/international freight movements, but weak re the characteristics of local urban goods movement; On the passenger side it is the opposite, we are stronger on local travel, but weak at the national activity level. Our last survey of long distance passenger travel—the kind one would use to evaluate a high speed rail proposal for example—was done in 1995—and done badly.
- When the Census Bureau proposed to cancel the Vehicle Inventory and Use Survey, DOT/BTS was not at the table to protest. This is the only survey of the national vehicle fleet that exists, which could be so valuable today with energy and GHG concerns so great not to mention the clunker program. It was ended by the Census Bureau with no response from the data authorities at DOT. It would probably take up to a maximum of \$15 million every five years to restore it.
- One of the flagships of the transportation data program the National Household Travel Survey, NHTS, will soon be available. That's the good news. Its story is symptomatic of our institutional problems. It has been postponed end-

lessly due to lack of financial commitment at DOT. There were \$20 million in state and MPO funds committed to supporting the survey and the DOT could not find the \$1.5 million to fund the basic program to get it started. I think we finally embarrassed them into getting going. Unlike previous cycles there was no BTS participation in the survey. This is perhaps the most central statistical program of the Department. It needs to be assured in its periodicity, rather than enacted whenever the funds can be raised by passing the hat. Where it not for the continuance of the authorization we would be deciding the post SAFETEA-LU program with the same data we had before SAFETEA-LU was enacted. The survey system needs methodological improvements as the traditional land line phone survey approach is overwhelmed by technological and societal changes.

- The most positive story, one of few bright spots, was the establishment of an effective national picture of freight transportation by conducting the Commodity Flow Survey every 5 years (after a hiatus in the eighties), collecting monthly Transborder Freight Data, and creating the Freight Analysis Framework. The Framework is designed to fill in the missing pieces, provide provisional annual updates, and make forecasts against which policies and investments can be analyzed. The picture of freight is provided as maps and tables in the annual Freight Facts and Figures publication, which is widely cited in policy studies and discussions that have helped inspire the many freight provisions in Chairman Oberstar's bill. This statistical program can be given credit for the real renaissance in thinking about freight in America demonstrating the real power of statistics. But the survey approach was reduced in 2002 and work must begin now in planning for the next 2012 effort. It needs to be expanded not reduced.

We can not begin to talk about government transportation decisions making a serious contribution to economic competitiveness without recognizing the waste in decision-making from weak data systems. The methodologies here are also weak and raise the ire of respondent businesses who are forced to do laborious data recording. We need new methods and new dedication.

U.S. DOT needs effective institutions and adequate resources to meet the growing data needs of performance management, concerns with sustainability and livability, and efforts to reinvigorate our economy. To continue programs such as the Commodity Flow Survey and bring back the Vehicle Inventory and Use Survey as part of the 2012 Economic Census, U.S. DOT must begin planning and investing now. If we falter, the maps and tables you will be using in the next reauthorization will be the same pictures we are using today even though the world they measure will have changed dramatically.

We need to address the data program failure on four levels:

- Content
- Methods
- Institutions
- Funding

*Content* The most directly evident gaps are:

- metropolitan goods movement, truck distribution and local delivery activities are a key question;
- intercity/long distance passenger travel getting at long distance trips for recreation, business, foreign tourism, and family/social purposes by all modes,(perhaps 25% of all transportation Person Miles of Travel);
- inventories of the size and characteristics of the vehicle fleet, for example distinguishing pickups and vans used for business vs personal household use;
- Linkages of travel activity with national economic productivity;
- Linkages of travel activity with access to social services/opportunities;
- Linkages of travel activity with GHG and pollutant generation;
- Linkages of travel activity with land use configurations.

*Methods* There are severe methodological challenges, among which are:

- Household travel surveys have shifted from face to face to telephone over the last 30 years. Now the expansion of phone numbers, replacing of land lines in households with cell phones, intolerance by the public to intrusions, severely threatens the utility of such methods;

- Establishment surveys, such as for freight movements can be arduous and time consuming paper-based processes meeting with increasing negative responses from economically challenged businesses;
- Census Bureau disclosure rules force retrenchment of available data due to the power of computers and the internet to mine data and discover linkages between respondents in different data sets. Thus we are paying more and getting less.
- We are perpetually on the cusp of utilizing new data technologies as substitutes for declining capability in our existing methods that promise greater speed and cost-effectiveness. The DOT has failed in conducting the research and testing in new methods that is critical to our future capabilities.

*Institutions* The DOT has tried a multitude of arrangements of program and staff over the years without success. What has not proven sustainable at DOT has been the high level focus of resources on information. Maybe our most fundamental weaknesses are here:

- The BTS has failed to take on most of the challenges it faces;
- There do not seem to be any mechanisms for coordination of statistical programs among DOT agencies;
- The FHWA tends to end up as the ultimate resource for data development;
- There is no high level support or impetus to setting data priorities;
- There is no place to which users can go to make their needs known.

*Funding* This is always the ultimate question. Resource restraints are severe but not overwhelming in that the relative costs are small compared to investment program scale and the scale of the impacts from some of the programs. As said in my testimony on Challenges for the Future in 2007.<sup>3</sup>

*The pathetic nature of our data collection programs and analytical capabilities demands Congressional focus. We are effectively naked with respect to our ability to understand and interpret national patterns and trends. Our future decision-making must be keyed to performance-based reporting systems. If our future decisions are to be founded on sound understanding of our rapidly changing society and grounded in effective, performance-based, economic justification it will have to be supported by far superior data and analytical capabilities than now exist. The costs are trivial contrasted to the cost of ignorance.*

### Closing

We have failed in the original goal to make high quality data available to support planning and policy development; and now we are talking about taking data requirements to a whole new level—making it central to establishing accountability, transparency, and improved performance for ongoing programs throughout transportation. While all parts of the transportation community must participate in this endeavor it is fundamentally the federal component that must lead.

In June of last year I again testified before the authorizing committee regarding Federal Roles. First on my list of federal roles was the following:

- *Provide better data and research needed for more effective business and government planning. This is a central, indisputable federal role.*<sup>4</sup>

Without effectively meeting this federal role to produce better data and research the U.S. DOT cannot expect to make significant progress towards its new strategic goals.

### BIOGRAPHY FOR ALAN E. PISARSKI

#### **Writer, analyst, consultant in the fields of transportation research, policy and investment.**

At the national level he has been invited frequently to testify in both Houses of the United States Congress on many occasions regarding economic and demographic factors that define travel demand, infrastructure investment requirements and public policy.

<sup>3</sup>Testimony Before The Us House Of Representatives; Committee On Transportation And Infrastructure, Sub-Committee On Highways And Transit: Surface Transportation System: Challenges For The Future, January 24, 2007.

<sup>4</sup>Testimony before The United States Senate, Committee On Environment And Public Works regarding The Future Federal Role For Surface Transportation, June 25, 2008.

At the state level he has been invited to advise state Gubernatorial and Legislative Commissions regarding their economic, social, demographic and infrastructure circumstances. (*Arizona, Washington, Georgia, Oregon, Pennsylvania, Missouri, Kansas, Ohio, Wisconsin, Texas, Virginia, and Maryland*)

Internationally he has served the U.S. AID, the World Bank, the United Nations, the Organization for Economic Cooperation and Development, the European Union, the World Tourism Organization and the European Tourism Commission.

As a writer and consultant in transportation public policy, travel behavior analysis and statistics his work related to transportation, particularly commuting and travel behavior, has been reviewed, discussed and quoted in all of the major national news magazines, and newspapers, appearing often on major national radio and television network programs, including the "Today Show", "Good Morning America," NBC, CBS and ABC Nightly News, "Nightline," and "20/20," discussing national transportation topics. Last year he completed the third in the Commuting in America series; and his latest "Bottom Line Report" for AASHTO addressing national reauthorization investment needs was released earlier this year.

**RECENT AWARDS:**

1999, Invited to give the Distinguished Lecture at Transportation Research Board of National Academy of Sciences.

2000, P.D. McLean Award for outstanding contributions to the advancement of highway transportation in the public interest.

2003, Lawrence J. Truitt Award for Public Administration by the Section on Transportation Policy of American Society of Public Administration.

2004, named among the top 100 transportation figures in the 20th century by the American Road and Transportation Builders Association, ARTBA.

2005, elected to membership in the Cosmos Club based on his contributions to science and society.

2007, received the W.N. Carey Award for Lifetime Distinguished Service and Leadership in Transportation Research from the Transportation Research Board of the National Academies

Further activities are visible at the website: [alanpisarski.com](http://alanpisarski.com)

Chairman WU. Thank you very much, Mr. Pisarski. Mr. Skinner, please proceed.

**STATEMENT OF ROBERT E. SKINNER, JR., EXECUTIVE DIRECTOR, TRANSPORTATION RESEARCH BOARD OF THE NATIONAL ACADEMIES**

Mr. SKINNER. Good morning, Chairman Wu, Ranking Member Smith, and Members of the Subcommittee. My name is Robert E. Skinner, Jr., and I am the Executive Director of the Transportation Research Board of the National Academies. I am pleased to testify about research and innovation directed toward the strategic goals of safety, livable communities, economic competitiveness and environmental sustainability. My comments are based upon the work of committees of experts appointed by the National Academies.

Let me briefly highlight selected recommendations in each strategic area. I will start with safety. Although safety is important for all modes, 95 percent of the deaths and injuries on our transport system occur on roads and highways. As Administrator Appel has already noted, the Congressionally requested Strategic Highway Research Program 2, or SHRP-2, is about to embark on the largest, most sophisticated naturalistic driving study ever conducted. It will gather extensive information about driving behavior from 3,000 volunteer drivers over a two-year period. Its ultimate aim is to gain fundamental knowledge about driver behavior that can be used to develop new safety measures. But SHRP's immediate mission is to successfully conduct the field study and assemble the database.

U.S. DOT will need future funding to maintain this huge, complicated database and to support a significant research analysis effort to mine it for effective safety countermeasures.

In the area of large truck safety, several TRB committee reports have pointed out the potential efficiency gains of permitting longer and heavier trucks to operate on a limited number of interstate highways. To avoid increasing risks, carefully controlled independently conducted trials are needed to test the efficacy of proposed technologies to enhance the safety of longer combination vehicles.

The term livable communities usually refers to development patterns that foster travel by non-automobile modes of transportation. The recent TRB report on the relationship between the built environment and motorized travel finds substantial gaps in knowledge about how to best design transit-oriented development. Research is needed about the density thresholds to support different levels of transit service and how these thresholds vary for metropolitan areas and communities with respect to their size, their employment concentrations, and their land use mixes.

Also needed are more rigorous before-and-after studies of efforts to foster compact, mixed-purpose land use and finer grained data about employment locations that can support more sophisticated public transportation planning.

Research related to economic competitiveness aims to make our transportation system operate more efficiently and more cost-effectively. Included in this category are research programs related to the construction, operation and maintenance of transportation infrastructure. For highways, there are opportunities to make these research programs more effective by providing greater support for longer-term, higher-risk, potentially higher payoff research, building and maintaining strong mechanisms for stakeholder involvement, conducting aggressive, well-resourced implementation initiatives, and increasing the share of research funding awarded through competition and merit review.

Also included in this category are topic areas that are either new or, relatively speaking, have been neglected in the past. Freight-related research is an example of the latter. Among other things, U.S. Department of Transportation needs to develop the capability to monitor the performance of the freight system and to develop tools that assist transportation agencies at all levels in evaluating public-private freight-related investments, which often occur at inter-modal bottlenecks.

A newer topic concerns how to fund and operate the highway system in the most efficient way. As the fuel tax becomes less viable, several groups, including a TRB/National Academies committee have suggested transitioning to a scheme that charges users on a per-mile traveled basis. A recommended R&D program to support this effort would likely cost \$70 to \$100 million over a 10- to 12-year period.

In the area of environmental sustainability, TRB has just released a report that recommends research programs to mitigate transportation's contribution to climate change and adapt transportation infrastructure to the consequences of a changing climate.

Given the uncertainties, a mitigation and adaption research program of \$250 million over six years is needed to assist federal,

state and local decision makers in picking the most cost-beneficial and cost-effective strategies.

My written testimony includes more detail about these and other topic area recommendations, as well as the processes by which research should be carried out and promising results implemented.

Thank you for the opportunity to testify this morning, and I look forward to your questions.

[The prepared statement of Mr. Skinner follows:]

PREPARED STATEMENT OF ROBERT E. SKINNER, JR.

Good morning, Chairman Wu and members of the subcommittee. My name is Robert E. Skinner, Jr. I am the Executive Director of the Transportation Research Board (TRB) of the National Academies. I am pleased to be invited to testify before you again. TRB is one of the five divisions of the National Research Council (NRC), which, in turn, is the operating arm of the National Academy of Sciences, National Academy of Engineering, and the Institute of Medicine. This complex of organizations is collectively referred to as the National Academies. The institution operates under the charter given to the National Academy of Sciences by Congress in 1863 to advise the government on matters of science and technology.

I was invited to testify about the kinds of research that the U.S. Department of Transportation (U.S. DOT) should be conducting to meet its strategic goals and on what U.S. DOT could do to facilitate the implementation of research and adoption of the results. I would like to preface my remarks by noting that I'll be limiting my comments about research priorities to previous recommendations made by committees of experts who were appointed by the National Academies to provide advice to the government. The committees were balanced in terms of expertise and perspective, were free of conflicts of interest, and the members served without compensation. Although I am pulling together the recommendations from many reports, my testimony does not represent a comprehensive assessment of what the U.S. DOT's research portfolio should contain; we have not been asked to assemble a committee to make such an assessment. Although I am able to draw upon pertinent reports of committees convened to address specific topics of science and technology, my testimony is incomplete on important R&D topics for U.S. DOT such as safety, aviation, intelligent transportation systems, and environmental topics (other than climate change). This is not because these topics are unimportant; rather, it is because TRB has not been asked to conduct major projects in these areas in recent years. Moreover, some of the committee reports I draw upon were primarily tasked to address a policy issue and made supplemental recommendations about research, but did not provide recommendations about individual projects or estimates of research costs. In addition, my testimony will be more focused on highway R&T topics than others because the Federal Highway Administration has asked us to review its highway R&T activities more regularly than have other modes. FHWA's program is also the largest of the surface modes and accounts for about half of the R&D funds authorized in the research titles of existing surface transportation authorizing legislation.

PRIORITY RESEARCH TOPICS

As per your invitation, this section is organized according to the four U.S. DOT strategic goals: safety, livable communities, economic competitiveness, and environmentally sustainable transportation.

**Safety**

TRB has not conducted a comprehensive assessment of safety research for many years, so my advice in this area will be limited to a few key topics. Importantly, missing entirely is any discussion about vehicle crashworthiness and design of highway appurtenances to absorb crash energy; these occupant protection measures have surely been major contributors to the long-term trend of improved highway safety.

*Driver behavior*

In 1998 Congress asked TRB to convene a committee of experts to determine whether a second Strategic Highway Research Program (SHRP) should be con-

ducted.<sup>1</sup> The first SHRP was a time-limited, large-scale research initiative designed to find breakthroughs in highway materials, paving, and maintenance practices.<sup>2</sup> It resulted in, among other things, major innovations in asphalt paving and winter maintenance practices that have been widely adopted by states, counties, and many other nations. In response to the 1998 request, the committee that prepared TRB Special Report 260 gathered extensive input from stakeholders about major problem areas in highway transportation and recommended a broad-scaled research program addressing four major concerns: safety, travel time reliability, more rapid and efficient renewal of infrastructure, and capacity additions in accord with environmental and social values. The recommended safety research area would address the lack of insight about driver behavior in pre-crash or near-miss situations that has hampered vehicle design and evaluation of safety countermeasures.

In response to Special Report 260, Congress authorized the second Strategic Highway Research Program in SAFETEA-LU. SHRP 2 is being managed by TRB. The program is about to embark on the largest and most sophisticated naturalistic driving study ever conducted. It will gather extensive information about driving behavior from 3,000 volunteer drivers over a 2-year period, which will include collecting pre-crash, crash, and normal driving information about the driver, as well as vehicle and roadway conditions. The vehicles of volunteer drivers will be extensively instrumented with cameras and sensors that will measure a wide array of driver behaviors, vehicle responses, and road conditions.

The aim of the naturalistic driving experiment is to gain fundamental knowledge about driver behavior. However, SHRP 2's immediate mission is narrower—to successfully conduct the experiment; create a comprehensive and accessible database; and develop analysis tools for that database. After SHRP 2 is complete, extensive research using the database will be required to obtain the knowledge necessary to design more effective crash countermeasures. More specifically, safety research funding will be required in a number of promising areas: for example, to:

- Probe and understand the complex conjunction of events and conditional circumstances that lead to crashes and near-crashes in order to identify and prioritize road safety countermeasures;
- Study how drivers react to different roadway and environmental features and how their reactions affect crash risk in order to evaluate specific potential road design, lighting, signage, and delineation safety countermeasures; and
- Determine the role and causes of driver distraction to inform both vehicle design and driver regulatory safety measures.

Additionally, some behavioral work planned for SHRP 2 but dropped due to funding—a site-based video data collection to observe driver behavior at intersections—should be funded. And finally, because of the scale and complexity of the databases that will be collected through this experiment, support will also be required to house and maintain those data, make them accessible to researchers, and provide tutorials and training on how to use them, which will be unlike anything in scale and complexity that the highway safety research community has had to work with before.

#### *Large Truck Safety*

Many TRB committee reports over the years have pointed out the potential efficiency gains of permitting longer and heavier trucks to operate on a limited number of Interstate highways.<sup>3</sup> Progress in this area has been stymied for years, in large part because of concern about the potential risks to safety of permitting larger vehicles to operate. Large truck safety is an important area of risk. Although the number of large trucks involved in fatal crashes is declining, between 4 and 5 thousand people are killed each year in crashes involving large trucks.<sup>4</sup>

Promising techniques are available for enhancing the safety of heavier trucks and longer combination vehicles (LCVs). These techniques include vehicle designs for better control and stability, information technology applications for control and stability and collision avoidance, technology applications designed to improve enforce-

<sup>1</sup>Special Report 260 *Strategic Highway Research: Saving Lives, Reducing Congestion, Improving Quality of Life*. Transportation Research Board of the National Academies. Washington, D.C. 2000.

<sup>2</sup>Special Report 202 *America's Highways: Accelerating the Search for Innovation*. Transportation Research Board, National Research Council. Washington, D.C. 1984.

<sup>3</sup>These recommendations are summarized in Special Report 267 *Regulation of Weights, Lengths, and Widths of Commercial Motor Vehicles*. Transportation Research Board of the National Academies, Washington, D.C. 2002.

<sup>4</sup>Traffic Safety Facts: 2008 Data—Large Trucks. National Highway Traffic Safety Administration, U.S. Department of Transportation. <http://www-nrd.nhtsa.dot.gov/Pubs/811158.PDF>.

ment, improvements in operator certification and training, and changes in highway design. However, little is known about the effectiveness of the majority of such measures once integrated onto LCVs and in actual use. Because of this knowledge gap, as well as a lack of scientific understanding about the relation of safety to truck design, road features, and other factors influencing risk, it is likely that important opportunities to reduce accidents are being missed, while resources are being wasted on ineffective actions. The committee that prepared TRB Special Report 267 recommended the conduct of carefully controlled, independently-conducted trials to test the efficacy of improvements in technology and changes in vehicle dimensions to determine whether LCVs could operate safely on a limited set of Interstates.

#### *Enforcement*

The National Highway Traffic Safety Administration (NHTSA) estimates that speeding is a contributing factor in 31 percent of fatal crashes resulting in more than 1,000 people being killed each month in speed-related crashes.<sup>5</sup> A TRB committee last examined this issue in a 1998 report, and some of the research it recommended at that time has been conducted by NHTSA, FHWA, and the National Cooperative Highway Research Program (NCHRP).<sup>6</sup> Issues that have not been resolved include the safety consequences of differential speed limits for cars and trucks, variable speed limits that would be adjusted based on traffic, weather, or lighting conditions, and the potential of automated enforcement to limit speeding in high-risk areas.

Although safety is important in all modes, 95 percent of the deaths and injuries associated with transportation occur on roads and highways. Unfortunately, the United States is no longer the world leader in highway traffic safety. Countries such as Australia, Germany, Great Britain, and Sweden have lower fatality rates than we do.<sup>7</sup> Such nations have been much more aggressive in enforcing speed limits and safety belt use, controlling drug and alcohol-impaired driving, and publicizing the importance of safe driving. We have a study under way that will be completed in a few months that will identify the measures these nations are using that might be applied in the United States and the research that may be needed to apply these measures in the United States.

#### *Incremental High-Speed Rail*

The Obama administration has renewed interest in intercity passenger rail by committing \$8 billion for high-speed and intercity passenger rail in the American Recovery and Reinvestment Act of 2009, which is also raising the profile of passenger rail research. For many years the Federal Railroad Administration (FRA) has funded a TRB committee to provide a peer review of the agency's research, development, and demonstration programs. This committee has consistently recommended research on positive train control (PTC) as a priority for FRA, which the agency has embraced.<sup>8</sup> Outside of the Northeast Corridor, most passenger rail travel occurs on track that is shared with freight trains, which poses a safety risk given the different operating speeds of passenger and freight trains. FRA regulation restricts the speed of passenger rail to 79 mph on shared track because of this risk. For the foreseeable future, higher-speed intercity rail passenger transportation will continue to rely on shared track; FRA regulation would permit speeds over 79 mph on shared track only if proven PTC were implemented.<sup>9</sup> With passage of the Rail Safety Improvement Act (RSIA) and the Passenger Rail Investment and Improvement Act in 2008, development and deployment of PTC has become a priority for FRA. RISIA requires implementation of PTC by 2015. The committee has also consistently recommended support for the nationwide differential GPS system, which

<sup>5</sup>*Traffic Safety Facts: 2007 Data—Speeding*. National Highway Traffic Safety Administration, U.S. Department of Transportation.

<sup>6</sup>Special Report 254 *Managing Speed: Review of Current Practice for Setting and Enforcing Speed Limits*. Transportation Research Board of the National Academies. Washington, D.C. 1998.

<sup>7</sup>In the last year for which comparable statistics are available (2005), the U.S. rate per million kilometers traveled was 9.0, compared with 5.9 in Sweden, 6.4 in Great Britain, 7.8 in Germany and 7.9 in Australia. *Critical Issues in Transportation, 2009 Update*. Transportation Research Board of the National Academies, <http://www.trb.org/Publications/Books/CriticalIssuesinTransportation.aspx>.

<sup>8</sup>See, for example, the committee's most recent letter report of April 2009. <http://144.171.11.107/Main/Public/Blurbs/161603.aspx>.

<sup>9</sup>The higher speed allowed depends on the class of track. Currently 125 mph is the highest speed that non-electric propulsion technologies can attain.



is an enabling technology for PTC.<sup>10</sup> Other research priorities recommended by the committee include performance-based standards and risk-based analysis; highway-rail grade crossing safety; and network capacity analysis.

### **Livable Communities**

The term “livable communities” is a bit difficult to define, but is usually intended to refer to development patterns that foster non-automobile modes of transportation. Our main report in this area that makes recommendations for research was requested in the Energy Policy Act of 2005 regarding the effects that smart growth, or transit-oriented development, might have on vehicle miles traveled (VMT) and energy consumption.<sup>11</sup> In estimating how much compact, mixed-use development might reduce passenger vehicle miles of travel, the committee that prepared TRB Special Report 298 found substantial gaps in knowledge about how to best design transit-oriented development to reduce auto trips. The research recommendations from this report are incorporated into our report recommending greenhouse gas (GHG) emissions mitigation strategies discussed under the sustainability goal, so I won’t repeat them all here, but one key recommendation stands out in terms of advising metropolitan areas responding to national climate change and energy conservation goals: we need a much better understanding of the density thresholds necessary to support different levels of transit (bus, trolley, bus rapid transit, light rail, heavy rail) and how they would vary across metropolitan areas of different size, employment concentration, and mixes of land use (employment, residential, and commercial areas that are intermixed rather than separated as is the norm in local zoning regulations). Also needed are better data on where jobs are located within metro areas at a fine enough level of detail such that they can be linked with transit plans and travel forecasts and better before-and-after studies of the effects of attempts to foster compact, mixed-use development. Portland, Oregon is one of the great successes in managing land use and investing in transit, but we do not understand whether communities need to replicate all the things that Portland and the state of Oregon have done to foster the urban form that Portland has achieved. The list includes the states growth management policies; creation of Portland Metro, which has an almost unique level of control over land use and transportation investments at the metropolitan level; Portland’s long-term and extensive support of data collection and modeling capability; the building of political cohesion over decades to support growth management and transit investment policies; and others. We also do not have good insight about the successes or failures of efforts to replicate elements of Portland’s strategy in other regions.

### **Economic Competitiveness**

Competitiveness is another somewhat difficult term to define. For the purpose of this testimony I rely on an economic definition—the minimum level of investment required and the appropriate regulatory approaches to achieve the efficient movement of people and goods. Of particular interest is how to help the freight system support the competitiveness of U.S. products in world markets. (The conundrum of this policy, however, is that almost everything we do to facilitate the export of U.S. goods also facilitates import of foreign goods.) Also of particular interest is how to make the construction and operation of transportation facilities more cost effective and how to raise the funds necessary in the most efficient way to pay for public infrastructure.

#### *Infrastructure*

The construction, operation, and maintenance of infrastructure represent the largest share of public infrastructure expenditures on transportation assets. State and local officials are constantly searching for ways to make limited public funds stretch farther. The RD&T programs of the Federal Highway Administration (FHWA) have a long history of supporting innovations in design, materials, practices, and policies of state and local highway agencies. TRB’s Research and Technology Coordinating Committee (RTCC) provides a program-level peer review of the FHWA program. The RTCC’s 2008 report recommends restoring the funding for FHWA’s RD&T programs that were reduced in SAFETEA–LU because of the designation and earmarking of

<sup>10</sup> Funded in past years through FRA’s R&D budget, this budget item is now the responsibility of the Research and Innovative Technology Administration.

<sup>11</sup> Special Report 298 *Driving and the Built Environment: The Effects of Compact Development on Motorized Travel, Energy Use, and CO Emissions*, Transportation Research Board of the National Academies. 2009.

more funds than were authorized.<sup>12</sup> Particularly hard hit were FHWA's R&D programs in policy and operations, but FHWA's safety and planning and environmental RD&T programs were also reduced. The committee also encouraged support for infrastructure programs strongly endorsed by stakeholders, such as the Long-Term Bridge and Long-Term Pavement Performance Programs.<sup>13</sup> To ensure that FHWA's infrastructure programs are addressing the right questions in the right ways, the RTCC recommends that Congress provide funding for extensive expert and stakeholder involvement in RD&T activities as FHWA has committed to in its Corporate Master Plan for Research and Deployment of Technology and Innovation.<sup>14</sup>

The states each have highway research programs that are mainly funded through the state planning and research (SP&R) provisions of Title I of SAFETEA-LU. These programs fund investigation of state-specific research topics, provide much of the local match for the University Transportation Centers Program, fund the collaborative, pooled-fund National Cooperative Highway Research Program, and support technology transfer and adoption of innovation. The RTCC urged that the SP&R provisions be continued.

#### *Public Investment in Freight Facilities*

The efficiency of the U.S. freight system is an important contributor to the international competitiveness of the United States. This system is largely private, but truck, barge, and ship operators depend upon public infrastructure and are subject to public safety and environmental regulation. In addition, there is a growing public role in investing in intermodal freight facilities to encourage more efficient intermodal transportation. A recent TRB committee report on funding options for freight transportation projects recommends that U.S. DOT develop the ability to monitor the performance of the freight system to identify sources of inefficiency.<sup>15</sup> This function would depend upon the collection of more extensive data about system performance, and research would be required to develop the components of such a monitoring system. An earlier committee recommended the development of a system of measuring the performance for the national Maritime Transportation System, which would also require research to develop and implement such a program.<sup>16</sup>

TRB Special Report 297 and previous reports by TRB committees have recommended that U.S. DOT assist transportation departments at all levels of government in developing the capacity to rigorously analyze public-private investments in transportation projects in order to protect the public interest.<sup>17</sup> This would include developing standardized methods of evaluation, including accounting for external costs to improve benefit-cost analysis, and guidance about how the public and private shares of benefits and costs should affect the public share of co-funded projects.

#### *Substitute for the Fuel Tax*

The federal fuel tax raises most of the user fee revenues for the federal highway and transit programs, about \$28 billion annually, but the federal tax has not been raised since 1993. The buying power of federal tax revenues has declined 33% since the tax was last raised, even as demand on the system has increased 31%. In SAFETEA-LU, Congress created two commissions to examine alternative mechanisms for charging users.<sup>18</sup> Both of these commissions recommended carrying out an accelerated development and testing program to determine the feasibility of charging users on a per-mile-traveled basis, also referred to as a VMT fee or mileage tax. In 2006 a TRB committee charged with evaluating the long-term viability of the fuel tax concluded that transitioning from a fuel-tax based user fee to one based on mileage traveled would be good public policy, and it made the same recommenda-

<sup>12</sup>Special Report 295 *The Federal Investment in Highway Research 2006–2009: Strengths and Weaknesses*. Transportation Research Board of the National Academies. Washington, D.C. 2008.

<sup>13</sup>See also the report of the TRB committee that provides an ongoing program review of the Long Term Pavement Performance Program, *Preserving and Maximizing the Utility of the Pavement Performance Database*. Transportation Research Board of the National Academies. Washington, D.C. 2009.

<sup>14</sup><http://www.fhwa.dot.gov/legstregs/directives/policy/cmp/03077.htm>.

<sup>15</sup>Special Report 297 *Funding Options for Freight Transportation Projects*. Transportation Research Board of the National Academies, Washington, D.C. 2009.

<sup>16</sup>Special Report 279 *The Marine Transportation System and the Federal Role: Measuring Performance, Targeting Improvement*. Transportation Research Board of the National Academies. Washington, D.C. 2004.

<sup>17</sup>See Special Report 297, Special Report 271 *Freight Capacity for the 21st Century*, Transportation Research Board of the National Academies, Washington, D.C. 2002, and Special Report 252 *Policy Options for Intermodal Freight Transportation*. Transportation Research Board of the National Academies, Washington, D.C. 1998.

<sup>18</sup>The National Transportation Policy and Revenue Study Commission and the National Surface Transportation Infrastructure Finance Commission.

tion to test the feasibility of this approach through demonstrations.<sup>19</sup> There are important questions about the political and technical feasibility and cost of a VMT fee system that could be resolved through a large-scale demonstration program. This concept is also linked to energy conservation and climate change mitigation strategies, because a VMT fee could be easily adjusted to charge a premium for fuel-inefficient vehicles. The committee that prepared TRB Special Report 299 (discussed in more detail in the next section) commissioned a paper by the architects of Oregon's previous 6-year pilot program in this area, which was completed in 2007.<sup>20</sup> Based on their analysis, the committee estimates that a 10–12 year demonstration program would probably cost \$70 to \$100 million.<sup>21</sup> TRB's National Cooperative Highway Research Program recently published an analysis by RAND researchers on the feasibility of implementing simplified VMT charging systems on a more rapid timescale; these researchers concluded that it would be premature to move toward implementation of these systems without carrying out a demonstration and test program.<sup>22</sup>

### **Environmentally Sustainable Transportation**

Addressing climate change and our nation's reliance on energy are high priorities for the administration and Congress. Transportation accounts for 28 percent of U.S. GHG emissions and is almost totally dependent on petroleum for fuels. Transportation consumes about twice as much petroleum annually as the United States produces, which results in our dependence on foreign sources. Just three weeks ago TRB released a committee's report that recommends the authorization of research programs to help mitigate transportation's contribution to climate change and adapt transportation infrastructure to climate change.<sup>23</sup> These topics have received relatively little attention in U.S. DOT's R&D programs in the past, so the gaps are considerable. Mitigation topics, in particular, will become much more important if climate change legislation is enacted that contains provisions in Waxman-Markey and Kerry-Boxer bills that require additional measures for the transportation sector. These measures include having EPA set targets for GHG emissions reductions and would require states and metropolitan areas to analyze options, plan for, and implement GHG emissions reduction strategies, with federal oversight of these activities.

TRB Special Report 299 recommends a mitigation research program that would total \$190 million over six years. This report does not address research on vehicles and fuels that the Department of Energy might fund. Rather, it makes recommendations for U.S. DOT research. The committee's report identifies both key topics of research and initial projects to undertake.<sup>24</sup> The latter would focus on providing policy and technical guidance based on available information and expert judgment to the tens of thousands of federal, state, and local officials who make decisions about infrastructure and land use. This area of policy and technical guidance is estimated to cost \$60 million of the recommended \$190 million mitigation research program. To highlight just some of the mitigation topics identified in that report, I'll mention (a) the importance of providing state and local officials with better guidance about the benefits, costs, and cost-effectiveness, of different mitigation strategies that they might employ, and (b) improving the technical tools that states and metropolitan areas will rely upon to evaluate alternative policies and infrastructure investments. A previous TRB committee identified key shortcomings of the travel forecasting models that are central to this analysis process and recommended both research and technology transfer to improve the state of the practice.<sup>25</sup> In addition, a report TRB released in August of this year identifies the potential benefits of combined land use and transit investment strategies in terms of reduced travel

<sup>19</sup>Special Report 285 *The Fuel Tax and Alternatives for Transportation Funding*. Transportation Research Board of the National Academies. Washington, D.C. 2006.

<sup>20</sup>Special Report 299 *A Transportation Research Program for Mitigating and Adapting to Climate Change and Conserving Energy*. Transportation Research Board of the National Academies. Washington, D.C. October 2009.

<sup>21</sup>See Appendix A of Special Report 299.

<sup>22</sup>Sorenson, et al. 2009. Implementable Strategies for Shifting to Direct Usage-Based Charges for Transportation Funding. NCHRP Web-Only Document 143. [http://trb.org/Publications/Blurbs/Implementable\\_Strategies\\_for\\_Shifting\\_to\\_Direct\\_Us\\_162252.aspx](http://trb.org/Publications/Blurbs/Implementable_Strategies_for_Shifting_to_Direct_Us_162252.aspx).

<sup>23</sup>Special Report 299 *A Transportation Research Program for Mitigating and Adapting to Climate Change and Conserving Energy*. Transportation Research Board of the National Academies. Washington, D.C. October 2009.

<sup>24</sup>See chapter 3 of Special Report 299.

<sup>25</sup>Special Report 288 *Metropolitan Travel Forecasting: Current Practice and Future Direction*, Transportation Research Board of the National Academies. Washington, D.C. 2007.

and CO<sub>2</sub> emissions.<sup>26</sup> The research recommendations from these reports are incorporated into the recommendations made in Special Report 299.

The committee that prepared this report proposes that the initial emphasis be on guidance to officials, but, because of uncertainties in a number of areas, it also recommends a fundamental research program that would be modeled on the processes followed by the National Science Foundation. The committee's report identifies major areas of uncertainty that the program should address, including: the total GHG emissions associated with the construction, operation, and maintenance of infrastructure for different modes over their full life-cycle; improved quantification of external costs; research on travel behavior to improve model design and calibration; improvements to the state of the practice in travel models; incorporation of full social cost and benefits estimates in the evaluation of alternatives; infrastructure system management and operations; and others. This \$130 million component of the recommended mitigation program would convene scholars and experts to identify the most promising areas of research, issue Broad Agency Announcements inviting proposals, and engage scholars and experts in merit review of proposals and peer review.

Special Report 299 also recommends an adaptation research program that would total \$90 million over 6 years and identifies specific research topics to pursue that would provide guidance on identifying vulnerable assets and develop decision tools to help public officials weigh the risks and benefits of different strategies.<sup>27</sup> The research recommendations of Special Report 299 build upon the recommendations of a 2008 TRB committee report that argued for the importance of beginning to adapt vulnerable assets to protect people and infrastructure against floods, storm surges, and heavy precipitation.<sup>28</sup> Roughly half of the U.S. population resides in coastal counties, so a substantial share of the population and transportation infrastructure is at risk. The priorities for adaptation research are to develop a process to help states and counties identify at-risk infrastructure and to develop decision tools to help officials weigh the uncertainties of climate impacts and the costs and benefits of taking protective measures.

Although the committee that prepared Special Report 299 includes many specific research topics in its report, it also stresses the importance of engaging officials, experts, and practitioners in the prioritization of the individual projects that should be pursued, in merit review of proposals to conduct the research, and in peer review of the completed research. If Congress decides to authorize the recommended research program, it should also require that these processes be incorporated in the program.

### Data Collection

Data collection is necessary to support research in all the goals listed above. Data collection is among the activities supported through U.S. DOT R&D budgets, but many of our committees have found major gaps and problems with available data. These problems will become more acute if, as expected, the next surface transportation authorization requires performance-based reporting on the results of expenditures of federal funds. In addition, if climate change legislation provisions were to be enacted such as those in the Waxman-Markey bill or the proposal of Chairman Boxer and Senator Kerry, then states and metropolitan areas would be required to conduct analyses of mitigation strategies that would demand much more extensive information about travel and land use at the neighborhood level.<sup>29</sup> States and every metropolitan area would require much more accurate and extensive measures of vehicle miles of travel (VMT) by road and vehicle type—including average speeds and speed distributions by time of day—to establish baselines from which to subsequently monitor the effects of different mitigation strategies on greenhouse gas (GHG) emissions.

TRB committees have consistently recommended support for and enhancement of two critically important surveys of U.S. DOT: the National Household Travel Survey (NHTS) and the Commodity Flow Survey (CFS).<sup>30</sup> The committees that prepared Special Reports 299 and 277 also recommended research on ways to improve data

<sup>26</sup> Special Report 298 *Driving and the Built Environment: The Effects of Compact Development on Motorized Travel, Energy Use, and CO<sub>2</sub> Emissions*. Transportation Research Board of the National Academies. Washington, D.C. 2009.

<sup>27</sup> See Chapter 4 of Special Report 299.

<sup>28</sup> Special Report 290 *Potential Impacts of Climate Change on U.S. Transportation*. Transportation Research Board of the National Academies. Washington, D.C. 2008.

<sup>29</sup> See Special Report 299, Appendix B.

<sup>30</sup> Special Report 295 and Special Report 277 *Measuring Personal Travel and Goods Movement: A Review of the Bureau of Transportation Statistics' Survey Programs*. National Research Council of the National Academies. Washington, D.C.

collection through reliance on new and emerging technologies. Given the cost of surveys and problems with response rates to surveys that rely on compilation of travel diaries, development of these alternatives is becoming a necessity. We are just embarking on a study to identify key passenger and freight travel data and to recommend data collection and funding strategies to obtain these data. As important as they are, the NHTS and CFS are not the only important surveys, nor would funding them adequately cover all the gaps, especially if Congress requires extensive reporting on performance measures as part of reauthorization.

### Conclusion

In principle, a comprehensive surface transportation research agenda should exist that, for a particular moment in time, relates research initiatives to specific goals and details those initiatives in terms of projects and project budgets. In practice, such a comprehensive, U.S.-wide agenda is almost never available because of the scale and difficulty of the task, the multiplicity of institutions and stakeholders involved, and the constantly shifting set of research needs, opportunities, and priorities. TRB's experience with managing two strategic highway research programs has been that moving from the level of defining the goals that research should achieve to the level of specifying which projects should be carried out to meet these goals requires concerted intellectual and planning effort by experts and stakeholders. Following both of the TRB special reports that led to SHRP 1 and SHRP 2, AASHTO, U.S. DOT, and industry invested thousands of person-hours of effort by federal, state, and private officials and researchers and invested millions of dollars to develop detailed research program plans and scopes of work for individual projects. Similar effort has gone into FHWA research road maps developed by FHWA's safety, operations, infrastructure, and RD&T offices, as well as in the development of FTA's research program plans to implement its R&D strategic plan and the development of FRA's R&D agenda. The next section describes the processes that need to be put in place so that when Congress authorizes funding to meet certain goals it can be assured that the capability exists to execute a program to meet those goals.

### HOW RESEARCH SHOULD BE CARRIED OUT

Although the content of U.S. DOT's research program is of great interest to our committees and other stakeholders, we should equally emphasize the importance of the process of strategic R&D planning, agenda setting, merit review by peers of competitively solicited proposals, peer review of completed research, and extensive involvement of stakeholders in all of these steps. If the processes are right, we can have higher confidence that the research will address the right questions, produce results that are useful, and have greater probability of being implemented.

In transportation infrastructure and regulatory matters, which often involve multiple levels of government in the development and delivery of public infrastructure, the process matters just as much as the content. Requiring such processes may be the best mechanism available through legislation to ensure that the research is relevant, meets the highest standards of science, and maximizes the success of technology transfer programs. In this regard, I encourage you to consider requiring the organization of U.S. DOT research programs according to the principles for research that were articulated in the preamble of Title V of SAFETEA-LU, as slightly reorganized by the RTCC.<sup>31</sup> In a nutshell, these principles are:

- 1. Federal support of the full innovation cycle from agenda setting through to implementation and evaluation;
- 2. Limiting federal support to research activities of national significance, public benefit and inadequate private investment, or as the best means to further federal goals;
- 3. Content of the federal program should include fundamental research, filling significant gaps, and policy and planning;
- 4. Extensive stakeholder involvement in the development and execution of R&D plans and technology transfer;
- 5. Most awards made on the basis of competition and merit review;
- 6. Program-level evaluation; and
- 7. Consistency with the U.S. DOT R&D strategic plan.

If I'm not mistaken, these principles resulted from the contributions of this subcommittee to Title V of SAFETEA-LU and have affected U.S. DOT programs. FHWA, for instance, has committed itself to these principles in its *Corporate Master*

<sup>31</sup> See Special Report 295, pg. 87.

*Plan for Research and Deployment of Technology and Innovation* and is organizing its activities accordingly.

### **Full Innovation Cycle**

Much, if not most, of the R&D supported by U.S. DOT is for activities almost wholly within the public sector. This is why support for the full innovation cycle is so important. It is not as if U.S. DOT can simply conduct precompetitive research and then expect the private sector to turn this into products. In most cases, public owners of highway, transit, and intercity rail are the customers of the research, which requires support for activities to help ensure that useful products are implemented, as described in more detail in the next section on the innovation deployment process.

### **Federal Support**

Private R&D funding is typically minimal in the transportation infrastructure sector because of the lack of incentives and opportunities for profit (see “barriers to innovation” discussion in the next section). Moreover, federal investment in research is often the best way to advance public understanding about potentially important topics that may not be understood or accepted by the public. For example, the authorization of pilot programs for congestion pricing over previous surface transportation bills, as recommended by one of our study committees,<sup>32</sup> has led to the adoption of High-Occupancy Toll Lanes in several metropolitan areas. Federal support for investigating the potential for VMT fees could lead to an acceptable alternative method for taxing road and highway use.

### **Content**

The RTCC has consistently recommended that FHWA allocate a larger share of its research to higher-risk, longer-term research.<sup>33</sup> The federal government is the only source of such research in surface transportation—it is usually not being done in state programs or in the private sector and is too applied for NSF. Such investment is necessary to bridge the gap between basic and applied research. In TRB Special Report 261, the RTCC suggested that at least 25 percent of FHWA’s portfolio be allocated to higher-risk, longer-term research; 50 percent should be allocated to fill gaps in research not being covered by other programs and on emerging issues of importance, and 25 percent for mission-oriented research on policy and regulation, technology transfer, and training. These proportions may differ over time and across agencies depending on the agency’s mission and stakeholders, but this portfolio approach is a useful way to analyze the strengths and weaknesses of U.S. DOT R&D programs.

### **Stakeholder Involvement**

In many cases, the processes for carrying out research are inseparable from the content and the customers of the research. Stakeholder involvement is particularly critical in FHWA’s RD&T because much of what FHWA does is produce technology, tools, and products that will be implemented by the states and local governments that own, operate, and maintain the nation’s roads and highways. Thus, the topics that FHWA pursues and the products that are developed need to be closely aligned with its state and local partners. Although FRA’s and FTA’s research programs have somewhat different orientations, TRB committees that review these programs have consistently commented on the importance of ensuring that there is a customer for the results of their projects and that these stakeholders have been consulted in the selection of projects to be pursued.<sup>34</sup>

The committee that prepared Special Report 299 recommends different kinds of stakeholder processes appropriate for the applied and fundamental research programs it recommends.<sup>35</sup> The more applied mitigation and adaptation research topics should be steered by the concerns and needs of policy makers and practitioners, while the fundamental research topics should be organized along the NSF model in which scholars and experts are guiding the decisions about which projects are likely to be most promising. Within FHWA’s program, the RTCC recommends a different

<sup>32</sup> Special Report 242. *Curbing Gridlock: Peak Period Fees to Relieve Traffic Congestion*. Transportation Research Board, National Research Council, Washington, D.C. 1994.

<sup>33</sup> Special Report 295 and Special Report 261 *The Federal Role in Highway Research and Technology*, Transportation Research Board of the National Academies, Washington, D.C.

<sup>34</sup> Committee for the Review of the FRA R&D Program, Letter Report of April 29, 2008. [http://onlinepubs.trb.org/onlinepubs/reports/frar&d\\_April\\_2008.pdf](http://onlinepubs.trb.org/onlinepubs/reports/frar&d_April_2008.pdf) and Transit Research Analysis Committee, Letter Report of May 4, 2007. [http://onlinepubs.trb.org/onlinepubs/reports/trac\\_may\\_2007.pdf](http://onlinepubs.trb.org/onlinepubs/reports/trac_may_2007.pdf).

<sup>35</sup> See Chapter 5 of Special Report 299.

kind of stakeholder involvement for the Exploratory Advanced Research Program than for FHWA's applied RD&T.<sup>36</sup> The former requires strategic direction on priorities by policy makers and technical guidance on promising research to meet those priorities by experts, who should also be involved in merit and peer review. The latter requires stakeholder and expert involvement in problem identification, merit review, and peer review.

As you may know, one of TRB's main services to the transportation community is to manage research programs for others. TRB currently manages cooperative research programs for state departments of transportation (DOTs), transit agencies, airport operators, programs in the fields of freight transportation and hazardous materials for diverse constituencies, and we also manage the special purpose, limited-duration Strategic Highway Research Program (SHRP) 2. SHRP 2 was requested by state DOTs, authorized by Congress in SAFETEA-LU, and is funded as a take-down on state capital programs in Title I. We believe that the processes of stakeholder involvement we follow have been critical for the successes of these programs. The National Cooperative Highway Research Program is a pooled-fund program of the states that has been in existence for more than 45 years and has had virtually 100% participation by the states over that period. This voluntary program, which depends on annual contributions by the states, would not have survived for so long had the states not found it of value.

#### **Competition and Merit Review**

TRB committees reviewing federal programs and recommending research programs have consistently supported the principles that proposals be solicited through open competition and that decisions about awards be based on merit review by peers.<sup>37</sup> Research earmarking is a serious threat to the efficacy of transportation research, as it is in other fields of science and engineering. The more that your committee can do to assure that the programs are competitive, the more likely they are to be successful.

#### **Program-level Evaluation**

U.S. DOT does support healthy program-level review of its RD&T activities. TRB is currently convening independent committees of experts to review FHWA's overall program (the RTCC) as well as particular FHWA R&D initiatives (the Long-Term Pavement Performance Program and the agency's pavement research and deployment activities), and additional reviews are under discussion. Committees are also reviewing the R&D programs of FRA and FTA. From time to time in the past, Congress has asked for reviews of specific U.S. DOT programs and special R&D initiatives.<sup>38</sup>

#### **R&D Strategic Planning**

Strategic planning for R&D can be a useful exercise if done right and with appropriate expectations. It is clearly beneficial to align R&D programs with strategic goals set by Congress and the administration, and some proportion of the federal program should be strictly focused on these priorities. However, many of the R&D activities of FHWA and, to a lesser extent, FTA are addressing RD&T topics in support of stakeholders in the highway and transit communities who have the responsibility to deliver technology to customers. Much of FRA's R&D supports FRA's safety regulatory mission and individual rulemakings that have often been years in the making. Hence, we should expect that a significant part of U.S. DOT R&D will be driven as much by a "bottoms up" as by a "top down" perspective.<sup>39</sup> This is appropriate in my view because support of the innovation process by states, counties, and transit authorities through RD&T is an important way to further federal goals of efficient use of resources, safety, mobility, and environmental conservation. Research results are much more likely to be implemented if the people and organizations that will have to implement them are involved in the shaping of the research agenda and in oversight of the conduct of the research. In addition, it is very difficult for any one person or group to understand the nature and extent of the problems being faced by agencies delivering transportation to citizens or to know which

<sup>36</sup> Special Report 295, pg. 90.

<sup>37</sup> See Special Reports 295 and 299 as examples.

<sup>38</sup> See, for examples, *Estimating Demand for the National Advanced Driving Simulator*, TRB, National Research Council, Washington, D.C. 1995 and Special Report 253: National Automated Highway Research Program: A Review. Transportation Research Board of the National Academies, Washington, D.C. 1998.

<sup>39</sup> Research and Technology Coordinating Committee, Letter Report of August 2, 2009. [http://onlinepubs.trb.org/onlinepubs/reports/RTCC-\\_letterreport\\_usdotrd&t.pdf](http://onlinepubs.trb.org/onlinepubs/reports/RTCC-_letterreport_usdotrd&t.pdf).

potential solutions might work. For all these reasons, stakeholder involvement is critical to selecting the right research and ensuring adoption of research results.

#### DELIVERY OF INNOVATION

##### Impediments

Adoption of innovation is a challenge in the public sector generally, and there are particular impediments in transportation infrastructure. Brookings' scholar Anthony Downs observed decades ago that the public sector fails to reward success but severely punishes failure; hence administrators of public facilities have few incentives to take risks and many to avoid them.<sup>40</sup> Transportation infrastructure managers are also inherently conservative about change because (a) public safety is uppermost in their minds and (b) they are often making decisions about committing tens of millions of dollars to build and maintain assets that are expected to be very long-lived. This problem is compounded in the administration of highway and transit programs because almost all roads and transit facilities are publicly owned and operated and must abide by public procurement policies.<sup>41</sup> Although these policies have gone a long way toward promoting open competition and avoiding graft, they have a downside as well. Most goods and services must be purchased in a low-bid environment that tends to focus on initial costs rather than life-cycle costs. In an effort to ensure minimum levels of quality, procurements often include highly detailed specifications and require strict adherence to formally-adopted standards. These practices have important benefits, but also tend to stifle innovation. Moreover, public laws and regulations make it very difficult for public agencies to purchase innovative proprietary products, which discourages the private sector from investing in the R&D needed to develop innovations for the highway and transit goods and services markets. For these reasons and others, innovation in transportation infrastructure can rarely rely on market incentives to encourage adoption of new products and services.

##### Elements of Successful Strategies

The committee that prepared TRB Special Report 296 recommends important principles and strategies for implementation of the expected products from the second Strategic Highway Research Program (SHRP 2). Several of these principles and strategies emerged from the experience with implementing the first SHRP and can provide a framework for implementation of transportation research in general. First, the committee acknowledged that implementation is resource intensive: it can cost at least as much, and perhaps several times more, to implement research results as to conduct the research itself. Moreover, in a large, complex, decentralized community such as highways or other transportation modes, it can take a long time for innovations to spread and become standard practice. Approaches recommended by the committee to foster the adoption of research findings include the following:

- Engage the full array of stakeholders throughout the process: different innovations have different user groups, as well as groups that may feel threatened by innovation; each needs to be engaged and their issues and needs addressed; ideally, this process should start when research objectives are being identified and continue through the conduct of research so that users are ready to implement the results they asked researchers to produce.
- Communicate ceaselessly: communication is not all there is to implementation, but the large number of potential users, the highly decentralized nature of the highway industry, and the time it can take for innovations to spread mean that it can never be taken for granted that everyone already knows about research results and how to implement them.
- Choose the right implementation strategies: there are many potentially effective implementation strategies, but not every strategy is appropriate for every product or user audience; research products and potential users should be carefully studied to determine which strategies are most likely to be effective in each case.

<sup>40</sup>Anthony Downs. 1957. *An Economic Theory of Democracy*. Harper Books, NY.

<sup>41</sup>This discussion draws from *Building Momentum for Change: Creating a Strategic Forum for Innovation in Highway Infrastructure*. Transportation Research Board, National Research Council, 1996, pg. 14, Special Report 261 *The Federal Role in Highway Research and Technology*. Transportation Research Board of the National Academies, Washington, D.C. 2001, and Special Report 296 *Implementing the Results of the Second Strategic Highway Research Program: Saving Lives, Reducing Congestion, Improving Quality of Life*, Transportation Research Board of the National Academies, Washington, D.C. 2009, pp. 95–97.



- Take advantage of implementation mechanisms that are proven to be effective: these include, from the first SHRP's implementation efforts, strategic packaging and branding of related products, technical assistance for users, follow-on research, testing, and evaluation, lead state programs, demonstration projects, training, curriculum development, use of Local Technical Assistance Programs (LTAP), and partnership with standards-setting organizations and entities that develop standard design guidelines, such as the AASHTO Policy on Geometric Design of Highways and Streets (the "Green Book"), the Highway Safety Manual, the Manual of Uniform Traffic Control Devices, and the Highway Capacity Manual.
- Develop new or special implementation mechanisms where needed: as more "non-traditional" research is performed (in environmental, economic, and human factors areas, for example) the stakeholder groups may differ and new implementation mechanisms may be needed to effectively reach these potential users and support their implementation of research results.
- Provide for long-term stewardship of products such as databases, software, and web tools: increasingly, research results are taking the form of or are accompanied by electronic products that require long-term maintenance, updating, quality control, and user support; these activities must be budgeted for and not be in competition with proposals for new research and implementation efforts.<sup>42</sup>

In addition to recommending very similar steps as those recommended above in Special Report 296, the RTCC has noted that overcoming the risk of some high-cost projects using new materials or processes may require incentives to help states overcome the risk of premature failure.<sup>43</sup> The RTCC also recommended monitoring and learning from efforts to implement research results. Our committees have observed elements of all these strategies at work in individual FHWA projects and programs, and many successful examples could be cited, such as the new Safety Analyst and Interactive Highway Safety Design Module projects developed by FHWA in conjunction with state DOTs and highway safety researchers. What has been lacking are the necessary resources to organize and carry out a program on the scale of that recommended in Special Report 296; the committee for that study estimated that a 6-year effort to support implementation of all the products expected to come out of SHRP 2 would cost \$400 million.

The committee that prepared Special Report 296 also identified knowledge management as key to facilitating the translation of research results into successful implementation. It is a broad concept that encompasses access to and sharing of information, networking and collaboration, and stewardship and archiving of data and information. It is dynamic and responsive and includes repositories of written information, as well as the collective knowledge of individuals, together with methods for accessing the information. Knowledge management is supported by and carried out through an array of methods and technologies. Information technology can significantly increase the scope, scale, integration, and timeliness of these methods; such technologies include online searchable databases and libraries, use of the Internet to communicate with colleagues around the world, on-line conferencing tools, backboards, and wikis. In 2006 a TRB committee recommended the development of a transportation knowledge network to address declining transportation library and information resources at the state and federal level; its recommended program of activity could provide for much of the needed information technology and access to technical materials for the highway field.<sup>44</sup> The committee recommended federal funding to support this effort, through RITA's National Transportation Library, that would range between \$3 and \$5 million in the first three years and \$5 to \$8 million in subsequent years (with local matching funds the total effort would range from \$7.5 to \$13 million).

As you may know, our precursor organization, the Highway Research Board, was created in the 1920s to serve as an intermediary between the federal government and states and among the states to share information about ongoing research, avoid

<sup>42</sup>The committee that prepared *Preserving and Maximizing the Utility of the Pavement Performance Database* (TRB 2009) concluded that it is critical for FHWA to organize itself to sustain and make accessible the massive and complex LTPP database so that it can be mined for improved pavement designs and pavement design guidance.

<sup>43</sup>Special Report 256 *Managing Technology Transfer: A Strategy for the Federal Highway Administration*. Transportation Research Board, National Research Council, Washington, D.C. 1999.

<sup>44</sup>Special Report 284 *Transportation Knowledge Networks: A Management Strategy for the 21st Century*. Transportation Research Board of the National Academies. Washington, D.C. 2006.

duplication in research, and to encourage the implementation of research by bringing together researchers with practitioners. In 1974, the name of the Highway Research Board was formally changed to the Transportation Research Board to acknowledge the expansion of our activities into other modes and all disciplines engaged in the field of transportation. Today TRB's core programs support 200 standing committees involving more than 4,000 researchers, consultants, and practitioners from states, transit agencies, airports, seaports, metropolitan planning organizations, and private industry. In response to requests from sponsors, TRB hosts 40 to 50 specialty conferences and workshops annually, largely for the purpose of exchanging technical information. The TRB Annual Meeting draws 10,000 participants to participate in hundreds of sessions and review thousands of technical papers. These events draw the leading researchers and administrators in our field along with numerous practitioners seeking guidance. In addition to reviewing and presenting papers, the members and guests of standing committees participate in meetings devoted to sharing information and identifying research needs. With support from our federal, state, and private sponsors, we also provide a free online database of ongoing research projects (with 7,000 records) and, in collaboration with RITA, offer a free online bibliographic database with more than 735,000 records of completed research citations and abstracts. These databases are accessed millions of times annually. Through both formal and informal mechanisms, TRB provides a way for knowledge about new research findings to reach our sponsors, their staffs, and the public at large. It also provides opportunities for federal, state, and local agency staff to get to know each other and to collaborate on the ongoing process of innovation.

#### BIOGRAPHY FOR ROBERT E. SKINNER, JR.

Robert Skinner has been the Executive Director of the Transportation Research Board (TRB) of the National Academies since 1994. TRB is a non-profit organization that promotes transportation innovation by sponsoring professional meetings and publications, administering applied research programs, and conducting policy studies. It serves as an independent adviser to the federal government and others on scientific and technical questions of national importance.

Prior to becoming executive director, Mr. Skinner directed TRB's policy study activities. Before joining TRB in 1983, Mr. Skinner was a Vice President of Alan M. Voorhees and Associates, a transportation consulting firm.

Mr. Skinner recently served on the Metrolink (Los Angeles) Commuter Rail Safety Review Panel and chaired the Special Advisory Panel for the Stem-to-Stern Safety Review of the Boston Central Artery/Tunnel Project. In addition it serves on a number of university and research advisory groups including the Board of Trustees for the School of Engineering and Applied Sciences at the University of Virginia, the Advisory Board for the Center for Urban Transportation Research at the University of South Florida, the External Review Committee for the MIT-Portugal Project, and the Advisory Board for the School of Public Policy at George Mason University.

Mr. Skinner earned his bachelor's degree in civil engineering from the University of Virginia and received a master's degree in civil engineering from the Massachusetts Institute of Technology. A registered professional engineer, Mr. Skinner received the James Laurie Prize from the American Society of Civil Engineers in 2003.

Chairman WU. Thank you very much, Mr. Skinner, and thanks to the entire panel. We will now open for our first round of questions, and the Chair recognizes himself.

Sort of slightly different from what I always do of focusing immediately on brief questions, I want to let the panel know that over the course of three hearings, it has become increasingly apparent to me that the research enterprise at Transportation seems to be fundamentally different from the relationship that research has to departments such as Defense or Energy. And as I try to get my arms more fully around this, whether it be beneficial to encourage the restructuring the national research enterprise, it seems that some significant drivers toward this vulcanized and very—well, something that is very tied to immediacy and something that is broken up over many different pieces, one problem is Congress itself in that there are no discretionary research funds for DOT.

Your research dollars in SAFETEA-LU were fully earmarked, and that is something to examine and perhaps to change.

In terms of sheer quantity, the SPR [State, Planning, and Research] funds at the state level, it is two percent. And Mr. Pederesen, I believe in your testimony it is two percent and only one-quarter of that is really allocable to research functions, and that is used for training purposes also.

So I think at the large-picture scale, we want to examine whether this scale of the research enterprise and its relationship to operating programs is appropriate going forward. It is like we have decided that roads have been built since Roman times, and we are not going to look that much, except for ITS, into vastly different ways of delivering transportation. At least that is an early assessment based on this series of hearings, and I suspect we will investigate this further in and out of hearings.

And any of you who choose to address this can come back to it. But first, Mr. Appel, and Assistant Secretary Trottenberg, the relationship between DOT research programs and other programs, whether in the academic community or in state organizations, there are other federal agencies, such as the National Science Foundation [NSF] and NIH [National Institutes of Health] which have formal programs for bringing people around the country, people who are expert in their fields, to spend some time at NSF or at NIH, and it is something that is valuable to the agency in bringing expertise to the agency, and it is valuable to the rest of the country in disseminating whatever is happening at the central agency and also helping folks around the country understand what is going on in Washington and the processes here which are relevant to what they are doing. What are the analogous programs at RITA and at the Department, the analogous programs to what is going on at NSF and NIH where it is an integral part of what they do and it is also viewed as an important career step for other folks, whether folks are coming from academia, university transportation centers or state departments?

Mr. APPEL. Well, I agree that this is a very important way to get new thinking and collaboration into the Department.

At the outset, I would say in the past we haven't done enough of it at DOT, and I am very happy to see the steps we are taking in that direction. There is a UTC director from Wisconsin that is on sabbatical now working in Assistant Secretary Trottenberg's office. Myself and my Deputy Administrator Rob Bertini have already put the word out to university transportation center directors across the country and their faculty that we are exploring opportunities for sabbatical programs at RITA and at DOT as a whole, and we have reached out to our colleagues in the Department.

So in a sense, while there hasn't been enough of it, we have got the wheels in motion to bring more outside talent in for fixed periods of time. We are talking to other government agencies about detail programs to get scientific and research experts into RITA, and I would hope to be able to say six months and a year from now that we have moved that forward. And I fully intend to be able to do that because as someone that has worked a lot more outside of DOT and transportation research than I have worked inside DOT, I see a lot of opportunity to pull that in. And in all the conversa-

tions and meetings I have with my colleagues at this table, I know there is great talent out there. So bottom line, we are moving that forward.

Chairman WU. Would it be helpful to have additional statutory authority?

Mr. APPEL. I think that is something that we need to talk about. I work pretty closely with the Assistant Secretary on what our thoughts are for authorization and what systems work and what we can do within the existing statutes, what might need to change. I welcome any comments you have.

Ms. TROTTEBERG. I think that is something we would very much like to explore. I think we are, as Peter said, trying to get more scholars into DOT, more research and some scientists. I think DOT has not traditionally had an NSF-type focus, particularly because a lot of our programs that we have mentioned have previously been formula-driven. I think there hasn't been the research and innovation behind them that I think we now want to try and achieve. So moving forward, that is something I certainly think we want to look at in reauthorization.

Chairman WU. Thank you very much. Mr. Smith?

Mr. SMITH. Thank you, Mr. Chairman, and again I thank the witnesses.

Assistant Secretary Trottenberg, if you wouldn't mind, you touched a little bit on urban livability and rural livability. Could you expand on rural livability?

Ms. TROTTEBERG. As Mr. Pisarski said, there are a lot of definitions of livability out there because it is a pretty complicated and new concept, and I know that can be frustrating. It is not as simple to explain as achieving a state of good repair or safety. But I think the simplest for us may be to put it in the transportation context which, at DOT, we view as providing affordable transportation choices. It is not foisting a lifestyle or a particular type of transportation on anyone. We see it as meeting a demand that we see all over the country. Obviously, it is different in different parts of the country, but for example, in rural areas, there is a huge demand for bike paths, pedestrian ways, ways kids can get to school without having to be driven. They can walk and hop on their bikes. There is a growing demand, as the population ages in some rural areas, for seniors to have mobility that doesn't necessarily involve an automobile. The issue is, and you know this, in rural America, sometimes the issues of access to jobs and healthcare and services are more acute than they are in urban areas. In urban areas, truthfully, there are usually a lot of good transportation options.

So we actually think livability is a concept that has tremendous applicability everywhere. It is not going to be big transit systems in a rural area, but it might be a van service. It might be a bike path. It might be solutions that will provide an option, not that people are giving up their cars, but that they will have another way to go if they don't want to drive.

Mr. SMITH. Thank you. I know that a lot of these decisions are going to be tough. I mean, if you don't mind my walking down memory lane here, when I was on city council I know we had a residential intersection where one resident complained that there was too much noise because there was a dip in the street. So the city

council said, well, you want a stop sign? No, emissions from a stop sign and the related impact. So I mean, these are tough decisions, and you know, the bicycle issue I think is one—I find it a bit ironic that here in Washington, D.C., I don't find the downtown area to be really at all bicycle friendly. I am also not advocating tying up a lane of traffic in that effort.

But again, the decisions are difficult. On the CAFE standards versus safety, I mean, we have data from the 1970s and '80s. The 2001 National Academy of Sciences Report showed that probably 1,300 to 2,600 traffic fatalities occurred per year additionally because of CAFE standards. President Obama did announce that he wants to increase CAFE standards even higher from 27-1/2 miles per gallon to 35-1/2 miles per gallon by 2016, and there are going to be some tradeoffs there. And I don't think that is an intended effect, obviously, but would you care to comment on that?

Ms. TROTENBERG. We have many panelists here who are experts on technology, particularly in terms of automobile components. There are wonderful technologies moving forward, including building parts of an automobile that can be much lighter but just as strong and crash-proof.

I am hoping that we won't have to have a trade-off between safety and emissions standards, that in fact you can really achieve both.

Mr. SMITH. I can appreciate that, but when we have a CAFE standard that is nearly stand-alone in terms of raising that number from 27-1/2 to 35-1/2, not considering other issues for all intents and purposes here, I hope that we can move some other things along.

I mean, I remember in high school I drove a vehicle that got nearly 50 miles to the gallon, and I am still here to—I lived to tell about it. And yet, that was based on a consumer choice, really, rather than so many other things. But the last thing I want is the American people blaming the government on a spike in traffic fatalities when perhaps some decisions weren't as consumer-based as they could have been or should have been.

Mr. Skinner, I did want to ask a bit on the VMT study. Or did you say it would be a study and you mentioned the cost. What was that cost again?

Mr. SKINNER. That cost I think I said was \$70 to \$100 million.

Mr. SMITH. And that is just for the study?

Mr. SKINNER. That is for the study. And that was over a considerable period of time. My personal view is that if we seriously want to move toward that kind of a system and do the research that is necessary to not only plan and consider options but to design a system, this is a very big deal. It will cost a lot of money. It will many years to do it, and it is going to require some kind of special governance structure because of the policy and political dimensions of this that will have to be addressed at some point.

Mr. SMITH. Right.

Mr. SKINNER. The research program that tackles this issue will be making decisions throughout that have policy implications downstream.

Mr. SMITH. Obviously rural Americans aren't really excited about such an approach for obvious reasons. I know the objective, do you

see any way to accommodate the concerns of some in rural America that, you know, they would feel that that is an affront?

Mr. SKINNER. First, again speaking personally, it is not clear to me that rural Americans, once they understand the options available to us, would object to such a scheme. There is a lot of issues that have to be decided. There would be the capability to price in a variety of different ways, but there would also be the capability to have very simple pricing strategies that look similar to what we have today.

Mr. SMITH. How far off do you see a workable VMT?

Mr. SKINNER. There was a recent study sponsored by the National Cooperative Highway Research Program that was performed by the Rand Institute that thought we might be able to start transitioning by as early as 2015. My personal view is that that is optimistic. I think that we are going to have to have, and all the studies have called for this, large-scale pilots, large-scale demonstrations of which Chairman Wu's home state is pioneer, before we are at a stage ready to implement something on a nationwide basis.

Mr. SMITH. Okay. Thank you. I will wait for the next round.

Chairman WU. Thank you very much, Mr. Smith. Just to follow up on one of your inquiries and sort of independent line of inquiry also, Mr. Pisarski, you cited in your written testimony that we have achieved in the United States a commendable 20 percent decrease in fatalities, sort of the one crisp metric. The Germans and French have, over the same period of time, achieved a 60 percent reduction in fatalities. What has permitted them to reduce their fatalities by a greater percentage and also have they been able to achieve this while also achieving better energy efficiencies in their vehicles?

Mr. PISARSKI. I really don't have the answer for you, Mr. Chairman. In fact, it is, I think, one of the areas of research where we really need to do. What do they know that we don't know? What are they doing that we are not doing, some of the things that I have asked the question often and I can tell you some of the answers I have gotten. One of the questions I have asked is what percent of fatalities are caused by the road condition itself, the physical design and shape of the road? And the Europeans will say to me, that is the wrong question. The question is how can we design the roads and the condition so that they will not ever contribute, in fact, will solve the problems caused by other things, drunk drivers, et cetera? So I think that is an area where I am very impressed with what they are saying.

But I think in the second level, there is a willingness, there may be a willingness there to be more draconian in their policies that perhaps we have not yet been quite willing to get to.

Chairman WU. One or two examples?

Mr. PISARSKI. Drunk drivers, \$1,000 fines, license taken away, holding people who serve the alcohol responsibly. So if you have a party at your house and somebody has an accident, you better have everybody sleep at your house because they are going to be charged if there is an accident. Very low speed limits in local neighborhoods because of the small villages. Neil knows much better than I do about this. But the difference between 25 miles an hour and 17

miles an hour in a local neighborhood where children are playing is dramatic in terms of its impact. And there is a whole array of these things that I think are going on that I just would love to know much more about, and as proud as we can be at our success, I think there is a lot more important things happening in other countries that we can learn from.

Chairman WU. Mr. Skinner, you wanted to pitch in also?

Mr. SKINNER. I just want to mention that we have a National Academies study that is just beginning the review process that is specifically looking at the experience of other highly developed countries that are surpassing us in terms of their improvement in highway safety. And that report should be out probably within two months. And it is almost certainly going to address the sort of things that Alan Pisarski has mentioned, more stringent measures against drivers who are intoxicated. They are more likely to have roadside stops, more rigorous speed enforcement, more use of automated speed enforcement, and interestingly, just a greater national awareness of the problem and a systems approach to the management of highway safety.

Chairman WU. We will look forward to the report, Mr. Skinner.

Mr. Pedersen you indicated you have something to add here.

Mr. PEDERSEN. I certainly agree with Mr. Pisarski that more research is needed in terms of what has been effective in other nations, but I in fact just had a cousin from Norway visiting me over the weekend, and we were talking about some of the differences. They have had some of the similar reductions. They have a blood alcohol content limit of .02, rather than .08 which we have. As Mr. Pisarski said, the fines are far, far higher. Their judicial system basically does not let anyone off that is caught for drunk driving. We have defense attorneys who have made a living out of getting drunk drivers through the court system and off.

Speed limits in urbanized areas, particularly in small towns, are not only set low, they are very strictly enforced with very high fines. I remember when I visited him in Norway we would be on these arterial roadways that had 100 kilometer per hour speed limit. We would go into town. We would go down to 30 to 40 kilometers per hour. And I was following him. He was driving. And he never went one kilometer over the speed limit. No tolerance at all in terms of giving as we do in the United States a 10-mile-per-hour break on speed limits.

It is also a cultural issue. They are in countries like Australia, willing to do random testing of drivers to see if they have been drinking. That is not something we do under our Constitution. But it is what it has taken in some other countries to be effective in terms of getting the drunk drivers off of the roadway. And that is one of the biggest contributing sources that we have in the United States to our fatality rate.

Chairman WU. Thank you very much. We are going to move on, back to Mr. Smith, but offline I think we will have some inquiries about the distracted driving studies and also both drug and alcohol and their influence on problems on the road and fatalities.

Mr. Smith?

Mr. SMITH. Assistant Secretary, can you say whether or not the vehicle miles traveled [VMT] concept is on the table with the Department?

Ms. TROTTEBERG. You mean the VMT fees?

Mr. SMITH. Yes.

Ms. TROTTEBERG. Publically, that is not something we are not looking at right now. I mean, after saying that, obviously there is a lot of interest in research in the transportation community about it, and obviously we are following that and talking with folks. But I think at the moment, you know, the White House has made pretty clear that that is not something that we are pursuing.

Mr. SMITH. Okay. So obviously you may not agree that perhaps there is just a misunderstanding of the VMT in rural areas and that if people really knew more about it, they would support it?

Ms. TROTTEBERG. Well, I have actually looked at a lot of polling about the different ways that you could raise revenue to pay for our transportation needs going forward, and there often seems to be a link with comfortableness and understanding of something and how much support there is.

VMT fees is a very new and fairly complicated concept, and with concepts like that people tend to be suspicious of them. I mean, I got to visit Oregon and see the experiment there, and it was really quite fascinating. The receipts at the gas station printed out how much you would have paid in gas taxes and how much you were paying in VMT fees. And it was very transparent. It enabled you to take a look and see what the difference was in terms of price. And potentially, if you can see what you are paying and link that to what kind of transportation improvements you might be getting for the money, there might be more public acceptance of it. Just like now, the highest public acceptance of ways to pay is tolls because people generally perceive, I pay a toll on the bridge, I get to use the bridge.

There are also a lot of very interesting ideas about how you could perhaps for rural drivers who drive long distances adjust the VMT. Here is one idea. I am not endorsing it, just saying it is an idea out there. You could have a flat rate for a VMT fee, and for rural drivers that drive a lot over that amount, you could just cap them at the flat rate. Those that drive way under that, who are using bikes or transit, perhaps, if they wanted to, they could apply for a refund. And that way you are not excessively penalizing rural drivers but you also perhaps are giving a reward to those that are really reducing.

So I think there are potentially creative approaches going forward.

Mr. SMITH. Thank you. I appreciate your elaboration. I know that we talked about livability and communities and standard of living, quality of life, conditions and so forth. From what I can tell, both critics and advocates have characterized the livability initiative as primarily focusing on increasing the population density of metropolitan city centers. Would you concur with that, that that is an objective of the livability issue?

Ms. TROTTEBERG. No, I wouldn't say that the objective of livability is to increase density in urban areas, but I do think, and again, sort of broadening it from transportation to its larger con-



cept, one way I like to describe it sometimes is co-locating, housing, commercial activities and transportation choices. Now, that can apply in a rural area, as well as a suburban area, as well as an urban area. It usually is an effort to try and change the way, in a broader sense, we have often done local zoning in the United States. It is looking at saying housing, transportation and commercial space should all be separated, sometimes we might co-locate them. And the market is showing a big demand for that, not everywhere in the country but we are certainly seeing in DOT a lot of communities are interested in saying, look, if you build a transit stop instead of down-zoning around it, why don't we zone for commercial and housing? There is a demand for that. And again, it is in places where the demand exists. It is not trying to foist it on areas where people want to live in a more low-density environment.

Mr. SMITH. I like the terminology of foisting, to use your own words. I appreciate your reflection on that. I think it speaks to the larger issue, and for my involvement at the local government level to here in Congress, I always try to look for a win-win situation, win-win result where we can meet the needs and desires of an economy and the marketplace and consumers and individuals and freedoms and associated issues and still meet other needs as well.

So thank you, Mr. Chairman.

Chairman WU. Thank you, Mr. Smith. I think just about all of you referred to the need for improved data collection. Could you talk a little bit further about problems with DOT and state collection of data and what you would recommend to buff things up? Mr. Pisarski, I think you had some particularly sharp things to say about that. But whoever wants to go first. Ms. Flemer?

Ms. FLEMER. I think the conundrum we are really operating under is that there is a lot of data collected by different managers or operators of a transportation system, whether it is by local traffic engineers, the public safety folks, or highway traffic operations. It doesn't really get collected in a manner that would help us jointly deliver a better system of transportation. For example, what if we knew through the collection of data all of the different conflicts that might occur on city streets relative to walkability for schools, conflicts at signalized intersections, the emissions reduction opportunities that may occur at certain signalized intersections, which is an issue in terms of urban life? Part of it is really just getting it all in one place.

The issue that I think is important for us is not to say that more and more data needs to be collected out of whole cloth. The ability to reach out and see what is being collected today and how we can make it more useful to decision-making, that is the connection that I would make. There is one concern, of course, in terms of coverage for major data collection efforts such as real-time information, and the coverage we have on our Nation's highways and arterial systems is probably insufficient to manage the system as well as to measure its performance. And I do think that moving forward to cover more of our system with data collection is an important piece.

I do believe that local governments have a very difficult time adding that component into their day-to-day work because of their own economic and budgetary limits related to that. So to the de-

gree that there can be sub-regional or state-level efforts to then roll up to a more federal program of data collection I think would be more helpful in the long run.

Mr. PEDERSEN. I have many different aspects that I could address in this, but I would like to specifically address the issue of performance management and performance measures as related to data issues.

AASHTO has been doing a lot of thinking about national-level performance measures associated with authorization, and as we have gotten into addressing the potential performance measures, the inconsistency of definitions, the inconsistency of data collection methods makes it very difficult in terms of trying to develop national-level performance measures.

I will give you the example that almost everyone thinks should be the easiest and that is pavement conditions. And the methods by which pavement condition data is collected is 50 different states have 50 different ways of doing it. What the condition data of pavements are in Maryland using the same performance measure ends up being very inconsistent with our neighboring states and very inconsistent with what people would experience in driving between those states as well. It becomes far more complicated when you get into some of the softer performance measures, whether they be environmental measures or freight-related measures. So focusing on the data issues associated with a national performance management approach is one of the greatest challenges that I would say we have.

Chairman WU. And that uniformity function is either for a national association or for the Federal Government.

Mr. PEDERSEN. It would be a challenge for both of us, yes.

Chairman WU. Mr. Pisarski?

Mr. PISARSKI. Yes, Mr. Chairman. I am and have been very critical of our state of information. I actually ran the Department's statistical program in its early days and over the years have seen it go, come, change institutions, organizations, always with kind of a lack of funding and a lack of great degree of interest.

What has happened over the years is that it has kind of waxed and waned as some people were supportive or less supportive. The whole process has been very limited. If you go and look at the National Household Travel Survey which is fundamental to our national understanding of what travel behaviors are all about, all you have to do is look at the years in which it was conducted and you can see that it was conducted whenever we could pass the hat and find the money to do the survey. We did one that goes back to 1969. We did one in '95, and I said, well, good because we are living here in 1995. In 2000 there was no money, so we got around to it in 2001. In 2005 there was no money. There was \$20 million in state funds, in MPO funds, put up to support that program, to supplement it at the state and the MPO level, and the DOT couldn't find \$1.5 million to make the base work happen. And so it was delayed and delayed and delayed, and it is now becoming available finally. So in effect, we are going through this reauthorization with the same data we have from the last one.

Chairman WU. Mr. Pisarski, would you say that the data needs or the data deficiencies suffer from the same problem, the overall

research enterprise does that? That there is no systematic consistent effort that is episodic, if it occurs at all?

Mr. PISARSKI. Yeah, I think that is a great way to describe it. We tried to get some of the things stabilized, like the commodity flow survey which looks at national trade flows, and that has done relatively well. But it also has had its weaknesses and it has been cut over time. On the intercity passenger side, we know almost nothing. Our last survey was 1995. It was rather poorly done. And so if we are looking at things like high-speed rail, we know very little about it.

Urban goods movement is another great area of weakness. It is just a matter of focus and a matter of funding and having the institutions in place to support the program.

Chairman WU. Thank you very much, Mr. Pisarski. My time has expired, and I want to recognize Mr. Akin for five minutes of questions.

Mr. AKIN. Thank you, Mr. Chairman. Just before the bell here, in May of this year, Secretary LaHood said that the Administration's livability initiative was an effort to coerce people out of their cars and that we can change people's behavior, that is, with respect to how they travel.

What aspects of the livability initiative involve potential coercion or government rules or regulations, either imposed directly at the Federal level or incentivize at the local level with Federal funding?

Ms. TROTTEBERG. I think I won't grab that quote. I will just mention, Congressman Akin, before you——

Mr. AKIN. I just want to know if you stopped beating your husband, too, you know. It is kind of a hard question, but I think it is a pointed question.

Ms. TROTTEBERG. Right, and I was just discussing with the Ranking Member that the way we would probably prefer to cast livability is in its transportation context, providing transportation choices, and meeting a demand which we are seeing all over the country. And the demand is different in different parts of the country. In a more urban setting, it might be for mass transit. In a more rural setting, it might be for bike lanes and a van pool. But it is giving people transportation options. I think ultimately, hopefully, it is not really a coercion. It is meeting a demand that we are seeing all over the country. For example, in the Discretionary TIGER [Transportation Investment Generating Economic Recovery] Grant Program that we are conducting that you all gave us in the Recovery Act, we have gotten 1,400 applications from all over the country from the smallest communities to the biggest cities with a whole variety of projects that you would really consider livability projects, which are taking neighborhoods, streets and turning what is perhaps just a road with traffic going pretty quickly into one that can accommodate bikes, pedestrians, buses, whatever the local community is interested in having.

Ms. FLEMER. Maybe I can speak to this also. I am Ann Flemer with MTC, a metropolitan planning organization in the San Francisco Bay Area.

We are looking at livability more as an opportunity to express in measurable terms the likelihood that people will want to live in a more transit-oriented development. We have been undertaking a

number of initiatives, talking to people about what does it take? What the choice is that people are making in terms of their location in order so that we aren't looking at a coercive approach to dealing with livability. But what we found is that in identifying some measurement criteria with the community, such as whether it is access to transit, how long does it take to get to central services and destinations and the like, that we were able to show community by community how we are doing on a scorecard of livability and know whether we are really putting our investment in the right place relative to the improvements that would make current occupants of a livable community or a transit-oriented type development community as well as attracting more people to that choice.

So I do think that the issues of livability do not have to be related to the coercion or the densification of urban areas. I would add that there is one element to this, though, that with more and more focus and choice toward more densification, we are also going to have some other co-benefit which is a very important element of our planning, and that has to do with emissions reduction. Because if we are able to connect more communities through alternative transportation modes, we will do a better job in that regard as well.

Mr. AKIN. Do you think that just the way people spend their money to some degree or the way they choose to do something in a way is a scorecard in and of itself? For instance, I mean, you could put in mass transit in some communities, maybe people wouldn't use it.

Ms. FLEMER. That is right.

Mr. AKIN. Well, in a way they are voting with their feet. And they are just saying, well, whatever you did, you didn't do it the right way or it just doesn't provide the extra value that I need relative to some other alternative. So do you ever consider that or is this pretty much more of a sort of a government planning model?

Ms. FLEMER. No, it is very much tied to choice, and that does very much tie to how well our urban transit systems are being used. We are actually doing some evaluation now in certain of our counties to identify where transit is most competitive relative to being inviting to people's use and mapping that against where we deliver transit today. And you will start seeing some disconnects, and by virtue of those disconnects, we find we are not doing as good a job of getting an effective use of an investment.

So those kinds of tools and data collection and dealing with livability questions, I think, will go a long way toward making some different investment decisions.

Mr. AKIN. Thank you. Thank you, Mr. Chairman.

Chairman WU. Thank you very much, Mr. Akin. Mr. Carnahan, five minutes.

Mr. CARNAHAN. Thank you, Mr. Chairman, and I thank all the panel. Given the time, I think I am going to focus my questions to Ms. Flemer, and thank you for being here.

Congestion is clearly one of the greatest challenges that we are facing in our service transportation system, and we clearly can't just build our way out of that issue. What do you think are really the greatest inhibitors to communities relying more greatly on ITS solutions to really deploy technology better?

Ms. FLEMER. I think one of the biggest inhibitors is a lack of resources to dedicate to the technology when there is an opportunity to install technology or to evaluate whether technology makes sense for a certain investment at a local level. It is often in tradeoff with other very fundamental needs of a city or county, having to deal with pavement management, or improve pavement condition and other safety concerns.

What we have done quite a bit of in our region, as a bit of our own experience, we have 100 cities and nine counties, all of which have some level of traffic engineering expertise, and some of which are doing far better in the realm of intelligent transportation systems or the use of technology. We do quite a bit of peer-to-peer work among all of the cities to help each other out making those decisions so we don't replicate mistakes and also to get as much benefit as we can. We used some of our federal funding at MTC to actually create a panel of experts who are assisting from a technical basis, local traffic engineers, to make decisions on technology in order for them to be able to make those decisions more cost-effectively.

But I do think that the fundamental issue is the resource question.

Mr. CARNAHAN. The cost is the biggest driver. Obviously you can make the case for safety, you can make the case for reducing congestion. You think cost is still the biggest drive?

Ms. FLEMER. Well, cost and being able to quantify the relative benefit to the cost spent. Another example, in our region—we just evaluated major corridors, 12 of them in our region, as to what would be the best investment to improve the capacity and the operation of the freeways. We looked at everything from infrastructure expansion, but what came out to be the most cost effective was moving toward more technology for ramp metering. I mean, fundamental things. This is not new, cutting-edge technology. But the fact that we have not been able to evaluate the cost and benefit and bring that into a public discussion of investment choice was really an inhibition up to now.

Mr. CARNAHAN. So getting that real-world data to make those decisions, what do we need to do to get that data in the hands of those decision-makers?

Ms. FLEMER. Well, what we have—I think speaking just from the metropolitan level and our own commission, getting it in the hands of decision-makers was to collect it from what is already being collected today, rather from the state Departments of Transportation, managers of major arterials in our area. The data collection, though, is driven quite a bit, the opportunity for better data collection, from the technology that is imbedded, sensors, traffic signals, cameras and the like, in order for us to process in real-time data that is already being collected, and therefore can be used for making investment decision as well as real-time operational improvements.

Mr. CARNAHAN. I saved my easiest question for last, and that is, in our need to move away from strict reliance on the gas tax, how we can use technology to really, as we see more and more alternative fuel vehicles, whether it is biofuels, hybrids, plug-in electric, hydrogen, to be sure that we have a fair system, that it is fair, it

is perceived to be fair, but that all users are paying their fair share to support our system. How do you see technology being used to get us to that point?

Ms. FLEMER. Well, there is technology that is available today that we use for toll collection and for the type of pricing mechanisms that are related to the usage of the system, not necessarily a flat-rate VMT-based system, but one that charges according to the use of a particular portion of the network. An example for us today in the Bay Area is the development of high-occupancy toll lanes which would use technology that is already in place for our toll collection for bridges and to start a process of being able to invite people in to use the capacity, the existing capacity of the system, in the HOV [High-Occupancy Vehicle] lanes and to charge them if they are using that system as a single-occupant vehicle.

Moving to VMT, I believe there are technologies that are already being developed within vehicles to calculate and to disseminate information relative to how much usage on any given time period or in a certain part of the metropolitan area. If we were to do some kind of congestion or zone-based charging, that technology is well in place. And I think what we are really going to have to see, and I know there was a timeframe mentioned earlier about a 10- to 12-year period, I think that has to do as much with the development and the turnover of the auto fleet that will make that technology more available within the vehicles as well.

Mr. CARNAHAN. Thank you, and thank all the panel and I want to thank the Chairman for letting me visit this Subcommittee. I serve on the Transportation Committee, and so I am very interested in what you are doing here. Thank you.

Chairman WU. We are under five minutes, but we still have a few hundred Members of Congress who have not voted on the Floor, so we will not return to the topic of coercion versus choice in terms of livability, but I think that that is going to be a topic of long-term discussion as we go forward in reauthorization.

And as we do go forward in a long-term reauthorization, last question I think we have time for is what would each of you recommend to be at the top of the priority list in terms of inclusion in the R&D title for the transportation bill? And I will ask you to be brief in your testimony today, but this is something of course that we are very, very interested in in this Subcommittee and I am going to ask you to submit additional comments in writing. If anyone would like to address this topic now?

Mr. PISARSKI. Mr. Chairman, I think I can start by saying I would focus on the information requirements that I have already mentioned and particularly having the U.S. DOT conduct what was called the TINA, the Transportation Information Needs Assessment. And looking at where we are going, the fact that we have I think pretty much been a failure at trying to use data better for planning and policy purposes and now we are talking about stepping to a next level of using it for performance evaluation, using it for transparency, and areas where we are not I think prepared, I think that is where that assessment needs to occur.

Mr. PEDERSEN. One of the things that AASHTO is very concerned about is the percentage of money that goes to the core programs continues to decrease. The amount of money available par-

ticularly for SPR programs is threatened. So protecting the amount of money that goes to research would probably be our first and highest priority.

You did make reference before to 25 percent of SPR being set aside for research. That is a minimum in terms of what can go to research. I will cite Maryland's experience, but I think it is common to other states. Much of the remaining three-quarters of the money actually goes to data collection that supports both planning activities and is also critical for research as well, and I think we talked before about the importance of data. It is very critical that we have that money available for data as well.

And then the final point that I would make which is really the first one that I made in my testimony, we do believe that multi-layered research structure that we have in place today does serve us very well, and we would want it to continue.

Chairman WU. Yeah, it seems to me that the research component is not the only component that needs to be beefed up. Data collection or the feedback loop is also a little bit weak.

Anyone else?

Mr. APPEL. I just think overall it is important to continue to recognize that there are many different stakeholders and components of U.S. transportation research. Some of them are at DOT, others are out in states and local communities and that a solid research program really contains combination and a collaboration between all of those, and it doesn't necessarily need to be centered all in one place.

Chairman WU. Thank you very much, Mr. Appel. I think, Mr. Skinner, you are going to have to have the last word here from the witnesses.

Mr. SKINNER. Thank you, Mr. Chair. I think it is important that the research program be respectful of the decentralized character of the transportation system, and the SP&R program that has been mentioned is an example of that. And it is important that that program exists and continues, that we need to have a program at the U.S. Department of Transportation that has greater discretion and flexibility, and I think in terms of topic areas, there are some new topic areas that need more attention, responding to climate change, both mitigation and adaptation is on the table, and depending on which policy direction we should take in future user fee mechanisms should be on the table.

Chairman WU. Thank you very much, and I want to thank all of the witnesses for appearing this morning. The record will remain open for two weeks for additional statements from members and for answers to any follow-up questions which the Committee and staff may have of the witnesses. And we will have additional questions.

I want to thank you all for appearing. The hearing is adjourned. [Whereupon, at 11:55 a.m., the Subcommittee was adjourned.]





Appendix:

---

ANSWERS TO POST-HEARING QUESTIONS

## ANSWERS TO POST-HEARING QUESTIONS

*Responses by Hon. Polly Trottenberg, Assistant Secretary for Transportation Policy, U.S. Department of Transportation; and Hon. Peter H. Appel, Administrator, Research and Innovative Technology Administration*

**Questions submitted by Chairman David Wu****Questions for Hon. Polly Trottenberg and Hon. Peter H. Appel**

**Q1. I Performance Metrics.** In Mr. Pisarski's testimony, he stressed the importance of giving terms such as "sustainability" and "livability" tangible definitions before considering programs or funding in those areas. How will DOT reach a consensus on definitions for the terms sustainability, community livability, and economic competitiveness? When will these definitions be completed?

**A1.** The first action of the Partnership for Sustainable Communities was to agree to six principles: provide more transportation choices; promote equitable, affordable housing; enhance economic competitiveness; support existing communities; coordinate policies and leverage investment; and value communities and neighborhoods. These principles effectively define a livable community. Additionally, there have been general criteria for these terms used in the context of certain DOT programs, such as the discretionary TIGER grant program. These criteria can be found in the Federal Register, 74 FR 28755 (2009-06-17), and will likely be retained in the next round of TIGER grants.

Economic competitiveness is advanced by the transportation system when we reduce transportation costs to American shippers and travelers. This is achieved through policies and projects that: (i) improve the efficiency and reliability of the transportation system in the movement both of people and goods, or (ii) make improvements that encourage net new investments in the productive capacity of the economy.

*Q1a. How will the DOT reach a consensus on performance metrics to support the goals above? When will these metrics be available?*

**A1a.** The Partnership on Sustainable Communities is developing a list of performance metrics that will be available within the next year to help support the definition of a livable community and measurement of actions. In developing criteria for evaluation of TIGER grant applications, DOT sought to identify what to look for in a project to qualify as "livable," "sustainable," and "economically competitive," which are all related concepts, and these criteria will help shape the performance metrics that we use.

Additionally, complete representation of transportation in the National Income and Product Accounts is a key part of understanding transportation's contribution to economic competitiveness. Since the accounts are normally limited to for-hire transportation, the Bureau of Transportation Statistics worked closely with the Bureau of Economic Analysis to develop a "Transportation Satellite Account" to add the contribution of private trucking and other forms of shipper-owned transportation. Updates to the Transportation Satellite Account are hampered by the loss of the Census Bureau's Vehicle Inventory and Use Survey after 2002.

**Q2. Improved Data Collection.** *All of the witnesses stressed the need to improve data collection in their testimonies. From DOT's point of view, what are the problems with current data collection efforts? How should data be shared among all of the Nation's transportation agencies?*

**A2.** Data should be made available and shared among all transportation agencies to the maximum extent practicable. One mechanism to facilitate data sharing is the Research and Innovative Technology Administration (RITA)/National Transportation Library (NTL) which serves as a central clearinghouse for transportation research, selected data, and related information. The NTL is a vehicle by which transportation agencies across the Nation can access and submit relevant research findings and data. DOT also participates in the Administration's Open Government Initiative which directs agencies to expand the availability of their datasets and analysis tools through Data.gov.

DOT is working to improve its data on passenger travel. The current data collection portfolio does not adequately address passenger long distance travel patterns. Data on passenger travel behavior is necessary for transportation decisions makers, planners, and researchers to effectively analyze travel patterns, identify infrastruc-

ture needs, and allocate resources to meet the Nation's passenger transportation demands.

DOT is also working to improve the Commodity Flow Survey (CFS). The CFS is a shipper survey that focuses on freight transportation. It includes manufacturing, wholesale, and mining shipments and reports attributes such as value, weight, mode, and origin and destination. Public policy analysts use the CFS for transportation planning and decision making. For example, CFS data are a component in any decision making concerning major freight projects that could improve economic competitiveness. DOT is working to increase the sample size in the next CFS survey in 2012 to improve the data for several commodity categories, such as crude petroleum and shipments from farms, service industries, trans-border shipments, and imports (until the shipment reaches the first domestic shipper).

DOT supports the wide availability and sharing of data among all the nation's transportation agencies and stakeholders, subject to standard confidentiality requirements to protect respondent privacy.

To better serve the many customers who use data and analytical results from the Bureau of Transportation Statistics (BTS), RITA is in the process of holding listening sessions with various stakeholders who routinely use BTS data. RITA is assessing the current strengths and weaknesses of BTS data and analysis efforts, to determine how BTS can best be relevant to the needs of those who use their data, and to discover how to better leverage resources.

*Q2a. Mr. Pisarski noted that the DOT did not perform the Transportation Data Needs Assessment called for by SAFETEA-LU. Why was this not done? He also identified a number of weaknesses with DOT data collection activities, such as the lack of high-level support for setting data priorities and the fact that there is no coordination for statistical programs among DOT agencies. Could you please comment on Mr. Pisarski's assessments? How does the DOT plan on improving the current system?*

*A2a.* U.S. DOT recognizes the importance of the Information Needs Assessment as a tool for identifying the data needs which are critical for transportation decision-making at the Federal, State and local level. The Information Needs Assessment was one of several mandates for Bureau of Transportation Statistics (BTS) as part of SAFETEA-LU. Given resource constraints, we were unable to reach agreement with the National Research Council to carry out the Assessment.

However, RITA/BTS supported an effort by the Standing Committees of the Transportation Research Board (TRB) to address data and information needs. Approximately 140 out of 200 Standing Committees identified more than 600 information needs, and a task force produced a white paper. The white paper emphasized the importance of understanding decision-maker needs in the development of data and analysis programs; underscored the value of reliable and sustainable national transportation databases; reminded us that, like any asset, data require investment of resources to produce a return of value; illustrated the efficiencies of sharing data across regions and agencies; and stressed the importance of the timely availability of data to support decisions.

On December 10, 2009, TRB convened the first meeting of the Committee on Strategies for Improved Passenger and Freight Data. Alan Pisarski is a member of the panel and RITA/BTS is a sponsor. The Committee's work will address issues called for in the TRB white paper. Specifically, the study will assess the state of passenger and freight data at the federal, state, and local levels and develop a practical, achievable, and affordable strategy for collecting and funding essential passenger and freight information. The study will also recommend new data collection strategies as well as funding approaches, targeted to administrators of major surveys and data collection programs in the U.S. Department of Transportation and to policy makers who fund these programs.

Regarding Mr. Pisarski's assessment of data collection activities, several ongoing DOT cross-modal efforts serve to coordinate statistical program activities. For example, the Traffic Records Coordinating Committee (TRCC) consists of representatives from the Federal Highway Administration (FHWA), National Highway Transportation Safety Administration (NHTSA), Federal Motor Carrier Safety Administration (FMCSA), and the Research and Innovative Technology Administration (RITA). The TRCC works to improve the collection and analysis of traffic record safety data. Data and information is also shared within the Department through a number of working groups such as the Transportation Forecasting Group, which has representatives from across the modal administrations.

*Q2b. Ms. Flemer noted that DOT has not carried out sec. 1201 of SAFETEA-LU. Why not?*

A2b. Section 1201 of SAFETEA-LU established the Real-Time System Management Information Program. The purpose of this program is to establish a system of basic realtime information for managing and operating the surface transportation system; identify and plan for future monitoring needs; and provide the capability to share monitoring data with States, local governments and the traveling public. The Department had been working with numerous entities in the private and public sectors, including States and local governments, for establishing the components of such a system. In 2006 the FHWA published a Request for Comments in the Federal Register to elicit comments from the stakeholder community on potential content and characteristics for such a nationally available program. In 2009 the FHWA published a Notice of Proposed Rule Making for a new regulation that would require States to establish basic capabilities within a 4 year time span.

The topic of real-time information and Section 1201 were considered as an objective of a recent Government Accountability Office report, "Efforts to Address Highway Congestion through Real-Time Traffic Information Systems Are Expanding but Face Implementation Challenges" (ref. GAO-10-121R). Specifically, the objective was to report on "what actions DOT has taken to establish the Real-Time System Management Information Program required by SAFETEA-LU, and stakeholders' views on these actions". The GAO findings include the following:

- DOT has proposed a program that aims to improve traffic information coverage, quality, and sharing
- DOT has proposed guidance on data exchange formats
- Stakeholders have cited benefits of the proposed program
- State and local stakeholders have cited time frames and costs as challenges in implementing the proposed program

Q3. **Tech Transfer.** Stakeholder groups like AASHTO and TRB have consistently stated the need to improve technology transfer. Are these valid criticisms? What are DOT technology transfers activities, and what criteria does the Department use to evaluate if they are successful?

A3. We certainly believe that there is room for improvement in the Department's technology transfer efforts. The modal agencies already utilize a variety of methods and programs to accomplish technology transfer. For example, the Federal Highway Administration manages the National Highway Institute to provide training and education to highway interests; it manages the Highways for Life Program to assist in the demonstration and evaluation of new technologies and moving innovations to the market; and it participates with AASHTO and other associations on dissemination of innovations and market-ready technologies. FHWA also utilizes the thirteen Technical Service Teams in its Office of Technical Services to bring innovations to the States and others.

RITA is also exploring how best to work across the modal administrations and DOT laboratories to initiate, coordinate, and evaluate DOT technology transfer activities, as well as to enhance the dissemination of transportation RD&T results. In 2008, RITA began coordinating the Department's submission for the Annual Technology Transfer Summary Report to Congress which includes patents, active licenses, number of licenses bearing income, and amount of income from licenses. The Summary Report also includes recent technology highlights from DOT laboratories. The Department has at least two agencies with designated technology transfer programs, the Federal Aviation Administration (FAA) at William J. Hughes Technology Center (Atlantic City, NJ) and the FHWA at Tumer-Fairbank Highway Research Center (McLean, VA) in conjunction with its Office of Technical Services. DOT counts at least twenty other programs, centers, or offices that are involved in the broad definition of technology transfer, which includes public-private partnerships; memoranda of understanding; cooperative agreements; technical training; technical assistance and expertise; international exchange programs; personnel exchange programs; and access to federal laboratory facilities and services.

Q3a. *In his testimony, Mr. Skinner discussed the need for "knowledge management" to facilitate the transfer of research results into practice. Could you please give specific examples of how stakeholders have benefited from the transportation library or other DOT informational resources? From DOT's experience, what are the specific informational needs of State and local transportation agencies?*

A3a. The NTL serves as DOT's public point of contact for the American Recovery and Reinvestment Act (ARRA) and DOT TIGER Team public inquiries. NTL helped advance the Department's and the President's agenda on economic recovery, providing quick, accurate responses to more than 3,000 detailed information requests

thus far from state and local governments as well as the general public. Applying knowledge management expertise, NTL contributes to ARRA's mandate to "foster greater accountability and transparency in the use of funds made available in this Act."

Some limited examples of the specific and ongoing needs of State and local transportation agencies include:

- Long-distance passenger travel data.
- Real-time and post-processed commuter travel data.
- Detailed freight movement data by commodity type and travel pattern.
- Federal and state research results applicable to other states.
- Data to support performance metrics for transportation system operations.
- Data for effective economic, environmental and land use analysis to support transportation planning.

**Q4. Participation of Stakeholders.** In Mr. Skinner's testimony, he noted the importance of stakeholder involvement in setting R&D priorities to ensure that the research results are adopted by transportation decision-makers. Who does DOT consider to be stakeholders in this process?

**A4.** The DOT engages in cooperative and joint research with stakeholders and partners across the transportation sector, including other Federal agencies, state and local agencies, academia, not-for-profit institutions, and industry, including carriers, vehicle and transportation equipment manufacturers, and shippers.

**Q5. Role of Social Science.** Many of the issues raised in witness testimony have a strong social science component, for example privacy and ITS systems, the definition of livability, and how the public would perceive improved transportation performances. What is the role of social science research as a component of transportation research programs? Has it received adequate attention in the past?

**A5.** The role of social science has not received adequate attention in the past. Transportation has traditionally been dominated by an engineering perspective that emphasized adding hardware and expanding infrastructure. Moving forward, the nation will need to make better use of existing resources. In this respect, social science methods (e.g., economics, sociology, psychology) are an important tool in measuring the effectiveness of alternative methods of achieving reduced congestion and better throughput that can improve economic competitiveness. Sociological and psychological tools are also important in measuring the impact of transportation policies on livability and community development. Many of the tools available to better use existing transportation assets have a basis in social science. Several aspects of Asset Management programs, such as optimizing the expenditure of maintenance and rehabilitation dollars over the life of an asset, involve benefit-cost analysis. This also includes designing policies (e.g., incentive-based programs) to achieve changes in commuter patterns to spread out traffic over alternative routes, modes, and times. Psychological analysis is important in designing more effective safety programs.

Social Science tools are also invaluable in conducting retrospective analysis to study which research programs and transportation policies were effective in achieving transportation outcomes, providing us with lessons learned and identifying causal factors that affect change that will assist us in framing better policies in the future. Research involving human subjects most always includes review by an Institutional Review Board (IRB) that reviews and ensures safety, privacy, and other aspects involving the human subjects.

Some specific social science involvement in DOT research:

- ITS research specifically includes assessment of how deploying ITS technologies affect driver performance (including driver distraction), and evaluation of how ITS deployments affect transportation systems performance.
- DOT has had a longstanding cross-modal human factors R&D program that investigates issues such as hours of service, operator medical requirements, the effects of aging on operator performance, and the effects of changing demographics on transportation service delivery.
- RITA is forming research clusters that are focus areas intended to connect scientists to share ideas, project pursuits, issues and lessons learned. Two areas include: Policy Analysis and Travel Behavior

**Q6. Stewardship of Database.** Could you please comment on the role of the DOT in the long-term stewardship of databases and physical collections?

A6. The modal administrations across DOT have the responsibility to establish and implement confidentiality protections and public accessibility, as appropriate, for Dot Funded and managed data collections to ensure proper long-term stewardship of transportation databases.

**Questions submitted by Ranking Member Adrian Smith**

**Q1. CAFÉ Standards and Vehicle Safety.** In response to a question regarding the tradeoffs between safety and fuel efficiency in the context of President Obama's plan to raise CAFÉ standards, Assistant Secretary Trottenbery stated that "I am hoping that . . . we won't have to have a trade-off between safety and emissions standards-that in fact you can really achieve both."

(a) Please clarify this statement and the Department's position on this issue. Specially: does the Department expect that there will *not* be a negative safety impact from the increased mileage standards? If so, what is this conclusion based on? If not, does the Department plan to support further research into this issue to better understand the tradeoffs?

A1. Safety is the top priority of the Department. The Department believes it is critical that the potential for any tradeoffs be fully understood and minimized. The 2002 National Academy of Sciences report you cited, "Effectiveness and Impact of Corporate Average Fuel Economy (CAFE) Standards," recommended switching to attribute-based standards to reduce the variance between large and small vehicles and thereby lower any safety risks associated with smaller vehicles. In fact, the Department now uses attribute-based standards when regulating fuel economy in order to address safety concerns about the vehicle fleet as we lower emissions and protect the environment.

The proposed size-based CAFE standards minimize the risk that manufacturers will reduce vehicle weight by reducing vehicle size. Nevertheless, given the relative cost effectiveness of at least some approaches to weight reduction, it is reasonable to assume that vehicle manufacturers will choose weight reduction as one means of achieving compliance with the proposed standards. To the extent that future weight reductions are achieved by substituting light, high-strength materials for existing materials—without any accompanying reduction in the size or structural strength of the vehicle—the Department believes that the safety impacts, if any, would be minimal.

However, the Department does not currently have sufficient information to predict with any precision what the fatality impacts might be for any given mixture of material substitution and downweighting.

To the extent possible, the Department will provide a refined analysis in the upcoming CAFÉ final rule that will be issued by April 1, 2010. However, it recognizes that the need to address issues relating to size, weight and safety is a continuing one, given that the need to improve fuel economy and reduce carbon dioxide emissions extends far beyond the years covered by this rulemaking. Accordingly, the Department will formulate a plan for gathering additional data and conduct additional analyses to better understand these issues.

**Q2a. Livability.**

(a) What is the Department's definition of "livability," and how will progress toward the livability goal be measured?

A2a. President Obama has made livable communities a key component of his domestic agenda and has challenged all Federal agencies to coordinate and innovate around this goal in an unprecedented way. Fostering livable communities—where transportation, housing and commercial development investments are coordinated, place-based, accessible and environmentally sustainable—is a transformational policy shift for DOT. The Department will foster livable communities by achieving key outcomes, including:

- Increased access to convenient, affordable transportation choices;
- Improved public transit experience;
- Increased portions of roads that accommodate pedestrians and bicycles safely; and
- Improved access to transportation for special needs populations and individuals with disabilities.

The Department is currently considering performance measures that can be used for measuring progress on achieving livable communities. For example, to assess the

outcome of increased access and transportation choices, data can be gathered on the percentage of a metropolitan area population within a half-mile radius of a transit station and the number of intermodal transportation options available to travelers. Mean distance traveled between transit service interruptions can measure the overall quality of the public transit experience. To measure the portions of roads accommodating pedestrians and bicycles, an assessment can be done on the number of States and Metropolitan Planning Organizations (MPOs) that address all of the SAFETEA-LU elements for walking and biking activities. In addition to local assessments, livability can be measured in part from data on local commuting patterns collected nationwide in the Census Bureau's American Community Survey. Finally, in order to assess progress regarding improved access to transportation, performance measures may include the percentage of bus fleets and rail stations compliant with the Americans with Disabilities Act (ADA). By no means is this discussion exhaustive, but these are options we are considering as performance measures for livability.

*Q2b. What research does DOT currently fund related to livability? What new research is being planned or considered to support advancement of the livability goal?*

*A2b.* The joint effort in 2006 by the Federal Highway Administration and Federal Transit Administration to revise and update the Statewide and Metropolitan Transportation Planning requirements contributed to the implementation of a "livable communities" model. The planning requirements were complex and comprehensive, and featured new components such as the required coordination between human service agencies and transit service providers to ensure that underserved populations had adequate and expanded mobility options. Many of the proposed changes in the planning requirements were founded on research studies carried out by DOT.

Additionally, pilot research projects were implemented to demonstrate the outcomes and impacts of innovative transportation alternatives and livable communities' approaches. For example, SAFETEA-LU provided a large infusion of funds to four diverse communities spread across the U.S. to allow the introduction of bicycle and pedestrian infrastructure, planning, and public outreach activities. The pilot communities used a share of available funding to undertake a rigorous evaluation of the effect of the program on bicycling and walking in each location.

Research carried out by DOT and other federal partners have facilitated the creation and expansion of livable communities throughout the U.S. The HUD-DOT-EPA Interagency Partnership for Sustainable Communities—expanded in 2009—creates a platform for high-level leadership in each agency to guide and oversee critical research efforts to better understand the connections between transportation and housing development, and community development initiatives that feature the wise use of energy and water resources.

While livability is a newly-defined DOT strategic priority, it is an area several University Transportation Centers (UTCs) are already pursuing as components of their ongoing research portfolios. The DOT Research, Development and Technology (RD&T) Planning Team has also identified livability as a DOT Research Cluster topic and will have topic-specific groups of researchers meeting to share information on pursuits and results.

Additionally, the Surface Transportation Environment and Planning Cooperative Research Program is a U.S. DOT (FHWA) led program that helps to improve understanding of the complex relationship between surface transportation, planning and the environment. The STEP includes research activities to develop models, understand transportation demand, develop indicators of performance, and meet other priorities. The results of this research will parlay well into the Department's livability efforts.

FHWA is moving toward implementing a livability research project that has been identified as a part of the strategic initiative priorities for FY 2009 R&T Flexible funds. The objective of the project is to develop tools that can support and develop strategies to incorporate and promote livability communities. The project includes the development of a white paper that will describe livability, conducting livability workshops in various locations throughout the country to assist State and local governments and Federal agencies in improving coordination and identifying tools that are needed to further livability, the development of a toolbox of training materials on livability, development of a regional comprehensive livability plan that can be used by rural and urban areas to address livability in their region in anticipation of the upcoming transportation reauthorization and the development and implementation of a marketing plan that would support the promotion of the aforementioned tasks.

**Q3. Research Prioritization.** How will the Department's increased focus on livability and sustainability result in changes to its R&D priorities? Will R&D to support livability and/or sustainability be paid for through new spending, or from cuts to other areas? If the latter, what research areas and/or programs will be reduced?

A3. The Department is still in the process of developing our strategic planning and research priorities, and as a result does not have the answer to this question yet. TIGER grants (Transportation Investment Generating Economic Recovery) have been very successful at funding desired attributes of transportation

**Q4. Research Earmarking.** A recent National Academy of Sciences review of DOT R&D programs found that "transportation research programs have experienced dramatic growth in earmarking" in the last 15 years, and that this trend, (1) may push universities' energies in the wrong direction; (2) may undermine respect for science and jeopardize academic freedom; (3) can adversely affect mission-oriented research; and (4) reduces accountability for expenditure of public funds. (<http://pubsindex.tah.org/document/view/default.asp?Ibid=761938>) Does the Department agree with these conclusions, and if so; what steps are being taken to reduce the earmarking of DOT research programs?

A4. The U.S. DOT believes earmarking seriously constrains the Department's achievement of its research goals and priorities. The large amount of earmarking done to U.S. DOT research programs may overly shape research at institutions and may obstruct the ability of research to improve our nation's transportation system. U.S. DOT is happy to work with Congress in communicating concern.

**Q5. Transportation data needs.** In his written testimony, Mr. Pisarski lamented a lack of data to inform transportation policy, and called for DOT to fund a comprehensive transportation information needs assessment (TINA) that was mandated in SAFETEA-LU. What is DOT's position on Mr. Pisarski's recommendation regarding the mandate, and does it plan to fund the TINA project?

A5. U.S. DOT recognizes the importance of the Information Needs Assessment as a tool for identifying the data needs which are critical for transportation decision-making at the Federal, State and local level. The Information Needs Assessment was one of several mandates for Bureau of Transportation Statistics (STS) Given resource constraints we were unable to reach agreement with the National Research Council to carry out the Assessment.

However, RITA/BTS and other modal agencies supported efforts by the Standing Committees of the Transportation Research Board (TRB) to address data and information needs. Approximately 140 out of 200 Standing Committees identified more than 600 information needs, and a task force produced a white paper. The white paper emphasized the importance of understanding decision-maker needs in the development of data and analysis programs; underscored the value of reliable and sustainable national transportation databases; reminded us that, like any asset, data require investment of resources to produce a return of value; illustrated the efficiencies of sharing data across regions and agencies; and stressed the importance of the timely availability of data to support decisions.

On December 10, 2009, TRB convened the first meeting of the Committee on Strategies for Improved Passenger and Freight Data. Alan Pisarski is a member of the panel and RITA/BTS and FHWA are sponsors. The Committee's work will address issues called for in the TRB white paper. Specifically, the study will assess the state of passenger and freight data at the federal, state, and local levels and develop a practical, achievable, and affordable strategy for collecting and funding essential passenger and freight information. The study will also recommend new data collection strategies as well as funding approaches, targeted to administrators of major surveys and data collection programs in the U.S. Department of Transportation and to policy makers who fund these programs.



## ANSWERS TO POST-HEARING QUESTIONS

*Responses by Neil J. Pedersen, Administrator, Maryland State Highway Administration, Vice Chair, AASHTO*

**Questions submitted by Chairman David Wu**

**Q1. Performance Metrics.** In your testimony, you stated that inconsistencies in definitions hinder the development of performance measures and that AASHTO is working to determine appropriate surface transportation measures and how they should be applied. When will this work be completed and what areas does it cover (i.e., congestion, safety, environmental sustainability, etc.)? What impediments has AASHTO faced in determining appropriate performance measures?

**A1.** AASHTO has long endorsed each State DOT developing its own measures, standards, and reporting methods to meet the unique needs of their specific circumstances. Every state is different and needs the flexibility to customize their performance management standards, as opposed to developing singular, rigidly-enforced national standards that do not meet the true needs. Part of AASHTO's authorization recommendation include a "back to basics" federal program focusing on increased funding for priority areas of national interest, including preservation, freight, safety, operations, congestion, and the environment. The increased funding would be coupled with national goals, and states would be charged with defining the targets, as well as the strategies to reach these targets, within their own states. AASHTO feels that the most effective way to develop and deliver a performance-based federal-aid program is through a state-based approach, acknowledging that most of the states have already implemented key aspects of a performance management process.

AASHTO is currently working to assist states to build on these efforts by creating more consistent processes in each state. The recommended process would have common key elements and measurement areas that each state could adopt, but each state would determine its own performance targets and strategies. Thus far, performance measures have been developed and adopted in concept by the Standing Committee on Performance Management of AASHTO for three areas—bridge preservation, pavement preservation, and safety. Work is needed, however, to develop guidelines and adopt them on uniform measurement techniques for the individual measures. The Committee is currently working to refine the candidate measures for traffic congestion and freight, and to develop candidate measures for system operations and the environment. It is anticipated that the additional performance measures will be developed and presented to the AASHTO Board of Directors within a two-year time frame.

Impediments to developing performance measures have not arisen in the determination of the measures themselves, but in the methods states and locals currently use to measure these items and the associated cost and time it takes to change existing databases, modify collection methods, and implement new reporting mechanisms. Measures applicable to urban areas will need to be developed with the MPOs and transit agencies.

**Q1a.** *Could you describe how Washington State has implemented "effective community-based design" or "collaborative decision making?" What other AASHTO members have followed Washington's model? What has prevented other members from following Washington's model?*

**A1a.** AASHTO has worked with FHWA and advocacy groups to advance one collaborative decision-making tool called "context-sensitive solutions," or CSS. CSS is a collaborative, interdisciplinary approach to decision-making that involves all stakeholders in providing a transportation facility that fits its setting. It is an approach that works to preserve and enhancing scenic, aesthetic, historic, community, and environmental resources, while improving or maintaining safety mobility, and infrastructure conditions. Several states have followed these principles to advance transportation programs and projects in a collaborative manner with local citizens in ways that fit into the community and environment. Collaborative decision-making can lead to better relations with stakeholders and can result in expedited program delivery, which can save time and money. Simultaneous with this demand for more involvement from communities and other stakeholders, most transportation agencies are being asked to do more with less; therefore, it is more critical than ever that decision-making result in timely and cost effective solutions that work for the transportation agency and their stakeholders (i.e., doing the right thing the first time).

Most states have adopted or utilize at least some aspects of context-sensitive solutions. Examples of states that have won accolades for their efforts to institutionalize CSS as part of their day-to-day program include Washington, New York, Utah, Illinois, and California.

A new collaborative decision-making model is under development in the Transportation Research Board's Strategic Highway Research Program 2 (IHRP 2), which was established by Congress as part of SAFETEA-LU. The objective of the "capacity" focus area is to develop a framework for reaching balanced, collaborative decisions on enhancing transportation capacity and to provide the tools for applying the framework. This new collaborative decision-making model may serve as a future way of doing business in highway project development in the twenty-first century, helping practitioners apply the most successful strategies for systematically integrating environmental, economic, and community needs into the analysis, planning, and design of new highway capacity. Transportation agencies are expected to be stewards of the environment with respect to natural habitats, wetlands, air quality, and greenhouse gas emissions. These agencies are also expected to serve as stewards of the community, delivering transportation capacity that people want and need. Because many interests are represented, finding the most appropriate solutions is challenging. Many of the strategies for accomplishing the objective are familiar to transportation agencies: consultation; ecological approaches to mitigation; practical or context-sensitive design; broad-based performance measurement; environmental justice; integrate corridor management; right-sizing; integrating planning and the requirements of National Environmental Policy Act; commitment tracking; and others. The next step is for State DOTs, MPOs, and their partners to pilot test the first release of the framework over the coming two years.

*Q1b. What is the AASHTO definition of sustainability? What metrics do AASHTO members use to assess the sustainability of their transportation systems?*

*A1b.* "Sustainability" means different things to different people. Because of this, AASHTO is working with our members to define sustainability from the perspective of a state transportation agency, with the goal of helping states move toward a more efficient and effective transportation system that meets the needs of its citizens, the economy, and the environment.

In 2007, AASHTO developed the report "Transportation: Invest in Our Future," which urged transportation decision-makers to adopt the so-called "triple bottom line" approach to sustainability by evaluating performance on the basis of economic, social, and environmental impacts. Many states have focused their sustainability efforts on achieving this triple bottom line.

Decision making in the context of sustainable transportation can take several forms: policy evaluation, project selection, alternatives evaluation, and impact assessment. It can also take the form of evaluating progress toward specific "sustainability" goals. The more common of the two types of decision making is the evaluation of progress toward sustainability goals. Most state DOTs perform this type of evaluation to some extent to track progress toward their goals. These evaluations are normally to track trends over time, compare with predetermined benchmarks, and compare between different areas. Washington and Hawaii have examples of such applications. Decision making where alternatives are assessed is still in the early stages of development. Multi-criteria decision making is an example of a methodology that can be used to evaluate the multiple and often conflicting objectives of sustainability. Recent examples of using multi-criteria decision making for sustainable transportation can be found at the regional level, corridor level, and street level.

*Q1c. In your testimony, you discussed the need for "economic tools" to assess life cycle costs and research to look at the long-term environmental costs and benefits of different transportation options. What are some examples of these economic tools and what research is needed to predict long-term environmental impacts? For both of these, you suggested tools that can offer long-term predictions. Do AASHTO members plan for 20, 80, or 100 year impacts?*

*A1c.* There are several economic tools in existence or under development that can help to estimate the life-cycle costs of certain aspects of the transportation system, but an expansion of these tools is needed to truly meet the need. Often times, DOTs are forced into choosing the solution with the lowest capital cost, with full knowledge that a higher up-front cost could lead to lower maintenance costs or longer life for that infrastructure down the road. Communicating these trade-offs in meaningful ways to our leaders and the public is crucial to using our limited resources to their best advantage.

The *Highway Economic Requirements System* (HERS) model was developed by the Federal Highway Administration (FHWA) to examine the relationship between national investment levels and the condition and performance of the Nation's highway system. FHWA uses the model to estimate future investment required to either maintain or improve the Nation's highway system. FHWA provides this information to the U.S. Congress on a biennial basis. The state version of this software package (HERS-ST) can predict the investment required to achieve certain highway system performance levels; or, alternatively, to estimate the highway system performance that would result from various investment levels. HERS-ST considers capital improvement projects directed at correcting pavement and/or capacity deficiencies.

The AASHTO *Manual of User Benefit Analysis for Highways* is another tool available for use by state and local transportation planning and policy officials in evaluating the user benefits of highway improvements. This manual and CD provide analytic tools to evaluate the costs and benefits associated with transportation improvement projects. This manual is currently being reviewed for update and expansion based on new research.

To manage their infrastructure needs, many state DOTs are moving toward an asset management approach to determine the most appropriate time to perform strategic fixes to their infrastructure during its life cycle. An asset management system helps the transportation agency schedule cost-efficient maintenance procedures earlier in the life-cycle to lengthen a structure's life, as opposed to allowing the infrastructure to deteriorate to the point where it is much more expensive to fix. A new NCHRP project (NCHRP 8-71) is working to determine when assets reach the end of their service life, including consideration of the cost and effectiveness of repair and maintenance actions that might be taken to further extend the asset's life expectancy. Different types of assets, such as pavements, bridges, signs, and signals, have very different life expectancies. In addition, asset life expectancy depends on the materials used, demands placed on the asset during use, environmental conditions, and maintenance, preservation, and rehabilitation activities performed.

With regard to environmental research, one aspect of the Transportation Research Board's (TRB) second Strategic Highway Research Program (SHRP 2) is working to integrate conservation, highway planning, and environmental permitting using an outcome-based ecosystem approach. (SHRP 2 Projects C06-A and C06-B) This effort is based in part of FHWA's document *Eco-Logical: an Ecosystem Approach to Developing Infrastructure Projects*, which provides the conceptual groundwork for integrated conservation plans and mitigation activities that transcend individual agency jurisdictional boundaries and encourages an outcome-based ecosystem approach to conservation. The SHRP 2 projects are intended to provide the tools needed to implement the ecological approach. This new approach is a vast improvement over the piecemeal, project-by-project approach to environmental protection that is required by current environmental law and regulations. (Note: The document *Eco-Logical* is available online at: <http://environment.fhwa.dot.gov/ecological/ecological.pdf>)

Historically, states have used different time horizons for different purposes. For example, long-range regional transportation plans have typically used twenty to twenty-five years as their planning horizon. Often, these time horizons are constrained by the ability to predict future land-use patterns and the associated traffic that is generated by these land uses: In terms of facility design life, 50 years or longer is not uncommon for bridges, and full-depth new pavements are designed with a life-cycle cost minimization approach that can be 50 years long. In terms of safety performance, five years is not uncommon for the effects of improvements to be measured.

**Q2. Improved Data Collection.** All of the witnesses discussed the need for improved data collection. What are the problems with current U.S. DOT and State data collection efforts? At the hearing, you discussed the fact that the lack of standard methods hindered large-scale data collection. What has prevented AASHTO and its members from developing standard data collection methods? How does AASTO and its members plan to address the lack of data collecting, sharing, and standardization?

A2. Decisions made by transportation agencies across the country rely on the data that are collected. These data, in turn, are fed into a performance management system, which is used to measure the performance of the transportation system. However, there are issues to be resolved relating to the consistent use of the measures by all states.

Several high-level issues and challenges have emerged from research, case studies, and a recent Leadership Forum held by AASHTO on this topic. Performance management systems at the state level have developed based on goals, measures, and targets that are relevant to a particular state; thus, because of the inherent dif-

ferences between the states and the variation in goals set by the leaders of that state, the targets, measures, and even the data collected are different from state to state. In addition, each state has different capabilities in terms of resources and funding to develop data management systems to support performance-based decisions, and each DOT is at a different level of development of performance-based systems.

Examples of issues that have been identified relative to specific, commonly-used measures within AASHTO's proposed goal areas are as follows:

- Pavement smoothness—while most states use the International Roughness Index (IRI) to measure pavement smoothness, there are differences from state to state in how the IRI is measured and reported.
- Pavement condition—there is currently no national standard for accurately characterizing the structural adequacy of pavements, and the standards that exist do not consider the full range of pavement distresses.
- Freight highway operations—there are inconsistencies in measuring average speed on Interstate and NHS routes due to differences that are attributable to significant variations in terrain, infrastructure design and capacity, weather, incidents, work zones, and time of travel Safety—measuring the number of serious injuries resulting from crashes will be inconsistent due to variations in the definitions of injuries from state to state. In addition, the ability to acquire good roadway and crash information on non-state highways is problematic.
- Congestion—there are a variety of methods for estimating vehicle-hours and person-hours of delay.
- Operations—there are currently no national standards for measuring incident clearance times and delay due to lane closures for work zones or weather events.
- Environment—transportation-related air quality emissions are estimated, not actual measures.

High-quality, consistent data are critical to successful performance management and, by extension, to achieving the overall goals and objectives of the transportation agency. Complex, system-level transportation decisions require timely, understandable, and standardized data. However, the extent of data collection efforts must be balanced with the needs for which the data are being collected. Some of the major concerns of the State DOTs related to data are availability, quality, and affordability. The DOTs need to collect the most appropriate data so it can be used to make confident, robust decisions, not simply use data that happens to be available. Several state DOTs, such as Wisconsin, Florida, and Minnesota, are approaching data business planning by deploying data management or governance frameworks. Data management is the development, execution and oversight of architectures, policies, practices, and procedures to manage information as it pertains to data collection, storage, security, analysis, quality control, and reporting. Data management impacts people, processes, and technology, and includes data governance and stewardship.

Two examples of recent advances at the national level that are based on data that have been gathered consistently over the past ten to twenty years are the *Mechanistic-Empirical Pavement Design Guide* and the *Highway Safety Manual*. The Pavement Design Guide is based on research and pavement performance data from the Long Term Pavement Performance (LTPP) program, which was established almost 20 years ago to improve pavement designs by helping to predict the life of pavements under various traffic loads. The Highway Safety Manual is the culmination of a 10-year effort, including multiple research projects, to assist agencies in predicting the potential safety outcomes of various highway improvements, such as widened shoulders, rumble strips, horizontal and vertical curvature, etc.

*Q2a. In your testimony, you also discussed the need for data collection technologies. What are examples of some of these improved data collection technologies? Who should be responsible for their development and what would you recommend to speed their deployment?*

*A2a.* New technologies for collecting data are emerging every day, but their widespread implementation is not always easy or inexpensive. For example, GPS probe technology is being used as part of the U.S. DOT's SafeTrip-21 Initiative to track vehicles and provide real-time speed and travel time information in two test areas: the San Francisco Bay Area and the I-95 Corridor between North Carolina and New Jersey.

The \$14.6 million public-private effort in San Francisco was launched in April of 2008 by U.S. DOT, Caltrans, and private sector partners. This field test has five elements:

- Provision of alerts regarding safety, trip planning, congestion, and transit conditions via GPS-enabled cell phones.
- A test of the ability of GPS-equipped cellular phones to generate robust, quality probe data generate real-time traffic information.
- Dissemination of real-time parking availability information at key transit stations via changeable message signs and GPS-enabled cell phones.
- A test of a work-zone monitoring device built into traffic cones and barrels that monitors traffic and wirelessly relays speed and queuing information for use in analyzing road work restrictions, as well as facilitating efforts to suspend road work when excessive traffic delays occur.
- Delay monitoring at signalized intersections to generate real-time travel information along signalized streets, as well as to provide data for signal retiming purposes.

The I-95 Corridor Field Test is a \$6.4 million public-private effort that was launched in November of 2008 in an agreement between the DOT and the I-95 Corridor Coalition and its partners. Elements include:

- A web-based trip planner system to provide cross jurisdictional, real-time information between key destinations along the I-95 corridor using commercially available, real-time traffic data derived from “probe vehicles”.
- A test of web, wireless, and kiosk-based real-time information on the status of ground transportation options—including transit, taxis, shuttle vans, and airportbus services—to and from Baltimore-Washington International Airport.
- Flat-panel displays of real-time nearby roadway traffic information at three locations in the Washington region.
- A work-zone monitoring device that will distribute information to encourage travelers to seek less-congested routes to avoid delays.

The SafeTrip-21 Initiative is part of the U.S. DOT’s IntelliDrive Program. This program conducts operational tests and demonstrations with the goal of accelerating the deployment of near-market-ready technologies that have the potential to deliver safety and mobility benefits to the traveling public.

One of SHRP 2’s strategic focus areas is looking into the role of human behavior on highway safety. This focus area will produce the most comprehensive information about driver behavior and driver interaction with vehicle and roadway ever collected. Researchers are conducting a “naturalistic” driving study to investigate ordinary driving under real-world conditions in order to make the driving experience safer. Three thousand volunteer drivers will have their cars fitted with cameras, radar, and other sensors to capture data as they go about their usual driving tasks. Among the data collected will be: video images out the front and rear windshields; the passenger side view; the driver’s face and hand position; speed; rates of acceleration; lateral and vertical motion; the presence of alcohol in the cabin; turn signal actuation; seat belt use, air bag deployment; objects in front of the car; and roadway information. The objective of the study is to produce a rich cache of data on driving behavior that researchers for decades to come can use as the basis for safety improvements. Nearly 500 research questions have been gathered from safety researchers and practitioners, and are being prioritized according to their potential for improving safety.

In the freight arena, there are several examples of new freight data collection technologies, and the use of these technologies will certainly expand and the number of technologies used will increase. GPS, cell phone, weigh-in-motion (WIM), virtual weigh stations, and electronic roadsides are collecting data now, some of which is being put to use specific to their underlying purposes and more generally to understanding freight movement better in order to support policies, programs, investment, and operations. However, it should be noted that there are concerns regarding the proprietary aspects of this data that make the collection process more complex.

An example of a new freight data collection project is the FHWA/American Trucking Research Institute (ATRI) partnership on Freight Performance Management. The ATRI (the research arm of the American Trucking Association) has an arrangement with three of the trucking communications companies to provide GPS data from the 600,000 on trucks on interstate highways nationwide, which is currently being used to map truck flows, identify chokepoints, and track traffic at land borders with Canada and Mexico. A similar example is found in Washington State

where the state DOT has an agreement with several cell phone and GPS communications companies to provide real-time information on truck movement in the Puget Sound area to better understand the patterns of movement, origins and destinations, interaction with passenger vehicles, and implications for infrastructure investment and operations.

In order to collect what has traditionally been closely-held propriety information, elaborate procedures have been developed to safeguard carrier identity and to guarantee non-disclosure of sensitive information. Thus, while it is possible to tap this data through new technology, it must be done carefully, and it raises longer-term issues concerning the availability of such data to all potential users. With other data generated by technologies such as WIM, virtual weigh stations, and electronic roadside, there are also issues related to proprietary data controlled by the providers of the technology and the possibility of compartmentalizing services and data based on multiple providers.

As for deployment, no single model or sector emerges as the primary answer to speeding up the delivery of data collection technologies. Collaboration between the public and private sectors is key to delivering new technologies to improve our transportation system. In addition, communication is critical so that the needs and goals of the public sector are shared with the developers and implementers in the private sector. Encouraging collaboration and communication between these two sectors—through such things as increased funding, provision for public-private ventures, and the removal of restrictions that prohibit innovation—will provide tremendous benefits in developing and deploying new technologies.

**Q3. R&D Priority.** Who should perform the research you recommended in your testimony on crash causation? As you know, a major focus of SHRP2 is on understanding crash causation. You suggested that SHRP2 research be funded above the core \$200 million funding for FHWA R&D programs. Why do you not consider SHRP 2 research on crash causation as a part of the core FHWA R&D program?

**A3.** The SHRP 2 Program is conducted independently under the auspices of the National Academy of Science. As such, the program engenders immense credibility due to its being competitively selected and subject to strict peer review standards. In addition, its multi-year focus is highly beneficial for a research program targeted at making significant advances in a relatively short period of time. The efforts being put forth as part of this targeted program are complementary to FHWA's core R&D program—as well as to other agencies' research programs, such as that of the National Highway Traffic Safety Administration—but go above and beyond what can be accomplished by FHWA alone given the wide range of activities these agencies must accomplish within their own funding allocations.

**Q3a.** *In your written testimony, you stated the need for more research to understand the effectiveness of laws designed to change behavior, such as those banning cell phones while driving. During the hearing, multiple witnesses commented that Europe has a better safety record than the U.S. in part because they strictly enforce traffic laws. Is much of the information you need to evaluate the effectiveness of strict laws and enforcement already available in Europe? How can we make better use of this information?*

**A3a.** U.S. researchers have studied and will continue to study the effectiveness of what has been accomplished in the European Union, Australia, and other parts of the world, and determine what can be effectively implemented in the U.S.. However, we need to be cognizant of the inherent differences between our countries with regard to such things as constitutional protections (law enforcement in other countries can randomly pull drivers over without cause), behavioral aspects (many European nations have significantly stronger laws related to drunk driving and speeding), and other issues that are uniquely "American." For example, while automated speed control has been around for decades, it has only been implemented widely in two U.S. states due to privacy concerns ("Big Brother") and the perception of it being a local money-making scheme. Thus, ideas from other countries are not always directly transferable to the U.S., and additional research and pilot testing need to be conducted to determine the effectiveness of any given application.

AASHTO and FHWA currently collaborate on an international scanning program that sends expert teams of planners, engineers, and policy makers to other countries to bring back information on innovative technologies and practices that could significantly improve highways and highway transportation services in the United States. The primary goal of the program is the successful implementation in the U.S. of the world's best practices. The program enables innovations to be adapted and put into practice without spending limited research funds to re-create advances already de-

veloped by other countries. And when each scan is complete, an implementation plan is developed—along with funding for carrying out the plan—for the most significant and promising technologies and policies identified on the scan. Over 75 scans have been conducted in the past 20 years on topics such as safety, road pricing, performance management, freight issues, operations, infrastructure renewal, financing, and workforce development, with travel to Europe, Japan/China/Singapore, Australia/New Zealand, India, and South Africa. However, this program is limited to 3-to-4 trips per year, while annual scan requests have numbered in the twenties. Thus, there is a great need to continue and possibly expand this program to accommodate the need for information exchange among all of the countries of the world.

*Q3b. You also recommended continued research on safety countermeasures. How do you define safety countermeasures and what specific priorities would you recommend in safety countermeasures research for the Federal DOT? Can you offer some examples of success stories from DOT safety research that have recently been adopted?*

*A3b.* In the late 1990s, AASHTO approved its Strategic Highway Safety Plan, which was developed with the assistance of FHWA, NHTSA, and TRB. The plan includes strategies in 22 key emphasis areas that affect highway safety—such as run-off-the-road crashes, seat belt use, and drowsy/distracted drivers—with the goal of significantly reducing the annual number of highway deaths. Each of the emphasis areas includes strategies and an outline of what is needed to implement each strategy.

From that plan, a series of guide was developed in the mid-2000s through the National Cooperative Highway Research Program (NCHRP) to assist state and local agencies in implementing specific strategies and countermeasures to address their safety issues. Many of these countermeasures—such as rumble strips, retroreflective pavement markings, and cable median barrier—are inexpensive to implement and have a strong track record of reducing particular types of crashes along our nation's highways. For example, Missouri DOT has systematically implemented rumble strips along its major highways and seen a significant drop in highway fatalities over the past few years. However, many other countermeasures do not have robust effectiveness data—or cost-effectiveness data—and, thus, have not been widely implemented. <http://safety.transportation.org/guides.aspx>

In 2008, NCHRP completed a study entitled “Effectiveness of Behavioral Highway Safety Countermeasures” (NCHRP Report 622). A significant portion of highway safety program activities is devoted to behavioral countermeasures. These include the entire driver control system—from training and licensing to laws and enforcement, sometimes culminating in fines and sanctions. Given the enormous cost of crashes and the importance of driver behavior in highway crash reduction, it is important that behavioral countermeasures be implemented as effectively as possible. However, it is a huge challenge to accomplish this goal.

Driver behavior can be changed, but it is not easily accomplished. Some behavioral countermeasures are effective; others, including some that are popular and widely used, are not effective. In addition, there are many complexities in assessing behavioral countermeasures—some that may not be effective on their own (e.g., certain public information programs) can be an essential feature when combined with other elements, and some programs that may be described the same way (for example, public information/education programs encouraging bicycle helmet use) can be different in significant ways that make one program effective, another not.

Moreover, among measures that are effective, there is a wide range in how much they reduce the problem, depending on the effect size (e.g., a 5% versus a 25% reduction in highway deaths), the size of the population to which the measure applies, and the expected duration of the effect. There also can be wide differences in program costs, both monetary and non-monetary.

The report provides a matrix documenting the effectiveness, costs, and benefits of existing behavioral highway safety countermeasures (to the extent that they are known) and the implementation issues associated with each. In addition, the report provides a framework for estimating the costs and benefits of emerging, experimental, untried, or unproven behavioral highway safety countermeasures.

A complementary publication, produced by the Governors' Highway Safety Association, is entitled “Countermeasures That Work: A Highway Safety Countermeasure Guide for State Highway Safety Offices.” This guide provides information for selecting effective, science-based countermeasures for major highway safety problem areas.

While these publications represent a significant step in evaluating the effectiveness of behavioral strategies to reduce highway crashes, more work needs to be done, including in the areas of speeding and alcohol enforcement. In addition, inter-

section safety, lane departure crashes, motorcycle crashes, and bicycle and pedestrian safety countermeasures need work. Some examples of success stories include the following:

- New Mexico has pursued aggressive alcohol enforcement, including alcohol interlock systems on vehicles, and has seen a reduction of DWI-related fatalities by nearly 20 percent in a three-year period.
- Missouri DOT has been implementing systematic safety improvements on their highway system over the past several years, such as rumble strips and median cable barrier, and has seen a dramatic drop in fatalities.
- “Naturalistic” driving tests in Virginia have led to the development of distracted driving countermeasures.
- Intelligent Transportation System (ITS) efforts are leading vehicle enhancements related to lane departures, car following, and distracted driving.

**Q4. Tech Transfer.** The need to improve technology transfer for transportation research has been a consistent recommendation from AASHTO and other groups since the passage of SAFETEA-LU. What specific actions should DOT take to improve technology transfer? What are the criteria that should be used to evaluate DOT technology transfer activities?

**A4.** AASHTO and FHWA have utilized numerous methods over the years to “spread the word” about new innovations and how they could benefit transportation agencies. One of the most effective methods of technology transfer has been face-to-face meetings, such as those that AASHTO hold throughout the year on specific topics or as part of routine technical committee meetings.

Several years ago, Utah DOT asked its attendees at the TRB Annual Meeting to document what they learned at the conference, what they would implement, and how much benefit the DOT would derive from this implementation. Between 2003 and 2009, Utah DOT sent 49 individuals—between 5 and 20 each year—to the TRB Annual Meeting. These attendees have introduced a total of 269 initiatives stemming from ideas gained at the Annual Meeting, and Utah DOT has implemented 136 of these as of October 2009. The cost-benefit ratio shows that the savings the Department gained far outweighed the cost of their attendance. Since the tracking process began in 2003, Utah DOT has realized a cost savings of more than \$189 million by implementing initiatives in contracting methods, safety improvements, accelerated bridge construction, and other areas. In addition, some attendees reported additional, intangible benefits from the TRB Annual Meeting that are more difficult to quantify, such as information transfer, networking, and the ability to develop and maintain technical competency by attending technical and poster sessions.

However, public perception persists that travel to meetings is a “perk,” and with travel budgets being slashed, these meetings are becoming harder for government employees to attend.

The use of internet technologies, such as webinars, has become a common substitute for meetings and is effective for “getting the word out” about new technology, and in these tight economic times they are a relatively low-cost way to reach a wide cross-section of people. AASHTO would welcome the opportunity to work with U.S. DOT to determine topic areas and formats for future webinars that would be most useful to the State DOTs and other practitioners in the field. Another potential option would be to survey the states to determine how many of their employees have participated in various technology transfer activities and how much benefit they received from this participation.

Regarding evaluation criteria, it is much easier to measure the number of people who have participated in technology transfer activities (outputs) than to measure what has resulted from these activities (outcomes) and establish a cause-and-effect relationship between the activity and the improvement. However, we know anecdotally—such as from the Utah DOT example above—that these activities can provide a quantifiable benefit to an agency. AASHTO feels that continued dialog between consumers and providers will help to determine ways to improve the evaluation of these activities.

**Q4a.** *Mr. Skinner discussed the need for improved management of information resources. What type of informational resources do State DOTs need? Could you please give specific examples of how State DOTs have benefited from the DOT library?*

**A4a.** State DOTs rely on information every day in all aspects of our work. Efficiency and credibility can be significantly impacted by the inability to find the information we need, slowing delivery or causing us to rethink decisions as new information emerges. Studies show that 15–35% of employees’ time is spent searching for infor-



mation. In addition, a significant percentage of our transportation workforce is eligible to retire over the next decade. There is a need to improve management of and access to information—both to improve efficiency as well as to prevent the loss of knowledge that we’ve gained. Examples of information and data needs include, but are not limited to, the following:

- *Project development:* A lot of information has been developed to support project delivery, but finding it can be challenging as systems, processes, and people have changed. Information needs include: materials used in previous construction and the geology of the area; demographics; natural resources; local plans; standards and specifications; policies; regulatory requirements; best available science; alternate design strategies; and much more.
- *Improvement to practices:* As regulations, standards, policies, or resources change, or as problems are identified, we need information to help shape changes in our practice. Information used includes research findings, practices at other organizations and sometimes in other fields, input from experts, and information specific to the topic of interest.
- *Integration of new policy objectives:* New policy objectives often require new information resources. A current example is climate change. We need timely access to information about: the impacts of and to transportation related to anticipated climate change; practices in development or in use by organizations; research, both on-going and completed; experts and key managers. The Climate Change Clearinghouse (<http://climate.dot.gov/>) is an example of an effort to improve access to information on this topic. Information sources from state and national sources are linked from this portal.
- *Performance management:* National expectations, methods, and trends are needed for the development and implementation of performance measures. Data and information are needed on a variety of topics to manage performance tracking and improve performance.

The National Transportation Library (NTL) is working with State DOTs to improve practices in the capture and sharing of information. Improvements include: digital library practices within the transportation community for more rapid access to information; availability of data, reports, and publications from U.S. DOT modal administrations; and collection practices to avoid redundancy and stabilize our repository of information for current and future transportation practitioners. Access to information has been improved because of the NTL, but much more needs to be done. The report *Implementing Transportation Knowledge Networks* (NCHRP Report 643) was published by the Transportation Research Board in December 2009 and outlines steps needed to improve the management of and access to information used within the transportation community. Additional resources are needed to initiate and accelerate these improvements. Other fields such as health, agriculture, and education have benefited from networking information resources and, in the process, improved access to information for the private industry and the public as well.

**Q5. Organization.** In your testimony, you identified six different entities involved in transportation R&D. Could you please rank these entities with respect to relevancy of the research to AASHTO members?

**A5.** As mentioned in my testimony, there are several components to our national transportation research effort that are supported with federal surface transportation funds. These various research entities play complementary roles, and each has its own place in national research and implementation efforts.

For national-level issues that are common to a majority of the State DOTs, the federal programs—including FHWA, FTA, NHTSA, FMCSA, FRA, and RITA—and the Transportation Research Board activities—including the cooperative research programs such as NCHRP—are all critical for utilizing pooled resources to resolve overarching issues that affect the transportation system as a whole.

For more local and state-specific issues, research carried out by the individual State DOTs, often in conjunction with the University Transportation Research Centers, is important for answering questions that are priorities in those areas. Because research needs far outweigh the available resources at the national level (or at any level, for that matter), these local projects are very important to keeping local programs moving forward efficiently and effectively. It should be noted that the majority of funding for the State DOT programs comes from the federally-sponsored State Planning and Research (SP&R) program.

The final component of the national research program is targeted research, such as TRB’s policy-level research and the second Strategic Highway Research Program (SHRP 2), both of which work to make significant progress in specific areas.

*Q5a. How well is R&D coordinated across these entities and who is responsible for the coordination?*

*A5a.* There is a significant amount of coordination taking place today between the entities involved in R&D, including Transportation Research Board-sponsored conferences, the development of research “road maps” in areas such as pavement and bridge preservation, and partnership efforts between agencies at various levels of government—federal, state, and local.

Coordination is the responsibility of all, both at the agency level and the individual level. One of the first tasks of a research project is to identify existing research efforts related to the topic at hand through such means as the TRB-sponsored research databases—the Transportation Research Information Service (TRIS) database, which provides information on completed research, and the Research-in-Progress (RIP) database, which lists ongoing projects. And these databases would not be effective if not for the efforts of the individuals and agencies across the country ensuring that their research efforts are listed and summarized for others to view.

Informal coordination takes place daily in meetings and conferences across the country where researchers review each others’ progress and provide input to continued work. The largest of these conferences is the annual TRB conference in Washington, DC, during which over 10,000 attendees meet in sessions and committee meetings to discuss current and future endeavors.

Another method for ensuring coordinated progress that has been used many times is the development of a “road map” in a particular subject area to guide researchers at all levels—government, university, private, and non-profit—toward a common goal. An example of such a road map is the Concrete Pavement Road Map, which is a comprehensive and strategic plan for concrete pavement research to guide the investment of research dollars over the next several years. Commissioned by FHWA, the development of this road map involved multiple partners, including TRB, State DOTs, the concrete pavement industry, several industry associations, contractors, materials suppliers, research universities, and concrete testing laboratories. From these meetings, approximately 250 problem statements were written, reviewed, fine tuned, and added to the research database as “work to be accomplished” via the Concrete Pavement Road Map. Additional road maps have been developed for pavement preservation and bridge research.

*Q5b. You also noted that all of FHWA’s R&D funding was either earmarked or designated by SAFETEA-LU, leaving nothing for DOT to fund “mission related activities that the states depend on.” Could you provide examples of some of these orphaned programs and the consequences that have resulted from their lack of funding? Also, within the context of R&D, how does AASHTO define earmarks? Does AASHTO oppose the practice of requesting earmarks?*

*A5b.* Throughout its history and the history of its predecessor agencies, a core element of FHWA’s mission has been to promote innovation and improvement in American’s highway system. During the last few decades, this critical mission element has developed into a broad may of research and technology activities covering the spectrum of advanced research, applied research, technology transfer, and implementation. To maximize the effectiveness of these Research and Technology (R&T) activities, FHWA also carries out or funds a host of activities necessary to support a vibrant R&T program, including research administration, communication, coordination, conferences, and partnerships with other national and international organizations.

Over the course of the last few authorization cycles, FHWA’s R&T funding has been increasingly earmarked and designated until, under SAFETEA-LU, not a single discretionary R&T dollar was left to the agency. Because Congress authorized all of the funds for R&T to be spent on particular projects or research areas (often earmarking the funds to particular universities), FHWA was unable to fund a number of mission-related activities that the states depend upon. For example, there was no funding available for policy research, including infrastructure condition assessment; for updates to the *Manual of Uniform Traffic Control Devices*, which is the national standard for devices used to regulate, warn, or guide traffic; for FHWA’s support of the Transportation Research Board (TRB); and for a host of other “orphaned programs.” In addition, funding was curtailed for state and local safety programs, as well as research conducted in the labs at the Turner-Fairbank Highway Research Center.

The most critical “orphan” was FHWA’s Policy Program, which includes the Highway Performance Monitoring System (HPMS) and other data systems that drive the program, as well as the data that are used for analyses. FHWA’s ability to explore

policy questions, especially in looking at changes in travel behavior due to road pricing and other innovations, has been significantly limited.

In addition, the lack of flexibility prevents FHWA from responding to changing national needs and crises—for example, the increased need for transportation security since 9/11/01. The states depend, directly or indirectly, on many of the activities carried out with FHWA R&T funds. FHWA needs to have the resources to carry out this aspect of their mission and the flexibility to carry it out in a responsive manner.

*Q5c. What are the “core R&D programs” at FHWA for which you recommended a funding level of \$200 million per year?*

*A5c.* AASHTO has recommended in its Authorization Policies that FHWA be provided with sufficient un-earmarked, non-designated funding to carry out research and technology (R&T) activities in all of its topic and mission areas, including structures, pavements, planning, environment, policy, operations, safety, and research and innovation support. In addition, enough funding should be made available to carry out the full range of R&T activities comprising the innovation cycle, including advanced research, applied research, technology transfer, research administration, communication and coordination, international outreach, and other R&T support activities. If Congress chooses to authorize other research programs of national priority, these should be funded over and above the core funding for FHWA’s program.

## ANSWERS TO POST-HEARING QUESTIONS

*Responses by Ann Flemer, Deputy Executive Director, Policy, Metropolitan Transportation Commission, Oakland, California; Vice Chair, Intelligent Transportation Society of America*

**Questions submitted by Chairman David Wu**

*Q1. Performance Metrics. You noted in your testimony that the first challenges to establishing national performance goals and measures will be to reach a consensus on what these should be. How should we develop a consensus on what the national performance goals and measures should be?*

*A1.* The first step in the process would begin with the statement of Congress' intent that it is in the Nation's interest to measure the performance of the transportation system and the federal investment in that system. Following this, Congress would direct the U.S. Department of Transportation (DOT) to establish an advisory panel to research and make recommendations to the Secretary regarding appropriate national performance goals for safety, traffic congestion, travel delays, transportation-related emissions, and others deemed necessary for the performance of the multimodal transportation network. National performance goals should reflect the diverse challenges faced by urban, suburban and rural areas. Consensus will require a clear understanding of how the goals will be used. One option would be to incorporate the goals into the federal transportation planning requirements to allow further definition in the context of state and metropolitan long range investment plans.

The advisory panel should comprise stakeholders from across the transportation community including public agencies, private industry (including the technology sector), academic researchers, public policy experts, and nonprofit associations that represent the transportation user perspective. Many of these are already well-represented by national associations that can draw additional input from their membership in the course of the panel's work. The panel should hold public hearings to consider the types of performance-related data that are available today or could be collected using the state-of-the-practice in intelligent transportation systems, including ways to ensure uniformity of data across modes and jurisdictions, and ways to accelerate the deployment of a nationwide real-time transportation information system that would provide state and local agencies with the performance data they need to measure, monitor and actively manage their transportation system. A recently-released Government Accountability Office report entitled "*Surface Transportation: Efforts to Address Highway Congestion through Real-Time Traffic Information Systems Are Expanding but Face Implementation Challenges*" has already provided significant research in this area (available at: <http://www.gao.gov/products/GAO-10-121R>).

The advisory panel should provide their recommendations within one year to the Secretary, who should review the recommendations and respond expeditiously with a plan for establishing national performance goals for the state and metropolitan planning process, and a plan for confirming with state DOTs and MPOs the availability of transportation system information in each performance category. Note that this data should also be made readily available to the public, and could be published as part of a National Scorecard that would track progress toward meeting performance goals and/or targets.

**Q2. Improved Data Collection.** All of the witnesses discussed the need for improved data collection. What are the problems with current U.S. DOT and State data collection efforts? At the hearing, you discussed the fact that deployment of data collection technology is slow and that there is a lack of accurate, uniform, userfriendly transportation performance data. What has prevented metropolitan planning organizations (MPOs) from developing standard data collection methods? How do MPOs plan to address the lack of data collecting, sharing, and standardization?

(a) What are the impediments to widespread deployment of some of the data collection technologies you mentioned?

*A2.* The availability and use of performance data at the state and metropolitan level is sporadic. Some areas of the country are already collecting, utilizing and disseminating real-time traffic and multimodal transportation information. Other areas have virtually no data collection systems in place. Systems that are in place often don't capture information across modes and jurisdictional boundaries. And most agencies are struggling to keep up with basic infrastructure maintenance, which

competes for funding with data collection and other technology improvements for which there is no dedicated funding. Many agencies that do collect good data tend to focus their efforts on the areas of most immediate urgency to their jurisdiction, such as maintaining a state of good repair, rather than on improving system performance for transportation users. The U.S. DOT is beginning to move forward to implement Section 1201 of SAFETEA-LU which required the establishment of a real-time system management information program. However, as no funding has been made available in the legislation to comply with the mandate, the rule's implementation will likely rely on agencies to collect and disseminate real-time traffic data without providing additional resources to undertake the effort. The private sector has stepped up over the past few years to provide new data sources, as well as technologies to deliver that data to the public. But to take advantage of this real-time data on a nationwide scale, the federal government needs to play a stronger role in overcoming current impediments to widespread deployment, such as the: 1) lack of dedicated funding for real-time data collection technologies and operations; 2) lack of urgency at the state and local level in the absence of requirements to measure performance; and 3) lack of guidance from U.S. DOT on appropriate performance metrics and data standards to make progress toward uniformity and data sharing capability.

**Q3. Highest R&D Priority.** What is the highest priority for ITS research at the Joint Program Office?

A3. One ITS research priority for the Joint Program Office stands out above the others because of the significant effort that has been invested to date: complete the research and accelerate the deployment of a nationwide interoperable *IntelliDrive<sup>SM</sup>* communications platform that holds significant promise for transforming our nation's multimodal transportation network. Providing wireless connectivity between vehicles from all modes, the transportation infrastructure, and consumer devices will open up a level of information and communications capability that represents the next generation of transportation safety, mobility and environmental solutions. Broad deployment of the *IntelliDrive<sup>SM</sup>* network will enable us to transition to a truly performance-based system based on real-time multimodal transportation data, and can provide the foundation to enable innovative transportation financing mechanisms. The U.S. DOT and many public and private sector partners have spent years and millions of dollars researching and testing vehicle-to-vehicle and vehicle-to-infrastructure communications, and the ITS Joint Program Office should continue to focus on *IntelliDrive<sup>SM</sup>* with the goal of determining the best strategy for deploying this game changing technology as quickly as possible, including completing assessments they have underway related to policy, institutional roles and public acceptance.

**Q4. Tech Transfer.** The need to improve technology transfer for transportation research has been a consistent recommendation from transportation interest groups since the passage of SAFETEA-LU. What specific actions should DOT take to improve technology transfer? What are the criteria that should be used to evaluate DOT technology transfer activities?

(a) Also, for many ITS technologies, such as *IntelliDrive*, understanding privacy, public acceptance, or other social science issues would seem to be critical to encouraging deployment. What is the role of social science in DOT R&D? In particular for *IntelliDrive*, what social science research has the program supported? What would you recommend to improve social science research at DOT?

A4. Social science research plays a critical role in the successful transfer of technologies to the real world environment, and particularly so for a system like *IntelliDrive<sup>SM</sup>* that promises to bring our bricks and mortar transportation system into the wireless age. Public acceptance, privacy concerns, liability issues, the potential for driver distraction, and consideration of the levels of acceptance anticipated in the next generation of system users, are but a few of the areas that require additional research as we look toward full scale deployment of the system. We are pleased that the ITS Joint Program Office has recognized this and has just released a 5-year ITS Strategic Research Plan that includes a significant level of policy, institutional and social science research in addition to technical research. We are also pleased that RITA leadership has spoken out in favor of major real-world demonstration programs which we believe are critical for identifying and addressing potential social challenges associated with the successful deployment of an *IntelliDrive<sup>SM</sup>* network, which has already been through rigorous technical testing. ITS America and many other public and private sector leaders are recommending a large-scale model deployment program—the *Smart Cities and Communities Initia-*

*tive*—that would designate several cities, communities, and corridors to serve as tech transfer and operational testing sites for *IntelliDrive<sup>SM</sup>* and other advanced technologies in order to provide real-world laboratories for the integration of multimodal ITS solutions.

Technology transfer activities in general should be evaluated based on the technology's ability to improve the performance of the transportation system, and the prospects for successful real-world deployment and operation. Under the Smart Cities and Communities Initiative, each site would be required to establish clear performance objectives, consistent with national performance goals, for multimodal investments and use of advanced transportation management systems. Performance metrics would include areas such as traffic-related accidents, congestion and emissions levels, system performance optimization and access across transportation modes (i.e., transit, bicycles, pedestrians, automobiles), and success at providing real-time, user friendly information to the public to make more informed multimodal travel decisions. Selected sites would be required to perform rigorous data collection and analysis and report back to Congress on the deployment and operational costs, safety, mobility and environmental benefits, challenges and lessons learned, and recommendations for future research and deployment strategies. In addition to providing real-world research and data on the costs and benefits of advanced ITS integration, the initiative would provide an ideal test bed for the transfer of public sector, private industry, and university research into the real world setting.

*Q5. Participation of Stakeholders. You noted that stakeholder involvement is critical for DOT research. Who are the stakeholders for ITS research funded by the DOT? What is the optimal model for stakeholder involvement in DOT ITS priority setting? What criteria should be used to see that DOT is meeting the goal of extensive stakeholder involvement?*

(a) You noted the importance of the private sector in such capacities as aiding the deployment of ITS technologies or creating innovative uses for system performance data. Could you please offer details on how private sector entities support these goals? How effectively has the DOT engaged with the private sector?

*A5.* As reflected in the membership of ITS America, the ITS stakeholder community is one of the most diverse yet all encompassing communities of any field. It includes state DOTs, MPOs, transit agencies, local governments, university transportation centers (UTCs), other university-based research leaders, federal labs, environmental and safety advocates, highway and transit users, business associations, and private sector companies from automakers, transit providers and commercial carriers to tolling companies, general contractors, consumer electronics firms, real-time data providers, technology integrators, traffic equipment manufacturers, and many other fields. The organization's membership covers a wide spectrum of interests, from some of the nation's largest technology firms to some of the smallest, most rural counties. In addition, state and local agencies, private industry, and academic leaders in nearly 40 states are represented by active ITS State Chapter organizations that represent thousands of additional stakeholders at the state and local level.

This broad community reflects the fact that ITS plays an important role in nearly every surface transportation mode, and is a critical and increasingly utilized solution for everyone from traffic engineers, transit operators and commercial carriers to the commuter trying to get home to his or her family after a long day at work. This last category—the public who depends on a safe and efficient transportation system—is a critical set of stakeholders that can be included in the process like never before thanks to the availability of Internet-based collaborative tools.

The U.S. DOT utilizes a Congressionally-mandated Federal Advisory Committee as one mechanism for receiving input on ITS research priorities. However, given the breadth of the stakeholder community, the ITS Joint Program Office has a challenging task in involving all of the necessary stakeholders in the process. One way to strengthen this outreach would be to explore the utilization of ITS America's membership, extensive State Chapter network, and committee structure to solicit meaningful input and reach the broadest set of public and private sector stakeholders.

By engaging the private sector more directly as part of this unique public-private collaborative environment, U.S. DOT and other public sector stakeholders could benefit from learning about the latest ITS technologies and solutions, and the private sector could be better informed about current transportation challenges as they are conducting research and developing new products and services. A great example of the benefits of such collaboration is the current distracted driving debate. Having a collaborative forum between U.S. DOT, state and local governments, the automotive, transit and commercial vehicle sectors, aftermarket and consumer elec-

tronics industries, safety advocates, GPS device manufacturers, real-time data providers, and others would provide an opportunity for those involved to share information and work together to address the technical, policy, and behavioral challenges associated with distracted driving. The U.S. DOT sponsored Distracted Driving Summit was a great start in bringing the stakeholder community together, but ongoing collaboration is critical as Members of Congress, U.S. DOT, and many states are working to craft legislation and regulations.

ITS America was originally created as a Federal Advisory Committee to U.S. DOT. While the organization has since expanded beyond this role, we continue to work with the ITS Joint Program Office to more fully utilize ITS America's membership, extensive State Chapter network, and committee structure, as a nonprofit neutral forum for stakeholder engagement.

## ANSWERS TO POST-HEARING QUESTIONS

*Responses by Alan E. Pisarski, Independent Consultant*

**Questions submitted by Chairman David Wu**

**Q1. Definitions.** In your testimony, you stressed the importance of attributing tangible definitions to terms such as “livability” and “sustainability” before considering programs or funding in these areas. How much time and funding would it take to develop clear definitions for these?

**A1. Definitions.** This research will involve both technological research and political science research as well to turn aspirational statements into viable, actionable performance goals. I would see it like this:

a. Set the boundaries clearly. What is “in” and what is “out”? Is congestion relief part of livability? Is increased access to jobs? What about freedom of choice re housing and life styles? Is there a national sense of livability, a livability standard, or doesn’t it really vary from state to state and within states? Isn’t the meaning of livability different in different places?

b. Set the parameters for those elements defined as “in scope.” Can the Travel Time Index, developed by Texas Transportation Institute, be adopted as a national standard, a national goal, for congestion, or some other option employed—e.g. total weekly delay per worker? Is there a national standard for density? for walkability?

c. Should we really define National Standards? Do we really want a national standard for congestion reduction; for access to transit service; to the number of side walk cafes we can walk to? Is an increase in walking to work a sign of amenity and also a sign of increased poverty? This would require research on the unintended consequences of setting such standards. (Sweden years ago adopted a floor space livability standard requiring a minimum square footage per household which forced young married couples to live with their parents, until they could afford “the standard.”)

d. Funding allocations can be considered—after cost effectiveness testing and comparative analyses focused on outcomes, and the establishment of mechanisms for judging results—many livability proposals are very long term in nature but should not be funded based on their level of aspiration. Funding should be based not on forecasted results, nor hoped-for results, but results. Realistically, transportation often is simply an enabling technology for most if not all livability concepts and the success or failure of goals will stand outside transportation decisions.

e. It would require a minimum of a year (probably more) to get boundaries established and suggested performance measures for those bounding parameters. The political science part involving gaining “buy in” from the participation of interested parties in the outcomes could take another year—or years. It should be recognized that Eurostat, the statistical arm of the EU, a capable and well-funded entity, has been at this for decades. Treated like a commission effort two to two and a half years and 5 million dollars would be the right scale. If it were treated as a regulatory process based on enacted legislation then it might be done with less time and cost. (recall that in ISTE, after more than two years of effort to define the aspirational statements regarding Information Systems, which were far more tangible than the present DOT goals, the attempts to form regulations were abandoned. Three of the five “Information System” mandates were never acted upon. The two remaining were fundamentally engineering-based (bridges and pavements) and had been pretty much in place before. The final regulations were reduced to “read the legislation.”)

**Q2. Improved Data Collection.** In your testimony, you cited many institutional failings at DOT that have resulted in a lack of focus and leadership on data collection needs—What would you recommend to correct the failings you cite? In particular, for the Bureau of Transportation Statistics, what are the “challenges it faces” that it has failed to address? What would you recommend to fix these shortcomings?

(a) You also commented that DOT has not shown leadership in the research and testing of new data collecting technologies. Who at DOT should be responsible for these activities?



**A2. Improved Data Collection.** It appears that in recent years the DOT's approach, and certainly that of its BTS, is to do what they think they are capable of, given present staff capabilities and funding constraints, rather than what needs to be done. This, in fact, was codified in a BTS mission statement a number of years ago. This modesty may be well placed, but the Department needs much more, whether by BTS or others. There has not been a statement of the needed information program for the Department to meet its legislative and programmatic responsibilities. The 1969 Transportation Information "Red Book," in response to a Congressional request, was one such broad statement. After 40 years it still eludes the Department's capabilities. There was something referred to as "The Horse Blanket"—a matrix of data collection requirements that "covered everything"—all modes, all aspects, all intersecting sectors of the economy, all levels of geography, etc., produced in the early days of BTS when aspirations were higher. There have been innumerable statements of needs, and about needs, by the TRB of the NAS, as indicated in my testimony. The research has been there—what is needed now in the research process is:

- Refinement and updating of the needs assessments.
- Establishment of connectivity with the user community to vet these needs assessments.
- Establishment of the boundaries of the program: what can/should be done by the private sector and what is appropriately a public function; what is federal—what is State and local?
- Assessment of the intersecting activities and responsibilities of other data collection agencies and programs.
- This should be done as a joint effort of all data collection entities within the department and could involve one year staff re-assignments between BTS and other statistical agencies of the Department and outside agencies.
- Development of estimates of times and costs.
- Development of a strategic plan setting priorities, recognizing targets of opportunity, and the requirements and capabilities of all departmental entities.

The BTS must recognize its multi-fold action responsibilities in this area, including:

- Leading by example; demonstrating effectiveness in resource allocation, statistical expertise and responsiveness. Ultimately it can act as a convener, or support to the convener, of the statistical agencies in the Department to coordinate programs;
- Assessing and guiding the overall program of the Department, focusing on the continuing, long term, "flag ship" data programs of the agency;
- Acting as an independent data collection activity, particularly regarding trans-modal efforts;
- Conduct, or cause to be conducted, immediate action as well as long term research into improved methods of data collection;<sup>1</sup>
- Representing the Department's and the transportation sector's needs in the Federal statistical community;
- Serving as the focal point for the many elements of the transportation community to make their needs known;
- Acting to assure that a national repository of transportation information is established and maintained;
- Reporting on the state of statistics in transportation for Secretarial and Congressional review.

In short I would say that the intent needs to be to bring clarity to transportation information needs, capabilities, and responsibilities; and action-ability to the public-private, federal, state and local responses.

**Q3. ITS.** You testified that "one of the great research-driven areas of potential success in the future . . . will be the increasing automation of personal vehicle travel as well as buses and trucks." Who should do this research, the federal government or the private sector? What is currently being done in this area?

<sup>1</sup>The BTS has this responsibility, but could delegate or coordinate research efforts with the Department's Administrations where their expertise or special capabilities indicated they provided greater comparative advantage. This responds to the question raised in the Chairman's sub-question 2(a).

(a) You described a failure among transportation agencies to recognize and incorporate technological solutions and instead rely on attempting to change behaviors. What are the barriers to implementing existing technologies and how can they be overcome?

A3. **ITS.** This “revolution” may be more evolutionary perhaps—evolutionary in its technological accomplishments but revolutionary in its pay-offs in safety, mobility, infrastructure investment and energy. The main barrier to implementation is a chicken-and-egg problem: motor vehicle manufacturers have little incentive to build intelligent cars until we have intelligent roads; yet highway agencies have little incentive to make highways intelligent until we have intelligent cars. We are seeing amazing incremental improvements occurring now that are solely vehicle-based with little or no roadway connection: cars that can park themselves, avoid collisions, maintain fixed distances behind other cars, stop a stolen car and guide police to the site, and even steer themselves on highways. But next steps will require the involvement of a smart road system. The “TII” effort, a renaming of ITS efforts, is now renamed “Intellidrive.” This needs to be meshed with the internal vehicle improvements. The “corporate” approach developed by RITA has many of the attributes that seem required to lead this effort within the Department. One aspect, would certainly require AASHTO and the States to establish a coordinating body acting with federal and private sector players in a concerted effort to assure that the states and other owners of major roadways are prepared for the future in terms of research, design standards and regulations that incorporate private and public research enhancements. Perhaps the major aspect will be integrating the efforts of the private sector—car manufacturers and others—with federal and state efforts. Some proponents see the potential for driverless highways by 2020 and a completely driverless system by 2030. The key will be in establishing the institutional capabilities along with the technological. If there is an area for the U.S. to establish its world technological competitiveness and leadership this would be it.

Q4. **Role of Social Science.** In your testimony, you highlighted the need for research on economic impacts, and other impacts, resulting from the development of a transportation system designed to serve a high income/high value society. What type of economic and sociological research does DOT currently support? What would you recommend for improving social science research at DOT?

A4. **Role of Social Science.** The DOT has never fully embraced social science research in its programs. In this I exclude some applied efforts especially cognitive psychological work in the safety area. I include in social science research two main areas: economics; and sociological research.

- Economics area. The Department has a number of scientists referred to as Chief Economists but these actors have not—to my knowledge—ever managed a substantial research program in the economics of transportation and most certainly have not been able to effectively extend transportation understanding in the interactions of transportation with the greater economy. This would yield great benefits in assessing and justifying transportation investment. Absent recessions we do not know how to justify transportation investment other than in jobs creation. This is a major weakness in the department and throughout transportation. Three programmatic examples: (1) the BTS, learning from other economic sectors (i.e. tourism research at Dept of Commerce and BEA), began the early development of transportation satellite accounts to the national income accounts of the US. Such accounts can rigorously and comprehensively define transportation’s role in the economy, for example, as a share of the GDP, far more effectively than in the standard accounts which only counts for-hire services as transportation. This work ended after several years of very effective research without any explanation by BTS and has not been updated. (2) research efforts were underway at one time to establish the entire U.S. transportation system’s asset value, as part of the GASB 34 effort. Again this was a one-time effort and has not been repeated. It would be very powerful to know whether the national asset value, in highways or transit properties for example, is increasing or decreasing, due to current levels of maintenance. (3) FHWA conducted over a number of years the most effective and well respected research on the economic benefits of highway investment. It was conducted by M. Ishag Nadiri, a noted professor of Economics at NYU, and was vetted extensively in the economic literature. It used input/output analyses and complex equations to establish the economic contributions to national productivity of highway investment. This work ended largely due to loss of staff at FHWA and Dr. Nadiri’s role as senior advisor to the President of Afghanistan. This kind of work must be reestab-

lished. These are only examples of what has been begun and lost. Other areas, equally fertile, such as issues of transportation's role in economic competitiveness, await.

- **Sociological Area.** We all seem to implicitly accept the value of mobility in our daily lives but do not have the sound research that could describe and quantify it. This would be immensely valuable for both individuals and distinct socioeconomic groups. We know that as income rises people demonstrate the value they place on mobility by spending more on it -in total dollars and as a share of all spending. Immensely valuable would be to examine the social and economic consequences for those who lack mobility. What effect does it have on access to employment opportunities, to social services, to the prices they must pay for goods. There has been limited research that shows that as congestion increases its effect on work trips the public tends to interact less with others in such mid week activities as PTA and community activities. A key discovery regarding recreational activities was that the African-American population had seen increases in intercity travel greater than the increases by the general population in the 1995 American Travel Survey; but they had not reached the level the general population had when the last survey had been done in 1977. This survey has not been repeated since 1995. With an aging population, more workers in the senior age groups and new immigrant populations dramatically changing the nation's demographic structure, this kind of work is essential. Moreover, if public policies lead to policies to restrict auto travel and raise its costs through taxes, cap and trade, or congestion pricing, etc., we must understand the impacts on those on the periphery of access to automobility. Much of this social science research will be central to any meaningful concept of livability.
- The great research questions re transportation today fall in the interstices between modes and often fall outside standard subject areas. Much of the needed research falls into the "Transportation and—" category, such as: transportation and energy; and air quality; and safety, and international competitiveness, and the society, and the good life. There is much that we don't know.

## ANSWERS TO POST-HEARING QUESTIONS

*Responses by Robert E. Skinner, Executive Director of the Transportation Research Board, The National Academies*

**Questions submitted by Chairman David Wu**

**Q1. Improved Data Collection.** Could you please give some specific examples of the “major gaps and problems with available data” supported through U.S. DOT R&D budgets? How have such gaps developed?

**A1. Improved Data Collection.** *Please give specific examples of major gaps and problems with available data.*

In my testimony I refer to data collection as among the activities funded through U.S. DOT R&D programs, but did not intend for this to be interpreted as indicating that data gaps and problems are limited to those programs funded by U.S. DOT. Indeed, some of the most important sources of transportation data come from surveys funded by the Census Bureau. There are many issues about the adequacy of data available for making decisions about investments and programs at all levels; I highlight some major ones below:

**Safety.** One of the reasons for the SHRP 2 safety program is that we lack good information about the causes of crashes. U.S. DOT has good statistics on deaths and injuries in transportation and reasonable estimates of total crashes, but these data alone are not adequate for understanding the events precipitating a crash. In order to reduce crash incidence, we need to understand better why they occurred. Such information is extremely difficult to obtain for many reasons, which vary across modes, but are largely due to the complexity of the events and, frequently, to the lack of objective witnesses. The SHRP 2 safety program will help fill these gaps for the highway mode by providing information about how automobile drivers react and respond to crashes and near-crashes.

**System Performance.** In TRB’s recent report, *Funding Options for Freight Transportation Projects*, the authoring committee observes that a much clearer link is needed between investments made and the resulting performance of the system.<sup>1</sup> To quote the committee, “highway congestion is not systematically measured, and therefore the scope and the costs of the problem, and how users are coping with it, are poorly understood.”<sup>2</sup> As noted in this report, the nation lacks measures of how well all freight modes are performing, because such freight data collection systems as exist were not designed to collect this kind of data.

The Commodity Flow Survey (CFS) is funded by U.S. DOT and administered by the Census Bureau. The CFS is the principal source of information about intercity freight movements for the Freight Analysis Framework (FAF) tool that the Federal Highway Administration develops for estimating freight flows between regions. Such information is essential for planning for capacity. The CFS, however, does not capture imports or agricultural and certain retail shipments, which represent a significant share of goods movement.<sup>3</sup> Moreover, FHWA’s FAF and other models for estimating demand placed on highways also depend on having reliable estimates of the number of trucks and their total use. Such information was provided by the Census Bureau’s Vehicle Inventory and Use Survey, which was ended for budgetary reasons. This is forcing FHWA to extrapolate from 7-year-old data over a period in which the economy has changed significantly.

**Information for Regional Investment Decisions.** Metropolitan areas are required by federal law to plan long-range capital improvement programs that are consistent with states’ implementation plans under the Clean Air Act.<sup>4</sup> Most areas inform the planning process through travel, and sometimes also land use, models that forecast future supply and passenger demand for highway and transit facilities. With growing interest in relying on non-highway options for meeting travel and accessibility needs, it becomes increasingly important to represent in these models features that affect mode choice, such as distances between residences and employment and transit stops, which require detail at much smaller units of geography than before. Also needed is information about existing trips by transit, bicycle, and walking

<sup>1</sup> TRB Special Report 297, *Funding Options for Freight Transportation Projects*, Transportation Research Board of the National Academies, Washington, D.C. 2009.

<sup>2</sup> TRB Special Report 297, p. 56.

<sup>3</sup> TRB Special Report 277, *Measuring Personal Travel and Goods Movement: A Review of the Bureau of Transportation Statistics’ Surveys*. Transportation Research Board of the National Academies, Washington, D.C. 2003.

<sup>4</sup> TRB Special Report 288, *Metropolitan Travel Forecasting: Current Practice and Future Direction*. Transportation Research Board of the National Academies, Washington, D.C. 2009.

that take place within small areas as opposed to simply between one part of a metropolitan area and another.

Regions have traditionally relied upon Census Bureau surveys for information about journey-to-work trips, which today are provided through the American Community Survey (ACS). However, a combination of policies to avoid disclosing respondents' identities, shift from a decennial to a year-by-year data collection, and declining resources for statistical programs will result in metropolitan areas receiving less detailed and less reliable data on use of non-highway modes, particularly in smaller geographic units, than they have received in the past.<sup>5</sup> Many states and regions rely on U.S. DOT's National Household Travel Survey (NHTS) for estimates of trips for all purposes. These data are nationally representative only, except for those states and regions that pay for over-sampling within their jurisdictions, which provides expanded coverage in 16 states.

Regional travel models do not represent commercial and freight trips within metropolitan areas. Data on intra-regional commercial and freight trips simply are not collected, yet use of diesel engines within metropolitan areas can be a significant factor in pollutant emissions and the ability to meet federal and state air quality standards.

**Intercity Passenger Travel.** In 1995 the U.S. DOT conducted a survey of multimodal long-distance trip making (The American Travel Survey), which is the last large-sample survey of its kind reporting on round trips of more than 100 miles by mode.<sup>6</sup> Resources have precluded a repeat of this survey. Given the renewed national interest in intercity passenger rail, the absence of information about intercity passenger trips accompanied by socioeconomic and demographic information about travelers represents an important gap in determining promising corridors for investment.

The above examples indicate important gaps in available data. Examples of many other limitations of available data are provided in Shofer et al. 2006.<sup>7</sup>

**Q2. R&D Priorities.** TRB recommended a number of research topics in Special Report 299 to mitigate the impact of the transportation system on the climate. How did you ensure that the report is not recommending DOT perform research that is already being done by other agencies?

**A2. R&D Priorities.** *How has TRB ensured that the research recommended in Special Report 299 was not already being done by other agencies.*

The committee that prepared TRB Special Report 299, A Transportation Research Program for Mitigating and Adapting to Climate Change and Conserving Energy, reviewed in detail the R&D programs of the Environmental Protection Agency and the Department of Energy and did not find examples of the recommended research under way in these agencies.<sup>8</sup> Searches were also made of an NSF database of funded research projects. As noted in the report, the committee found scattered examples of projects on related topics under way in universities, but noted that such isolated projects were not of an adequate scale or coverage to address the decisions that will be faced by federal, state, and local authorities.

**Q2a.** *A number of the topics you recommended for greenhouse gas mitigation strategies seem to have strong social science components. Generally, across all topics, how well has DOT supported the social sciences? If support has been lacking, what would you recommend to ensure stronger social science research?*

**A2a.** (a) Support of social-science research at U.S. DOT.

TRB committees have not had the occasion to address this question. I can observe that U.S. DOT research is not characterized by discipline in any database that I am aware of and that the transportation field itself is multi-disciplinary. Whereas much of U.S. DOT's research is surely engineering-oriented, the modal administrations fund safety research on human behavior; U.S. DOT's policy and planning research, includes economic and behavioral topics; U.S. DOT's survey programs rely on social science methodologies; and even some infrastructure topics, such as asset management, are informed by economics. I am not aware of whether research funded

<sup>5</sup> See *CQ Weekly*, Not Enough Information, Dec 7, 2009, pp. 2800–2816, for a good overview of resource constraints on the ACS that are reducing sample sizes and increasing sampling error.

<sup>6</sup> The National Household Travel Survey asks for information about long-distance trips, but because these trips are infrequent, and given the relatively small sample of the NHTS, the number of trips collected is too small for substantive analysis.

<sup>7</sup> Shofer, J., T. Lomax, T. Palmerlee, and J. Zmud. 2006. Transportation Information Assets and Impacts, An Assessment of Needs. *Transportation Research Circular E-C109*. Transportation Research Board of the National Academies, Washington, D.C.

<sup>8</sup> See Chapter 2 of the report.

through the University Transportation Centers (UTC) Program is characterized by discipline, but several UTCs focus on planning, policy, and other topics that rely heavily on the social sciences.

*Recommendations to support social science research.*

The U.S. DOT generally suffers from not having a budget for policy research, which depends heavily on economics, political science, and other social-science disciplines. Restoring funding lost for policy and planning research, as recommended in Special Report 295, would certainly be a step in the right direction.<sup>9</sup> Moreover, much of the fundamental mitigation research recommended in Special Report 299 would be in the social sciences because this program depends so heavily on understanding public preferences, attitudes, and behavior and the ability of public policies to affect travel behavior in ways that would reduce energy consumption and emissions of greenhouse gases.

**Q3. Tech Transfer.** The need to improve technology transfer for transportation research has been a consistent recommendation from TRB and other groups since the passage of SAFETEA-LU. What specific actions should DOT take to improve technology transfer? What are the criteria that should be used to evaluate DOT technology transfer activities?

**A3. Technology Transfer** *What specific actions should DOT take to improve technology transfer?*

A previous, and now somewhat dated, report of the Research and Technology Coordinating Committee (RTCC) pointed out that in TEA-21 FHWA received far less funding for technology transfer than it requested.<sup>10</sup> The agency has had limited resources for technology transfer since that time. The over-designation and earmarking of funding in SAFETEA-LU constrained FHWA's RD&T budget generally beginning in 2005. [SAFETEA-LU did fund the Highways for Life, Training Programs, and Local Technical Assistance Programs, albeit the total support—about \$40 million annually—is modest compared with the \$100 million FHWA received annually for technology transfer before 1998.] The RTCC's 1999 report also recommended improved organizational focus for technology transfer, which FHWA has acted upon as resources and program designations have permitted. TRB has not been asked to conduct a comprehensive assessment of FHWA's technology transfer programs since the RTCC's 1999 report, but FHWA is currently seeking guidance from the RTCC on how to overcome barriers to adoption of proprietary products. A letter report from the RTCC on this particular topic may be forthcoming following the committee's scheduled March 2010 meeting.

The Strategic Highway Research Program 2 (SHRP 2) implementation report (TRB Special Report 296) identifies specific actions that should be taken to implement the expected outcomes of the SHRP 2 program, although it should be noted that the congressionally-mandated schedule to complete the implementation report required completion before most of the SHRP 2 products had been delivered.<sup>11</sup> Outlined on pages 107–111 of SR 296 are recommended principles to guide the program, and outlined on pages 111–115 are key implementation strategies. The latter include strategic branding and packaging; provision of technical assistance; support for standards, specifications, guidebooks and manuals; conduct of follow-on research, testing and evaluation; support for implementation by lead users and demonstration efforts; training and education; and long-term stewardship of certain products, databases, software packages, and website.

*What are the criteria that should be used to evaluate U.S. DOT technology transfer activities?*

The principles laid out in Special Report 296 for the SHRP 2 program might be a useful resource in developing criteria appropriate for technology transfer programs within U.S. DOT.<sup>12</sup> These principles include: identifying a specific responsible enti-

<sup>9</sup>TRB Special Report 295. *The Federal Investment in Highway Research 2006–2009: Strengths and Weaknesses*. Transportation Research Board of the National Academies, Washington, D.C. 2008.

<sup>10</sup>TRB Special Report 256. *Managing Technology Transfer: A Strategy for the Federal Highway Administration*. Transportation Research Board. National Research Council, Washington, D.C. 1999.

<sup>11</sup>TRB Special Report 296. *Implementing the Results of the Second Strategic Highway Research Program: Saving Lives, Reducing Congestion, Improving Quality of Life*. Transportation Research Board of the National Academies. Washington, D.C. 2009.

<sup>12</sup>It should be noted that the various administrations of U.S. DOT have varied relationships with stakeholders. FHWA and FTA work in partnerships with states, transit agencies, and others to encourage adoption of innovation, but this role is less characteristic of agencies with a primarily safety regulatory role (NHTSA, PHMSA, FRA) and for agencies with limited missions (Maritime Administration, St. Lawrence Seaway). RITA's technology transfer activities are

ty; involving stakeholders throughout the technology transfer process; extensive communication and outreach; prioritization of effort on products most likely to be adopted and having significant benefit; marketing and packaging to facilitate user acceptance; choosing implementation strategies appropriate for a particular product; and balancing a strategy of being open to unexpected opportunities with a disciplined and specific program. An obvious criterion to add would be a measure of the rate of adoption for the innovations marketed through the program.

**Q4. Participation of Stakeholders.** You noted that stakeholder involvement is critical for DOT research because state and local agencies are ultimately responsible for implementing research results. Who are the stakeholders for research funded by the DOT? What is the optimal model for stakeholder involvement in DOT R&D priority setting? What criteria should be used to see that DOT is meeting the goal of extensive stakeholder involvement?

**A4. Participation of Stakeholders** *Who are the stakeholders for research funded by the DOT?*

At the broadest level, stakeholders include the public, Congress, transportation policy makers and agencies at all levels of government, special-purpose transportation authorities, private companies, and the research and education community. State and local governments and authorities tend to be the closest to the users of publicly-owned highway, transit, rail, and airport facilities and are the organizations most likely to directly benefit from and use the results of much of U.S. DOT's applied research. Freight and passenger railroad companies and states are stakeholders for aspects of FBA's R&D, and will be even more so as FRA R&D renews its activities in intercity passenger rail.

*What is the optimal model for stakeholder involvement in DOT R&D priority-setting?*

TRB committees have not addressed this question directly, certainly not for DOT as a whole. In commenting on appropriate stakeholder roles in FHWA programs, the RTCC has observed that assistance in priority setting for FHWA's advanced research program should differ from that of FHWA's normal applied programs.<sup>13</sup> Advanced research requires two levels of input on priority setting. The first involves policy makers' identification of significant problems that need to be solved. The second involves engaging with experts and researchers to define researchable topics to address the identified problem areas. In applied research, practitioners, experts, and researchers can guide both topics of research and methodological approaches.<sup>14</sup> The committee that prepared TRB Special Report 299 identified different stakeholder involvement processes along these lines for the fundamental mitigation and applied adaptation research programs recommended in its report.<sup>15</sup>

We believe that the models relied upon for the Cooperative Research Programs (CRPs) administered by TRB and funded by different modal administrations are very effective in engaging stakeholders in setting applied R&D priorities. In these programs, stakeholders identify the problems that need to be addressed through applied research, and then representatives of these groups select which projects should be funded. CRPs tend to operate with the philosophy of placing priority on addressing problems identified by those in the field where research has the prospect of making a positive difference, but such programs are not necessarily strategic because of their "bottoms up" nature. The SHRP 2 program is much more focused, and addresses a small set of strategic issues through a somewhat different process, but nonetheless places decision-making authority in the hands of a stakeholder committee. For programs operated within U.S. DOT, stakeholder recommendations presumably would have to be advisory only.

*What criteria should be used to evaluate DOT achievement of extensive stakeholder involvement?*

---

largely carried out through requirements on universities that participate in the University Transportation Centers program.

<sup>13</sup> See TRB Special Report 295. *The Federal Investment in Highway Research, 2006–2009: Strengths and Weaknesses*, Transportation Research Board of the National Academies. Washington, D.C. 2009, page 90.

<sup>14</sup> Brach, A. 2005. A Taxonomy for Stakeholder Involvement in Public Sector Transportation Research and Development Programs. *Public Works Management and Policy*, Vol. 9, No. 3, pp. 223–231.

<sup>15</sup> TRB Special Report 299: A Transportation Research Program for Mitigating and Adapting to Climate Change and Conserving Energy. Transportation Research Board of the National Academies. Washington, D.C. 2009.

FHWA has committed to extensive stakeholder involvement in its *Corporate Master Plan for Research and Deployment of Technology and Innovation*,<sup>16</sup> albeit, as noted by the RTCC in Special Report 295, the agency was not provided with resources in SAFETEA-LU to act upon these principles to any significant degree. Even so, the principles laid out in the Corporate Master Plan would provide a basis for developing criteria for evaluating whether the goal of extensive stakeholder involvement is being achieved in the future. Key considerations would be whether an open and transparent process exists for stakeholders to become involved and the role of stakeholders in influencing decisions about priorities and resource allocation. Evaluating success in this regard may well require surveying stakeholders about their perceptions and the application of expert judgment regarding the effectiveness of the processes put in place.

**Q5. Organization.** TRB Special Report 261 recommended that at least 25% of FHWA's R&D portfolio should be allocated for higher-risk, longer-term research, 50% should be allocated to fill gaps in research not covered by other programs and on emerging issues of importance, and 25% for mission-oriented research on policy and regulation, technology transfer, and training. Percentage-wise, how much does FHWA currently fund in each of those categories? How much has FHWA traditionally funded in each of those categories? What are some examples of research that would fall into each of those categories?

- (a) You also stated the need to provide for long-term stewardship of products, such as databases, software, and web tools. How would you recommend DOT plan and provide for these long-term investments? For example, for SHRP2, what would these costs be?
- (b) You noted that TRB committees are in the process of evaluating FHWA's overall research program as well as particular research programs, such as pavement research and deployment. What is the criteria TRB use in these evaluations? When will these evaluations be completed?

**A5. Organization** TRB Special Report 261 recommended that at least 25% of FHWA's portfolio should be allocated for higher-risk longer-term research, 50% should be allocated to fill gaps in research not covered by other programs and on emerging issues of importance, and 25% for mission-oriented research on policy and regulation, technology transfer, and training.

The RTCC made those recommendations in 2000 with a concern about increasing the share of investment devoted to advanced, or higher-risk, longer-term research. Given the estimates of what would be required to effectively transfer the technologies and products developed out of the SHRP 2 program estimated in Special Report 296 in 2009, the RTCC may need to revisit its estimates for how FHWA's portfolio should be allocated.

*Percentage-wise, how much does FHWA currently fund in the categories of higher-risk, longer-term research, gap-filling research, and mission-oriented research?*

Answering this question involves making a number of assumptions and judgments, not least of which is deciding what to include in the denominator. Assumptions are required in deciding what "FHWA funds." Should this, for example, include the SHRP 2 program and State Planning and Research? Should it include all funding through Title V of SAFETEA-LU (the research title), which includes about \$30 million annually for research programs and earmarks administered by U.S. DOT agencies other than FHWA? Should it include highway research conducted through the University Transportation Centers Program, which is funded through Title V? In the estimates below, I've limited the denominator to those funds that FHWA directly administers for R&D and technology transfer (excluding SHRP 2, SP&R, and Title V programs administered by agencies other than FHWA).

In Chapter 5 of Special Report 295, the RTCC provided quantitative estimates for aspects of this question and qualitative assessments for others. Regarding higher-risk, longer-term research, the RTCC estimates that the Exploratory Advanced Research Program and earmarks for fundamental asphalt research have averaged about \$19 million during 2006–2009 period of SAFETEA-LU.

The RTCC qualitatively assesses that FHWA's infrastructure, operations, and safety research is "mostly gap filling." These programs have been funded at approximately \$74 million annually during FY 2006–2009. FHWA's planning and environmental research during SAFETEA-LU, about \$19 million annually, is classified as mostly gap-filling, but the RTCC notes that most of these activities could also be

<sup>16</sup> <http://www.fhwa.dot.gov/legstregs/directives/policy/cmp/03077.htm>



classified as mission-oriented technical assistance. Mission-oriented policy research, which suffered from FHWA's loss of discretionary funds in SAFETEA-LU, has averaged less than \$1 million annually. FHWA's training and education programs of about \$23.5 million annually during SAFETEA-LU could be classified as mission-oriented technology transfer. The Highways for Life program, which is funded out of Title I at about \$19 million annually, can be classified as mission-oriented technology transfer.

The above estimates allow one to guesstimate that about 12 percent of FHWA's R&D is longer-term, higher-risk; about 60 percent of FHWA's R&D is allocated to R&D that is filling gaps not covered in other programs; and about 28 percent is for mission oriented RD&T activities. The RTCC's main concerns about the designation of FHWA's R&D funds in SAFETEA-LU are the under-emphasis on longer-term, higher-risk research and the near absence of funding for policy research.

*How much has FHWA traditionally funded in each of these categories?*

The RTCC has not systematically assessed FHWA's R&D allocations in years before SAFETEA-LU. In 2000, the RTCC estimated that about 0.5 percent of FHWA's RD&T funding at that time could be categorized as longer-term, higher-risk; this estimate, however, did not include an earmark for fundamental asphalt research.<sup>17</sup> (Before SAFETEA-LU, FHWA had about \$1 million annually specifically directed toward longer-term, higher-risk research, compared with about \$11.5 million annually during SAFETEA-LU.)

*What are some examples of research that would fall in each of those categories?*

Examples of longer-term, higher-risk research can be reviewed on the webpage of FHWA's Exploratory Advanced Research Program at this link: <http://www.fhwa.dot.gov/advancedresearch/research.cfm>. The RTCC classifies the SHRP 2 safety program as advanced research. The projects that make up this program can be accessed from this link: [http://trb.org/StrategicHighwayResearchProgram2SHRP2/Public/Pages/Safety\\_153.aspx](http://trb.org/StrategicHighwayResearchProgram2SHRP2/Public/Pages/Safety_153.aspx)

As indicated above, most of FHWA's Infrastructure, Operations, and Safety research can be categorized as gap-filling research. Examples of completed research projects can be viewed at the following links:

<http://www.tfhr.gov/structur/pubs.htm>  
[http://www.fhwa.dot.gov/pavement/pub\\_listing.cfm](http://www.fhwa.dot.gov/pavement/pub_listing.cfm)  
<http://www.tfhr.gov/safety/pubs.htm>  
<http://www.tfhr.gov/its/pubs.htm>

In terms of mission-oriented RD&T, FHWA's policy research supports the analysis and models relied upon to prepare a report assessing the condition and performance of highway and transit systems. The 2006 report, *Status of the Nation's Highways, Bridges, and Transit: Conditions and Performance*, can be accessed from this link: <http://www.fhwa.dot.gov/policy/2006cpr/index.htm>

The Highways for Life technology transfer program is described at this link: <http://www.fhwa.dot.gov/hfl/>

*(a) You also stated the need to provide for long-term stewardship of products, such as databases, software, and web tools. How would you recommend DOT plan and provide for these long-term investments? For example, for SHRP 2, what would these costs be?*

A TRB committee made recommendations for the stewardship of the data collected through the Long-Term Pavement Performance Program (LTPP) in 2009.<sup>18</sup> In its report, the TRB LTPP committee recommended that the database be established as the National Pavement Performance Database (NPPD) as a self-contained and fully funded entity with appropriate staff resources to carry out the tasks of keeping software and hardware current, enhancing data quality and completeness; incorporating additional pavement performance data as it becomes available; conducting LTPP data analysis and product development; supporting those who seek to analyze the data; and developing new pavement designs and maintenance strategies based on the results of analysis of the database. The committee estimated that the funding for these activities would average about \$9 million per year (this estimate includes the cost of collecting data from the pavement test sections that remain in service). At the urging of this committee, FHWA commissioned a thorough analysis of what

<sup>17</sup>TRB Special Report 261. The Federal Role in Highway Research and Technology. Transportation Research Board of the National Academies, Washington, D.C. 2000.

<sup>18</sup>Preserving and Maximizing the Utility of the Pavement Performance Database. Transportation Research Board of the National Academies, Washington, D.C. 2009.

would be required to support the LTPP database for the long term. The committee relied upon this consultant report for the budget estimates included in its report.

An estimate for supporting long-term stewardship of SHRP 2 databases, software, and web tools is \$14.3 million annually over the next authorization period.<sup>19</sup> This funding would support maintenance and updating of the products and a minimum level of customer support. Specialized training, additional analyses, and development of additional tools for special or new user needs are not included in this estimate.

*(b) You noted that TRB committees are in the process of evaluating FHWA's overall research program as well as particular research programs, such as pavement research and deployment. What is the criteria TRB uses in these evaluations? When will these evaluations be completed?*

My testimony referred to the ongoing work of the RTCC in reviewing and evaluating FHWA's R&D program. The committee issues occasional letter reports as well as full length analyses, usually prefatory to the surface transportation reauthorization process. Its last full-length report was Special Report 295. As indicated above, the RTCC may issue a letter report following its March 2010 meeting with advice on how FHWA can facilitate the adoption of appropriate proprietary research products. (States are generally prohibited from using federal aid to purchase products only available from a single vendor unless FHWA issues a public interest finding.)

My testimony also referred to the work of a committee that reviews FHWA's pavement research and deployment—the Pavement Technology Review and Evaluation Committee. The committee is expected to release its final letter report in early 2010. Previous letter reports of the committee are available at this link: <http://www8.nationalacademies.org/lcp/projectview.aspx?key=48707>

The criteria that the committees use for evaluation vary across topics. As peer review projects, they obviously rely heavily on expert judgment. The RTCC's Special Report 295 relies on the principles for R&D articulated in the preamble of Title V in SAFETEA-LU to evaluate FHWA's R&D program, which I believe resulted from contributions of the House Science and Technology Committee to this legislation. The Pavement Technology Review and Evaluation Committee has placed particular emphasis on the stakeholder involvement principle from Title V's preface in its previous letter reports.

○

<sup>19</sup>TRB Special Report 296. *Implementing the Results of the Second Strategic Highway Research Program: Saving Lives, Reducing Congestion, Improving Quality of Life*. Transportation Research Board of the National Academies. Washington, D.C. 2009.