

**TRANSPORTATION RESEARCH PRIORITIES:  
MAXIMIZING RETURN ON INVESTMENT OF  
TAXPAYER DOLLARS**

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

FIRST SESSION

TUESDAY, JUNE 14, 2011

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# CONTENTS

## Hearing Date

	Page
Witness List .....	2
Hearing Charter .....	3

## Opening Statements

Statement by Representative Benjamin Quayle, Chairman, Subcommittee on Technology and Innovation, Committee on Science, Space, and Technology, U.S. House of Representatives .....	8
Written Statement .....	8
Statement by Representative David Wu, Ranking Minority Member, Subcommittee on Technology and Innovation, Committee on Science, Space, and Technology, U.S. House of Representatives .....	9
Written Statement .....	10

## Witnesses:

The Honorable Peter Appel, Administrator, Research and Innovative Technology Administration, U.S. Department of Transportation .....	
Oral Statement .....	12
Written Statement .....	14
Mr. John Halikowski, Director, Arizona Department of Transportation; Chair, American Association of State Highway and Transportation Officials Standing Committee on Research .....	
Oral Statement .....	17
Written Statement .....	18
Mr. David Gehr, Senior Vice President, Highway Market, Parsons Brinckerhoff; Chairman, American Society of Civil Engineers Transportation Policy Committee .....	
Oral Statement .....	29
Written Statement .....	31
Dr. Irwin Feller, Professor Emeritus of Economics, Pennsylvania State University; Senior Visiting Fellow, American Association for the Advancement of Science .....	
Oral Statement .....	34
Written Statement .....	36
Ms. Lynn Peterson, Transportation Policy Advisor, Office of Governor John Kitzhaber (OR) .....	
Oral Statement .....	42
Written Statement .....	44

## Appendix I: Answers to Post-Hearing Questions

The Honorable Peter Appel, Administrator, Research and Innovative Technology Administration, U.S. Department of Transportation .....	66
Mr. John Halikowski, Director, Arizona Department of Transportation; Chair, American Association of State Highway and Transportation Officials Standing Committee on Research .....	72
Mr. David Gehr, Senior Vice President, Highway Market, Parsons Brinckerhoff; Chairman, American Society of Civil Engineers Transportation Policy Committee .....	74

IV

	Page
Dr. Irwin Feller, Professor Emeritus of Economics, Pennsylvania State University; Senior Visiting Fellow, American Association for the Advancement of Science .....	75
Ms. Lynn Peterson, Transportation Policy Advisor, Office of Governor John Kitzhaber (OR) .....	76

**Appendix II: Additional Material for the Record**

Material Submitted by Representative Randy Neugebauer, Subcommittee on Technology and Innovation, Committee on Science, Space, and Technology, U.S. House of Representatives .....	80
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**TRANSPORTATION RESEARCH PRIORITIES:  
MAXIMIZING RETURN ON INVESTMENT OF  
TAXPAYER DOLLARS**

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**TUESDAY, JUNE 14, 2011**

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

The Subcommittee met, pursuant to call, at 10:02 p.m., in Room 2318 of the Rayburn House Office Building, Hon. Benjamin Quayle [Chairman of the Subcommittee] presiding.

RALPH M. HALL, TEXAS  
CHAIRMAN

EDDIE BERNICE JOHNSON, TEXAS  
RANKING MEMBER

U.S. HOUSE OF REPRESENTATIVES  
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SUBCOMMITTEE ON TECHNOLOGY AND INNOVATION

*Transportation Research Priorities:  
Maximizing Return on Investment of Taxpayer Dollars*

Tuesday, June 14, 2011  
10:00 am

2318 Rayburn House Office Building

**Witness List**

**The Honorable Peter Appel**

Administrator of the Research and Innovative Technology Administration, USDOT

**Mr. John Halikowski**

Director of Arizona Department of Transportation and Chair of the American Association of  
State Highway and Transportation Officials Standing Committee on Research

**Mr. David Gehr**

Senior Vice President of Parsons Brinckerhoff and Chairman of the American Society of Civil  
Engineers Transportation Policy Committee

**Dr. Irwin Feller**

Professor Emeritus of Economics at Pennsylvania State University and Senior Visiting Fellow  
for the American Association for the Advancement of Science

**Ms. Lynn Peterson**

Transportation Policy Advisor for the Office of Governor John Kitzhaber (OR)

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

**Transportation Research Priorities:  
Maximizing Return on Investment of  
Taxpayer Dollars**

TUESDAY, JUNE 14, 2011  
10:00 A.M.—12:00 P.M.

2318 RAYBURN HOUSE OFFICE BUILDING

**I. Purpose**

On Tuesday, June 14, 2011, the Subcommittee on Technology and Innovation will convene a hearing to review the research, development, and technology (RD&T) activities of the Department of Transportation. The hearing will focus on issues related to the funding and prioritization of current research initiatives and how to maximize the efficiency of these activities. With the expiration of SAFETEA-LU in fiscal year 2009, this hearing will also examine research issues to inform the current Federal surface transportation reauthorization effort.

**II. Witnesses**

- **The Honorable Peter Appel**, Administrator, Research and Innovative Technology Administration, U.S. Department of Transportation
- **Mr. John Halikowski**, Director, Arizona Department of Transportation; Chair, American Association of State Highway and Transportation Officials Standing Committee on Research
- **Mr. David Gehr**, Senior Vice President, Highway Market, Parsons Brinckerhoff; Chairman, American Society of Civil Engineers Transportation Policy Committee
- **Dr. Irwin Feller**, Professor Emeritus of Economics, Pennsylvania State University; Senior Visiting Fellow, American Association for the Advancement of Science
- **Ms. Lynn Peterson**, Transportation Policy Advisor, Office of Governor John Kitzhaber (OR)

**III. Brief Overview**

The Department of Transportation (DOT) annually supports more than \$600 million in research, development, and technology deployment (RD&T) activities focused on surface modes of transportation (rail, transit, motor carrier and highway). DOT characterizes research funding into three main categories: applied, development, and technology. The first two categories are pre-implementation stage work, while the technology, or “T” classification, implies that funds are being used for technology deployment or field demonstration.

Secretary Ray LaHood’s DOT priorities are organized around five strategic goals: safety, state of good repair, economic competitiveness, livable communities, and environmental sustainability. Several plans have provided strategic direction for the Department. DOT’s most recent strategic plan, “New Ideas for a Nation on the Move” provided goals for fiscal years 2006–2011. In 2006, the Research and Innovative Technologies Administration (RITA), the research coordination body of DOT, produced “The Transportation, Research, Development, and Technology Strategic Plan for 2006 to 2010.” The plan, mandated by the surface highway reauthorization bill passed in 2005 (PL–109–59, “SAFETEA-LU”), established a five-year pathway for DOT research activities. The Transportation Research Board, a part of the National Research Council, reviewed the plan and identified a number of strengths and weaknesses. One area of concern was that the plan did not “explain how the varied missions of DOT and its operating agencies influence the RD&T portfolio.” DOT does not have a current strategic plan for the Department or specific to RD&T activities, and current research priorities are not easily quantified or characterized.

A draft strategic plan was made available for public comment in May 2010, but has not been finalized.

In November 2008, the Transportation Research Board produced a report titled, "The Federal Investment in Highway Research 2006–2009: Strengths and Weaknesses." The Board made a number of recommendations for change to highway research programs, including improved engagement of the research community in the priority-setting process and subjecting research programs to merit-review.

The hearing will explore whether the research activities of DOT are well-executed and integrated across the Department, and how to efficiently address the long-term research and technology needs of the country. In particular, the relationship between states and the Federal government will be explored. The pending surface transportation reauthorization presents an opportunity to ensure transportation RD&T activities are aligned with national transportation priorities and to examine how the priorities will further the states' ability to incorporate transformational research results into their transportation systems.

#### **IV. Background**

The Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU), which became law in August 2005, was the last comprehensive Federal surface transportation reauthorization bill. Since that authorization expired in fiscal year 2009, a series of extensions have been enacted to continue funding for programs. The most recent extension, the Surface Transportation Extension Act of 2011 (Public Law 112–5) extended surface transportation programs through September 30, 2011.

The DOT surface RD&T endeavor is conducted by a host of multi-modal Administrations. Those Administrations include the Federal Highway Administration (FHWA), the Federal Transit Administration (FTA), the National Highway Traffic Safety Administration (NHTSA), the Federal Railroad Administration (FRA), and the Federal Motor Carrier Safety Administration (FMCSA). In addition, the Research and Innovative Technology Administration (RITA) conducts a small amount of internal research and primarily facilitates and supports coordination of research efforts across the DOT.

#### DEPARTMENT OF TRANSPORTATION RESEARCH, DEVELOPMENT AND TECHNOLOGY (RD&T) ACTIVITIES\*

##### RESEARCH AND INNOVATIVE TECHNOLOGY ADMINISTRATION (RITA)

RITA is responsible for planning, coordination, facilitation, and review of DOT's research programs. The request includes \$17.6 million for RITA to conduct a small amount of internal research and to coordinate research programs across the agencies. RITA oversees the following programs, which are funded out of other Administration's accounts:



<b>Research Area (and source of funding)</b>	<b>FY 2012 Request (millions)</b>
Intelligent Transportation Systems (FHWA)	\$110.0
Univ. Transportation Center (UTC) Program (FHWA, FTA)	\$100.0
Competitive UTC Consortia (FHWA, FTA)	\$80.0
Bureau of Transportation Statistics (FHWA)	\$35.0
UTC Multimodal Competitive Research Grants (FHWA)	\$20.0
Multimodal Innovative Research Program (FHWA)	\$20.0
Transportation Safety Institute (fee for service)	--
Volpe National Transportation Systems Center (fee for service)	--

<b>Research Area (and source of funding)</b>	<b>FY 2012 Request (millions)</b>
Structures (improving and maintaining infrastructure)	\$75.0
Planning, Environment, and Realty (environmental research, project delivery improvement initiatives, asset management)	\$35.0
Highway Operations (research to improve movement of people and goods)	\$25.0
Safety	\$25.0
Next Generation Research & Technology	\$22.0
Policy (analysis on emerging domestic and international issues)	\$18.0

FHWA also funds the Future Strategic Highway Research Program (SHRP II), administered by the Transportation Research Board, which is a multi-year research effort focused on moving transportation research to deployment in the field in order to reduce congestion, improve highway safety, and rehabilitate aging infrastructure. While no funds were requested to continue the program in FY 2012, the last enacted funding was \$50 million in FY 10.

#### FEDERAL TRANSIT ADMINISTRATION (FTA)

FTA's FY 12 National Research & Technology Deployment request is \$129.2 million. When funding for implementation and deployment is removed, the total amount focused on research and development is about \$40 million. FTA's requested research and development activities in FY 12 include: Innovative safety research, industry analysis research, rail programs and infrastructure research, transit standards development, and transit planning and forecasting research under the National Program (\$14.5M); transit-focused University Transportation Centers Program (\$8.0M); Clean Fuels and Environmental Research (\$14.8M); Greenhouse Gas and Energy Reduction Deployment and Demonstration Programs. \$10 million would be provided for two transit agencies to serve as "test beds," and \$65 million for demonstration activities (\$75.0M).

#### NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION (NHTSA)

NHTSA's FY 12 request for Research and Analysis is \$78.2 million which includes: Crashworthiness Research (\$21.4M), Crash Avoidance Research (\$12.7M), and Alternative Fuels Vehicle Safety (\$1.5M). Additionally, \$13 million is requested for Highway Safety Research.

## FEDERAL RAILROAD ADMINISTRATION (FRA)

The FRA Core R&D request of \$40 million includes funding for: railroad systems, human factors, track and train interaction, HAZMAT travel, and the National Cooperative Rail Research Program, among other areas. Additionally, \$50 million is requested for High-Speed Rail R&D. These funds are to address safety risks and fund new technology.

## FEDERAL MOTOR CARRIER SAFETY ADMINISTRATION (FMCSA)

The FMCSA RD&T program request for FY 2012 is \$11.6 million. The request includes the following research and development activities: Produce Safer Drivers (\$2.4M), Improve Safety of Commercial Vehicles (\$200,000), Produce Safer Carriers (\$1.1M), and Enable and Motivate Internal Excellence (\$700,000).

**V. Major Issues and Concerns**

## DOT PRIORITIZATION OF RESEARCH AND PERFORMANCE METRICS

The current amount DOT spends on research to support surface programs is approximately one percent of federal expenditures on highways. Questions remain as to whether this is a sufficient amount, and whether the long-term research needs of the nation are being adequately addressed. In addition, the current strategic priorities for the DOT, which impact all programs, may not be well-aligned with the needs of stakeholders. Components such as livable communities, environmental sustainability, and economic competitiveness remain ill-defined, amorphous, and difficult to measure, especially as they relate to research programs. There are no Federal performance standards to guide states or standardized reporting metrics. Without a means for states to prove the effectiveness of their programs, and without the DOT requiring such justification coupled with clear strategic goals, it is challenging to ensure that federal funds are being used as efficiently and effectively as possible.

## COMPETITIVE FUNDING AND UNIVERSITY TRANSPORTATION CENTERS

The practice of earmarking funding in the surface transportation bill has expanded in recent reauthorization measures. The 2005 SAFETEA-LU legislation contained over 5,600 earmarks accounting for \$21.7 billion in the highway title alone. Some transportation groups have opposed the practice of earmarking, arguing it constrains DOT's ability to invest strategically in RD&T. In fact, SAFETEA-LU's research title earmarked more funding than was authorized by the title, so several research programs and projects were unable to be funded until a technical corrections Act was passed in 2008 to fix the research funding shortfall.

SAFETEA-LU provided about \$70 million annually to support University Transportation Centers (UTCs) across the country. The act authorized an expansion in the number of UTCs from 33 to 60 UTCs, 20 of which were competitively selected. All UTCs require a portion of state matching funds, conduct basic and applied university-based transportation research, and are managed by RITA. Secretary LaHood recently made the decision, based on authority provided to DOT under the last extension bill (P.L. 112-5), to cease funding for all of the existing 59 UTCs and reform the program into a competitive, consortium-based system. Several other research programs funded through RITA, FTA, and FHWA also will not receive funding in FY 11 as a result of the Secretary's decision. For FY 2011, UTC applicants will be required to apply in consortia of at least two institutions of higher education. The UTC program has been cited as valuable to transportation research, as well as underutilized by DOT and overly focused on highly applied research instead of advanced research to support national transportation needs.

## HIGHWAY TRUST FUND SOLVENCY

The current highway research programs have been funded through a series of extensions, which have transferred sums from the general fund. Driving has declined significantly in the last decade and vehicles have become more fuel efficient. Consequently, at the current rate of 18.4 cents per gallon, set in 1993, the Highway Trust Fund is no longer covering all of the surface transportation expenses. To remain solvent, the highway account has already required three transfers from the general fund totaling \$29.7 billion. The most recent transfer of \$14.7 billion in 2010 is expected to keep the account solvent through sometime in 2013. A means of adding more funds to the trust fund must be found, or the size of programs supported by DOT must decrease. In the current budget environment it is unclear whether the

most viable path forward is to restore the solvency of the fund or to address financing needs in other ways.

Chairman QUAYLE. The Subcommittee on Technology and Innovation will come to order. Good morning, everybody. Welcome to today's hearing entitled, "Transportation Research Priorities: Maximizing Return on Investment of Taxpayer Dollars." In front of you are packets containing the written testimony, biographies, and truth in testimony disclosures for today's witness panel.

I will now recognize myself for five minutes for an opening statement.

The research and development activities at the Department of Transportation are vital to the Nation's prosperity. These efforts support critical infrastructure and enhance both our economic competitiveness and our way of life. The pathway forward for these programs continues to present significant challenges for Congress. We need to ask difficult questions to determine how best to address the issues facing our aging infrastructure within the limitations of our current budget environment.

The DOT annually supports more than \$600 million in research, development, and technology deployment activities focused on surface modes of transportation. These programs were last authorized in 2005, and are primarily supported through the Highway Trust Fund and Mass Transit Fund. However, since 2009, funding shortfalls have required us to transfer nearly \$30 billion from the general fund to maintain all of our highway programs.

Advancements in materials and technology can help achieve long-term cost savings by reducing congestion and improving the durability and lifespan of our transportation projects. It is, therefore, critical that we find a way to maintain a healthy, substantive research base behind our state and local transportation initiatives.

Concerns have been raised about how research priorities are identified and the means used to quantify and measure performance. Today's hearing provides an opportunity for us to examine if our research activities are well-executed and integrated across the Department and whether they are efficiently addressing the long-term research and technology needs of the country.

I would like to thank our witnesses for coming here today and for sharing your thoughts on how to improve our transportation networks and research activities. I look forward to starting a dialogue with you today and hope you will continue to work with us to maximize the effectiveness of these programs as we attempt to reauthorize our federal surface transportation programs.

[The prepared statement of Mr. Quayle follows:]

PREPARED STATEMENT OF THE SUBCOMMITTEE ON TECHNOLOGY AND INNOVATION  
CHAIRMAN BEN QUAYLE

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Chairman QUAYLE. I would now like to recognize the Ranking Member of this Subcommittee, Mr. Wu, for an opening statement.

Mr. WU. Thank you, Chairman Quayle, for calling this hearing. I also want to thank our witnesses for appearing before the Subcommittee and for their assistance today in helping us assess what research and development needs should be addressed in any surface transportation reauthorization bill considered by this Congress.

Since the last reauthorization the Subcommittee has examined a number of research and development challenges faced by DOT. For example, in 2009, we looked at ways to improve the planning and coordination of DOT's research agenda, strengthen technology transfer, and ensure that federally-funded research and development is meeting State and local transportation needs and mitigating the impact of the surface transportation system on the environment. It is important that we have some of these discussions again today because the transportation sector has an enormous impact on our lives and the economy.

The average household in America spends 16 percent of its budget on transportation. In all, transportation-related goods and services contribute about \$1.2 trillion to the U.S. economy.

If we are committed to making our transportation system more reliable and more efficient and ensuring that transportation planners are wisely investing taxpayer dollars, we need to have a robust and effective transportation and research program.

Therefore, I am pleased that this Subcommittee continues to take seriously its critical role in guiding DOT's research and development priorities while seeking input on the specific investments needed to see those priorities through to fruition.

I also believe that we need to be talking more seriously about improving the energy efficiency of our entire transportation system. We should be asking questions like what modeling tools would help communities develop an effective, mixed-use transportation system of cars, buses, bicycles, light rail, and trolleys such as we have in Portland, Oregon. If we are serious about congestion mitigation and traffic management, what are the next steps towards realizing those goals and reducing the amount of time cars spend idling in traffic.

Sustainability and energy efficiency are no longer just buzz words in transportation, in the transportation community. They are

crucial components of a working national transportation infrastructure. Building more roads is not the only answer. We must use our resources carefully and plan strategically, and that requires a commitment to finding simple and innovative ways to increase the productivity and longevity of our transportation systems.

I am proud that my congressional district has been at the forefront of this endeavor, implementing and operating a transportation infrastructure that serves as a national model of integrated energy efficiency and sustainability. The State and local departments of transportation in Oregon have worked effectively to implement truly innovative solutions to our transportation challenges using a diverse set of technologies including a transit signal priority project that greatly reduces idling for buses by linking on-board computers to traffic lights, sensory ramp meters that cut congestions on our freeways, and real time digital dissemination of traffic information to travelers so that they can avoid backups.

These efforts are coordinated regionally, not just city by city, so that the energy savings benefit taxpayers throughout the area.

Ms. Lynn Peterson, who is the Sustainable Communities and Transportation Policy Advisor to the governor of the State of Oregon, is here to tell us more about how the research and policy communities collaborate to make these projects a reality. The Committee on Science, Space, and Technology will play an important role in defining our transportation research priorities for the future. I am confident that today's witnesses will give us some solid ideas for moving transportation research forward, and I look forward to their testimony.

Thank you, Mr. Chairman. I yield back.

[The prepared statement of Mr. Wu follows:]

PREPARED STATEMENT OF RANKING MEMBER DAVID WU

Thank you, Chairman Quayle, for calling this hearing. I also want to thank our witnesses for appearing before the Subcommittee and for their assistance today in helping us assess what research and development needs should be addressed in any surface transportation reauthorization bill considered by Congress.

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For example, in 2009, we looked at ways to:

- improve the planning and coordination of DOT's research agenda;
- strengthen technology transfer and ensure that federally funded research and development is meeting state and local transportation needs;
- and mitigate the impact of the surface transportation system on the environment.

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- What modeling tools would help communities develop an effective mixed-use transportation system of cars, buses, bikes, light rail, and trolleys like we have in Portland, Oregon?
- If we are serious about congestion mitigation and traffic management, what are the next steps toward realizing those goals and reducing the amount of time cars spend idling in traffic?

Sustainability and energy efficiency are no longer just buzzwords in the transportation community. They are crucial components of a working national transportation infrastructure. Building more roads is not the only answer. We must use our resources carefully and plan strategically—and that requires a commitment to finding simple and innovative ways to increase the productivity and longevity of our transportation systems.

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The Committee on Science, Space, and Technology will play an important role in defining our transportation research priorities for the future. I'm confident that today's witnesses will give us some solid ideas for moving transportation research forward and I look forward to their testimony. Thank you, Mr. Chairman. I yield back the balance of my time.

Chairman QUAYLE. Thank you, Mr. Wu. If there are Members who wish to submit additional opening statements, your statements will be added to the record at this point.

At this time I would like to introduce our witness panel. Our first witness is Mr. Peter Appel, Administrator of the Research and Innovative Technology Administration at the Department of Transportation. Next we will hear from Mr. John Halikowski from the great State of Arizona, where he is the Director of the Arizona Department of Transportation and Chair of the American Association of State Highway and Transportation Officials Standing Committee on Research.

Our third witness is David Gehr, a Senior Vice President at Parsons Brinckerhoff and Chairman of the Transportation Policy Committee at the American Society of Civil Engineers. Our next witness is Dr. Irwin Feller, Professor Emeritus of Economics at Penn State and the Senior Visiting Fellow for the American Association for the Advancement of Science.

I now yield 2 minutes to the Ranking Member, Mr. Wu, to introduce our final witness, Ms. Peterson.

Mr. WU. Thank you very much, Mr. Chairman, and I am happy to introduce a fellow Oregonian, someone I have worked with in the past and have enjoyed working with, Ms. Lynn Peterson.

Ms. Peterson currently serves as Governor Kitzhaber's Sustainable Communities and Transportation Policy Advisor. She is the former Chair of the Clackamas County Commission and a nation-

ally-recognized transportation and land use integration expert. In her role with the governor's administration, Ms. Peterson leads the governor's policy efforts on transportation initiatives, including high-speed rail, freight, highway planning and improvement, the solar highway, and linking transportation to housing and sustainability.

Prior to serving on the Clackamas County Commission, Ms. Peterson worked as a Transportation Consultant and as a Strategic Planning Manager for TriMet. She also was a Transportation Advocate for 1,000 Friends of Oregon and a Transportation Planner for Metro.

I would like to thank Ms. Peterson for coming all the way across the country, a trip with which I am more familiar than I want to be, and for dedicating her career for building safe and healthy communities.

Thank you, Mr. Chairman.

Chairman QUAYLE. Thank you, Mr. Wu. As our witnesses should know, your spoken testimony is limited to five minutes each, after which the Members of the Committee will have five minutes each to ask questions.

We are going to start it off. I will now recognize our first witness, Mr. Peter Appel.

**STATEMENT OF THE HON. PETER H. APPEL,  
ADMINISTRATOR, RESEARCH AND INNOVATIVE  
TECHNOLOGY ADMINISTRATION,  
U.S. DEPARTMENT OF TRANSPORTATION**

Mr. APPEL. Thank you, Chairman Quayle, Ranking Member Wu, and Members of the Subcommittee. On behalf of Secretary Ray LaHood, I would like to thank you for the opportunity to appear here today to discuss the research, development, and technology priorities of the U.S. Department of Transportation.

It will come as no surprise to this Subcommittee that the research, development, and technology priorities of the Department are the same as the strategic objectives for American transportation that Secretary LaHood has set forth. Our first priority is safety, and our additional priorities are the state of good repair, economic competitiveness, livable communities, and environmental sustainability.

I am privileged to lead the Research and Innovative Technology Administration or RITA, which guides the development of research and technology priorities and their coordination across the Department. At RITA we seek to implement the research and development programs in the most effective means possible, conducting research that advances national transportation goals and is deployable, while ensuring that the various operating administrations across the Department do not duplicate research efforts but rather find synergies across them.

RITA works to identify synergies and opportunities for collaboration in support of the Department's priorities. An example of this is RITA has pulled together all of the human factors experts across the Department to address crucial safety issues involving operator fatigue, no matter what mode of transportation.



Setting research priorities starts with the Research, Development, and Technology Planning Council, which I chair. The Council consists of my fellow heads of the Operating Administrations across the DOT and the Office of the Secretary. The Council sets forth guidance, oversees implementation, and identifies at a policy level the coordination that needs to occur to meet new challenges in research and technology.

Our guidance is implemented through the RD&T Planning Team, which includes the Associate Administrators for research and the heads of research for each Operating Administration. The team discusses ongoing research activities, convenes clusters of researchers and program managers, facilitates research alignment with DOT priorities, and ensures that research we undertake has clear value and a path to deployment. We routinely interact with stakeholders to ensure that we have a coherent RD&T direction and that research has a champion willing to test, demonstrate, and deploy the results of our research.

One of our closest partners is the American Association of State Highway and Transportation Officials represented here today by John Halikowski seated to my left. AASHTO routinely takes research results and incorporates them into AASHTO standards, guiding State and local transportation agencies in improving planning, design, operations and maintenance.

A key tool that RITA has deployed over this past year to accelerate collaboration are 14 scientific Research Clusters. Each cluster has a dedicated online collaboration portal which includes shared research, activities, searches through the National Transportation Library, and links to research stored in the Transportation Research Board's Transportation Research International Documentation and Research in Progress databases.

RITA is the Department's lead on cross-cutting technology transfer activities as well. RITA's Technology Transfer Program seeks to move the Department's investment in research and technology into application and to facilitate commercialization. RITA hosts events to showcase research technologies developed by Departmentally-funded programs. Most recently on April 6 we hosted a University Research Technology Transfer Day at DOT Headquarters where about 25 universities from across the country demonstrated research they were doing that had a clear pathway to technology transfer and implementation and deployment.

We have seen many DOT-funded research and technology results come to commercialization. Among these are several of which you may have heard such as the Solar Roadways Program, the unique concept to make roads out of recyclable solar panels. This program won the first GE Ecomagination Challenge and we are funding a phase II of this effort.

Another example, innovative analytical methods to determine the best locations in the Chicago area for electric vehicle charging stations. These innovations are already being applied to other regions to support electric vehicle deployment. This research was conducted by the University Transportation Center at Northwestern University.

The Engineered Material Arresting System that safely stops aircraft that overshoot the runway end. This is deployed at over 50

runway ends at over 35 major airports and has prevented seven significant accidents. Research was conducted at the FAA Hughes Technical Center.

The Department is focused on working with our state and local partners to accelerate the deployment and acceptance of such technologies. With that I look forward to answering any questions you may have. Thank you.

[The prepared statement of Mr. Appel follows:]

PREPARED STATEMENT OF THE HONORABLE PETER APPEL, ADMINISTRATOR,  
RESEARCH AND INNOVATIVE TECHNOLOGY ADMINISTRATION,  
U.S. DEPARTMENT OF TRANSPORTATION

**Transportation Research Priorities: Maximizing Return on Investment of Taxpayer Dollars**

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

On behalf of Secretary Ray LaHood, I'd like to thank you for the opportunity to appear here today to discuss the research, development and technology priorities of the U.S. Department of Transportation.

It will come as no surprise to this Subcommittee that the research, development and technology priorities of the Department are the same as the strategic objectives for American transportation that Secretary LaHood has set forth:

- Safety—our number one priority;
- State of Good Repair—optimal condition and performance of our infrastructure;
- Economic Competitiveness—targeted investments to better serve the traveling public and facilitate freight movement, while supporting American jobs and exports;
- Livable Communities—increasing travel choice and providing access to affordable transportation; and
- Environmental Sustainability—addressing transportation's impacts on air, water and natural ecosystems.

As always, the Department seeks to implement our research and technology programs in the most effective means possible, conducting research that advances national transportation goals while ensuring that the various Operating Administrations of the Department do not duplicate research efforts. The organization I am privileged to lead, the Research and Innovative Technology Administration, or RITA, guides the development of research and technology priorities, and research coordination across the Department.

RITA works to identify synergies and opportunities for collaboration in support of the Department's priorities. For example, RITA has pulled together all of the human factors experts across the Department to address the crucial safety issue of operator fatigue, no matter the mode.

Setting research priorities starts with the Research, Development and Technology (RD&T) Planning Council, which I chair. The Council consists of my fellow heads of the Operating Administrations and key members of the Office of the Secretary. The Council sets forth guidance, oversees implementation, and identifies at a policy level the coordination that needs to occur to meet new challenges in research and technology. A recent example of this guidance is the creation of the DOT Safety Council, to share best practices and results in safety systems.

Our guidance is implemented through the RD&T Planning Team, which includes the Associate Administrators for research in each Operating Administration. The Team meets monthly to discuss ongoing research activities, to convene clusters of researchers and program managers in specific disciplines, to facilitate research alignment with DOT priorities, and to ensure that research we undertake has clear value and has a path to deployment. The Team coordinates DOT research with non-DOT-funded research being conducted in the states, at universities, in the private and non-profit sectors, and through the Transportation Research Board (TRB). We routinely interact with these and other stakeholders to ensure that research has champions willing to test, demonstrate, and deploy the results of our research.

A key tool that RITA has deployed over this past year to accelerate this collaboration are fourteen scientific "Research Clusters." These Clusters were identified by the Team as the priority topics on which DOT researchers should collaborate with each other and with our external stakeholders. Each Cluster has a dedicated on-line

collaboration portal which includes shared research, activities, searches through the National Transportation Library, and links to research stored on TRB's Transportation Research International Documentation and Research in Progress databases.

The fourteen Research Clusters currently include:

- Data Driven Decision-Making,
- Economics,
- Energy Sustainability,
- Human Factors,
- Infrastructure and Materials,
- Livability,
- Risk-Based Analysis to Address Safety Issues,
- Modeling and Simulation,
- Multimodal Intelligent Transportation Systems,
- Policy Analysis,
- Positioning, Navigation and Timing (PNT),
- System Resilience and Global Logistics,
- Transportation Implications For an Aging Population and Those With Special Needs, and
- Travel Behavior.

RITA reaches out to other Federal agencies to address Administration research and technology priorities, and to make sure that our work on similar topics is complementary. For example, we serve on the interagency Biomass R&D Board, and recently hosted the Interagency Biofuels Infrastructure Workshop. We have significant interest in the Department of Energy's SmartGrid work, especially as it relates to electric vehicle deployment. Through our involvement at the National Science and Technology Council, we work on Administration priorities relating to technical standards policy and development, nanotechnology in materials, and wireless broadband deployment.

RITA is the Department's lead on cross-cutting technology transfer activities. RITA's Technology Transfer program seeks to move the Department's investment in research and technology into application, and to facilitate commercialization. RITA hosts events to showcase research technologies developed by Departmentally-funded programs, most recently the April 6, 2011, University Research Technology Transfer Day at DOT Headquarters.

We have seen many DOT-funded research and technology results come to commercialization—among these are several of which you may have heard:

1. A Small Business Innovation Research (SBIR) project resulted in "Solar Roadways," the unique concept to make roads out of recyclable solar panels. Solar Roadways won the first GE Ecomagination Challenge, and we are funding a Phase II SBIR project.
2. The Northwestern University Transportation Center is using innovative analytical methods to determine the best locations in the Chicago area for electric vehicle charging stations. These innovations are already being applied in other regions to support electric vehicle deployment.
3. The Federal Aviation Administration's (FAA) Hughes Technical Center tested the engineered material arresting systems that safely stop aircraft that overshoot the runway end. It is deployed at over 50 runway ends at over 35 major airports, and has prevented seven major accidents.
4. Intelligent Transportation Systems (ITS) research has brought many improvements to daily transportation operations—traffic management centers, improved work zone safety, transit customer information services (like NextBus), electronic payment systems (like EZPass), and traveler information systems.

Deployment is thoughtfully and continuously coordinated from the start of the innovation cycle with our stakeholders in state and local governments, port and airport authorities, transit agencies, and all of the industries that build and operate America's transportation systems. Each Operating Administration conducts a research planning process to identify their top priorities for future operational and safety improvements. These planning efforts are consistently coordinated with stakeholders, both to ensure that we are meeting the needs of the people actually operating the system, and to ensure deployment champions in the field. Because DOT research results range from new data analyses, to new designs and materials,

to more effective operational methods, to technologies like Intelligent Transportation Systems and the Next Generation Air Transportation System, methods for coordination and deployment are scaled to suit.

Much of our research is undertaken in response to Congressional mandate or National Transportation Safety Board (NTSB) recommendations and to other pressing safety issues, often to support new or refined safety regulations and guidance. We involve all parties from the beginning to the end of the innovation cycle to ensure that we are researching the best possible opportunities to resolve the safety issues, and that our results are deployable and economically effective in daily operations.

The Department works closely with almost 100 Standards Developing Organizations (SDOs) to ensure that the results of our research and technology demonstrations are incorporated into the codes and standards that transportation operators use every day to work safely and efficiently. One of our closest partners in this effort is the American Association of State Highway and Transportation Officials (AASHTO), represented here today by John Halikowski. AASHTO routinely takes research results and incorporates them into AASHTO standards, guiding state and local transportation agencies in improving planning, design, operations and maintenance.

The Department is focused on working with our state and local partners to accelerate the deployment and acceptance of new technologies. For example, the FHWA Every Day Counts Initiative is designed to identify and deploy innovation aimed at shortening project delivery time, enhancing roadway safety, and protecting the environment. A major pillar of Every Day Counts is to move effective, proven and market-ready technologies into widespread use. In support of our local partners, the FHWA's Local Technical Assistance Program and Tribal Technical Assistance Program enables counties, parishes, townships, cities, towns and tribal governments to improve their operations by supplying them with a variety of training programs, an information clearinghouse, technology updates, and customized technical assistance.

Continued success in research and technology innovation and deployment requires us to keep what has worked, while continuing to find creative ways to break down barriers. The Administration supports the following goals:

- simplifying the existing surface transportation research program;
- maximizing research funding flexibility so that available resources are applied to Departmental and stakeholder priorities;
- using full and open competition, and peer review, to get the best possible researchers and technologists working on top priorities; and
- emphasizing performance-based management of programs.

I would like to call your attention to specific innovation reforms which the Obama Administration supports:

- authorizing FHWA a technology and innovation deployment program, specifically to test, evaluate, and accelerate the delivery and deployment of technologies;
- allowing FHWA to increase research efficiency by expanding the authority to conduct research in collaboration with international partners;
- reorganizing RITA's University Transportation Centers program on a fully-competitive consortia model, to better leverage the intellectual capital created through the Federal investment in the important work of the universities;
- authorizing a Multimodal Innovative Research Program to competitively award advanced multimodal transportation research projects, facilitating practical innovative approaches to address systemic transportation problems; and
- enabling RITA's National Transportation Library to establish agreements with other transportation libraries and information centers, to improve the accessibility and exchange of high quality transportation information and data that support operations, policy development, and decision-making.

Thank you for this opportunity to provide an overview of the Department's transportation research priorities. I look forward to answering any questions you may have.

Chairman QUAYLE. Thank you very much.

Mr. Halikowski, you are now recognized for five minutes.

**STATEMENT OF MR. JOHN HALIKOWSKI,  
DIRECTOR, ARIZONA DEPARTMENT OF TRANSPORTATION;  
CHAIR, AMERICAN ASSOCIATION OF STATE  
HIGHWAY AND TRANSPORTATION OFFICIALS  
STANDING COMMITTEE ON RESEARCH**

Mr. HALIKOWSKI. Thank you, Mr. Chairman. Good morning, Mr. Chairman and Ranking Committee Member Wu, Members of the Committee, my name is John Halikowski. I am Director of the Arizona Department of Transportation and Chair of the Standing Committee of Research of the American Association of State Highway and Transportation Officials.

On behalf of AASHTO, I want to express my appreciation for your focus on transportation research needs in the United States. In today's fiscally-challenging circumstances, particularly for state governments across the country, state departments of transportation rely heavily on research that leads to practical solutions to their most challenging problems.

The return on today's dollar investment in research pays off many times into the future. Today I want to cover three points about transportation research and the need for strong, continued commitment and investment.

First, it is critical that we retain the current, multi-tiered research structure that has worked very well for us. Second, AASHTO has identified a number of high-priority policy areas where we believe that national research focus is needed, and last, it is critical to ensure that the discoveries made through research are communicated and transferred into practice.

First, on our current research structure. There are numerous layers to the current research structure, funded by federal, state, and local dollars. This multi-layered and integrated structure has worked well in delivering strategic research that responds to the needs of the transportation industry.

About one percent of the Federal Highway Program is spent on highway research by the Federal Highway Administration and the 50 States through their federally-funded State Planning and Research Program. This relatively small amount that we spend on research helps us to leverage the rest of the transportation program by providing us with solutions that improve the quality and efficiency of the system. Thus, in any consideration of future federal transportation research programs, this multi-layered approach should be continued and supplemented.

Through the existing multi-layered research structure, including the Transportation Research Board (TRB), and the states, we can support and complement strategic national transportation research with our own research efforts.

Second, regarding the areas of research focus, the State DOTs through AASHTO have identified a number of research areas where coordinated, collaborative strategic policy research is needed. These areas are safety, performance management, interstate preservation, freight and economic competitiveness, accelerating project delivery and environmental streamlining, transportation funding, and finance.

It is an appropriate role for the U.S. DOT to take a leadership role in undertaking strategic policy research in support of these na-

tional policy focus areas. Specific examples are contained in my written testimony.

For you, however, I would like to highlight a few examples of high payoff, practical research in my home State of Arizona. ADOT has partnered with the University of Arizona to take our freeway management system real time, taking smart ramp metering to the next level. The use of this system will enable us to squeeze more capacity out of our system by increasing the throughput while improving safety, air quality, and reducing resource consumption.

In another example, Arizona State Route 260 runs through one of the largest contiguous stands of Ponderosa pine in the world and is home to a large population of elk. ADOT partnered with the Arizona Game and Fish Department to record over 4,000 animal crossings and over 100,000 location fixes using GPS-colored elk to determine their preferred crossing locations. This has let us know exactly where we need to use fencing to channel the elk crossing to underpasses and thereby not only reducing wildlife vehicle collisions but also preserving the wildlife population and minimizing the State outlays needed.

Lastly, it is the importance in transferring the findings of our research to transportation planners, engineers, designers, and contractors. U.S. DOT should embrace the latest methods to assist in technology transfer and implementation and be provided with the funding needed to share this information.

For example, the use of web-based technologies, including webinars and interactive pages, web pages and online training and the Strategic Highways Research Program implementation funding needs to be provided for.

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

Again, thank you for the opportunity to testify before you, Mr. Chairman, Members, today. I will be happy to answer any questions.

[The prepared statement of Mr. Halikowski follows:]

PREPARED STATEMENT OF MR. JOHN HALIKOWSKI, DIRECTOR, ARIZONA DEPARTMENT OF TRANSPORTATION; CHAIR, AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS STANDING COMMITTEE ON RESEARCH

Chairman Quayle and Members of the Subcommittee, thank you for the opportunity to testify on Transportation Research Priorities for the next surface transportation authorization bill. My name is John S. Halikowski, Director of the Arizona Department of Transportation, and today I am speaking on behalf of the American Association of Highway and Transportation Officials (AASHTO) which represents the state departments of transportation (DOTs) in all 50 states, Washington, DC, and Puerto Rico. I serve as Chairman of AASHTO's Standing Committee on Research.

On behalf of AASHTO, I want to express our appreciation to you, Chairman Quayle for your recognition of the value of a strong federal-state partnership in conducting and deploying the results of transportation research.

Mr. Chairman, in your invitation to me, you posed a number of questions. In response, today I want to focus my remarks around the following general points:

- The current national framework, structure and process for identifying transportation research needs, conducting and disseminating research, and partnering for transferring technology works well and should be sustained.

- In the context of this framework, there are ample opportunities for all stakeholders to identify research needs, participate in overseeing research studies and have access to research results
- In 2008, AASHTO's Board of Directors adopted policy priorities for reauthorization of the Safe, Accountable, Flexible, and Efficient Transportation Equity Act: A Legacy for Users—SAFETEA LU (Public Law 109–59). While those policies remain priorities for AASHTO, we have updated and refined our policy recommendations for the national research program to reflect a fiscal environment that is much more constrained than we anticipated or planned for nearly three years ago.
- Through AASHTO's various standing committees, current detailed research needs and gaps have been identified along with opportunities for addressing those needs.

### **The Current National Framework for Research: An Overview**

To build, maintain and expand its vast, multimodal transportation system the United States has long relied on the fruits of research—innovations in planning, materials, construction methods, system operation, organizational effectiveness and many other areas. Innovation through research allows state agencies—even with today's fiscally challenging circumstances—to efficiently deliver a safe, reliable and sustainable transportation system while continuously improving facilities and services.

The federal government's support and funding for transportation research has been steady over many decades dating back at least to the 1893 formation of the Office of Road Inquiry in the U.S. Department of Agriculture.<sup>1</sup> However, by any measure—across industries or countries—the U.S. transportation community invests very modest resources in research and innovation. A substantial return on investment from smarter, better, and longer-lasting transportation can easily be documented in terms of such factors as more durable infrastructure and improved operations. But the benefits extend far beyond the easily quantified to lives saved, a greener transportation system and improved quality of life.

Transportation research in the U.S. is a complex and decentralized array of interrelated programs. This reflects the decentralized nature of the transportation system itself, which includes local, regional, state and federal operators and agencies, and involves many stakeholders—the U.S. Congress and Department of Transportation (U.S. DOT), state departments of transportation, local and regional governments and planning agencies, universities, private firms, associations and users of the systems.

The multiple and interrelated components of our national transportation research effort that are supported with federal surface transportation funds include the following:

1. **Federal research and technology transfer** carried out directly by U.S. DOT, including research directed by the Secretary's Policy Office, as well as by the modal agencies—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). Through the federal program, U.S. DOT tackles high-priority national research needs and shares new technologies and practices with the states. The U.S. DOT research program is described further detail later in this testimony.
2. **Research conducted by each State department of transportation**, managed by the individual state DOT members of AASHTO's Research Advisory Committee, coordinated with national research programs and funded using either federal funds or directly by the states themselves. The majority of the funding for this research comes from the federal State Planning and Research (SPR) Program, which is the nation's cornerstone state research program. State research programs are described in further detail later in this testimony.
3. **Various cooperative research programs managed by the Transportation Research Board (TRB)**, including the National Highway Cooperative Research Program (NCHRP), Transit Cooperative Research Program (TCRP), the National Cooperative Freight Research Program (NCFRP), the Airport Cooperative Research Program (ACRP), and the Hazardous Materials Cooperative Research Program. Most of these programs determine their research agenda on

<sup>1</sup>Transportation Research: Value to the Nation—Value to the States, 2008.

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. NCHRP pools the voluntary research dollars to find solutions to transportation challenges identified as critical by the states.

4. **Policy research undertaken and managed directly by TRB.** TRB conducts policy studies at the request of the U.S. Congress, executive branch agencies, states, and other sponsors examining complex and controversial transportation issues. Studies cover all modes of transportation and a variety of safety, economic, environmental, and research policy issues.
5. **Special research authorized by Congress,** such as the second-generation, Strategic Highway Research Program (SHRP2), which is focusing on four critical issues in transportation—safety, infrastructure renewal, travel-time reliability, and capacity needs.
6. **The University Transportation Centers (UTC) Program** carried out by 60 University Transportation Research Centers typically housed within 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.

#### **Federal Research and Technology Programs**

Throughout its history, a core element of U.S. DOT's mission has been to promote innovation and improvement in America'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. Research conducted through the U.S. DOT allows the federal government to address the more strategic, national research needs which are typically more expensive and broader in scope than can be accomplished by the states on their own.

In addition, in order to maximize the effectiveness of these research and technology activities, U.S. DOT supports and funds a host of complementary activities including research administration, deployment and training, communication, coordination, conferences, and partnerships with other national and international research organizations.

Transportation research authorized under past federal-aid highway, highway safety, motor carrier and transit authorization bills included funding for national surface transportation research, technology innovation and deployment, and training and education. Funding for FHWA's Research and Technology Program (R&T) was authorized under Titles I and V of SAFETEA LU for conducting research, technology and training activities. The largest research component is the Surface Transportation Research, Development, and Deployment program (STRDD) which had an annual authorization of \$196.4 including \$14 million for an Exploratory Advanced Research (EAR) program, which focuses on long-term, high-risk research with the potential for dramatic breakthroughs in surface transportation.

This FHWA R&T program enables U.S. DOT with FHWA and the other modal administrations to carry out policy research to achieve their mission and address their four priority areas of safety, livability, sustainability and economic competitiveness. For example, given the 50–100 year design life for highways and bridges, research should now be underway to consider and develop new specifications for highway and bridge construction, maintenance and materials to adapt to weather impacts associated with climate change. U.S. DOT and FHWA have assumed a leadership role in that critical research undertaking. The states and others can complement U.S. DOT's research program through the research we are conducting in our ongoing programs.

AASHTO believes that even in a constrained fiscal environment, funding for FHWA's R&T program should be maintained at levels sufficient to continue a strong and effective research program. We have recommended funding at no less than \$175 million per year.

#### **State Transportation Research**

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 first authorized in the Federal-Aid Highway Act of 1944. Currently SPR funding to each state equals 2% of its federal funds in the six core highway programs, with at least 25% of the total required to be spend on research, develop-



ment 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 use these funds 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.

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, the transfer of technology from researcher to user, and research that supports the development of standards and specifications.

The return on the states' investment in research is substantial. In just one example, a formal cost analysis in 2003 prepared for the Indiana Department of Transportation's research program, jointly administered with Purdue University, showed benefit-cost ratios ranging from as high as 220 to as low as 3 to 1. The average benefit-cost ratio for nine projects, collectively, was an amazing 59:1. In 2009 a similar analyses was performed with an average benefit-cost ratio of 32:1. But it is more than just good economics. Research, for example, is producing safer highways and construction zones for its customers and workforce, saving future maintenance expenses, developing longer lasting materials, introducing new technology and processes, developing environmentally friendly solutions, to Indiana's waste problems, promoting economic growth, bringing on-line faster and more economical facilities.<sup>2</sup>

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.

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.

We urge that the SPR Program which is funded by a 2% set aside of funds from the core highway programs be continued in its current formula-based configuration.

#### **Cooperative Research Programs**

The states also voluntarily co-fund the National Cooperative Highway Research Program through the Transportation Research Board of the National Academy of Sciences. Funds are drawn voluntarily 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 state's allocation amounts to 5 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 underway 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

<sup>2</sup> Indiana Department of Transportation-Joint Transportation Research Program (Purdue University), 2011

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.

### **AASHTO's Research Policy Priorities for Surface Transportation Reauthorization**

AASHTO believes that research and technology transfer are critical for federal, state, and local governments to provide world-class transportation services to the American people. A strong transportation research and technology transfer program should be sustained at the levels provided in the last authorization, or at the same proportionate level achieved for research in that bill, depending on the overall funding provided in this authorization. This paper assumes that the reauthorization will not meet the levels of the last reauthorization in total dollar levels authorized per year.

- Maintain the State Planning and Research Program. We urge Congress to maintain the State Planning and Research program in its current, formula-based configuration with a 25% minimum set aside for research, development, and technology transfer activities, including the National Cooperative Highway Research Program. The percentage drawdown for the SP&R program may have to be increased to maintain the dollar levels of the last authorization.
- Fund FHWA's Core Research and Technology Programs. AASHTO supports funding FHWA's core Research and Technology program at a small increased level of \$175 million per year, without earmarking and with sufficient flexibility in order for FHWA to carry out its mission in national research and innovation.
- Continue Research Programs for FTA, NHTSA, FMCSA, and RITA. AASHTO supports continuing to fund the research program for FTA, NHTSA, FMCSA, and RITA (including funding for the Bureau of Transportation Statistics) at the levels provided in SAFETEA-LU. If funding falls below that provided in SAFETEA LU, proportionate shares for these programs should be maintained.
- Fund Implementation of the Strategic Highway Research Program (SHRP 2). Provide funding for SHRP 2 Implementation through a statutory takedown of funds from the federal-aid highway programs. The percentage should be at least one quarter of one percent of the core program funding levels in order to assure a stable, predictable source of funds estimated at approximately \$50 million per year.

SHRP 2 Implementation should be authorized following the recommendations of the TRB report called for by SAFETEA-LU, TRB Special Report 296, "Implementing the Results of the Second Strategic Highway Way Research Program."

**"Recommendation 1:** A SHRP 2 implementation program should be established."

**"Recommendation 2:** The Federal Highway Administration should serve as the principal implementation agent for SHRP 2, in partnership with the American Association of State Highway and Transportation Officials, the National Highway Traffic Safety Administration (NHTSA), and the Transportation Research Board. NHTSA should exercise a leadership role in the long-term stewardship of the safety database."

**“Recommendation 3:** Stable and predictable funding should be provided over several years to support SHRP 2 implementation activities.”

**“Recommendation 4:** A formal stakeholder advisory structure should be established to provide strategic guidance on program goals, priorities, and budget allocations, as well as technical advice. At a minimum, this advisory structure should include an executive-level oversight committee for the entire SHRP 2 implementation program and a second oversight committee focused exclusively on administration of the safety database.”

- **Fund the Cooperative Research Programs.** Fund the cooperative research programs administered by TRB at the annual levels established in the previous authorization.
  - Transit Cooperative Research Program—\$ 10.5 million
  - Cooperative Freight Research Program—\$ 3.75 million
  - Hazardous Materials Cooperative Research Program—\$ 1.25 million
- **Fund Intelligent Transportation Systems (ITS) Research and Development.** Continue funding support for ITS Research at its current level of \$110 million per year. Continue support for on-going initiatives such as IntelliDrive, a partnership between state and federal DOTs, the automotive industry and its suppliers, to improve safety and mobility.
- **Fund the University Transportation Centers Program.** Fund the University Transportation Centers Program at the levels established in the previous authorization—\$69.7 million. Ensure an 80/20 federal/non-federal matching requirement.
- **Fund the FHWA Training and Education Programs.** Continue support for FHWA training and education programs at current funding levels, including the National Highway Institute, the Garret Morgan Transportation and Technology Futures Program, Eisenhower Fellowships and other capacity building programs. Continue funding for the Local and Tribal Technical Assistance Programs (LTAP/TTAP) at a small increase over the current levels to \$15 million per year. These programs are significant to the sharing of knowledge and peer-to-peer exchange practices among the counties and the district offices of the state DOTs.
- **Fund ongoing data and knowledge-related activities.** Continue funding for ongoing data and knowledge-related activities, including the National Pavement Performance Database and the National Transportation Library.

## AASHTO's Research Funding Recommendations

Program Name	Current level FY 2010	U.S. DOT Request FY 2012	AASHTO 2008 Recommendation	AASHTO Contingency Funding* Level 2011
FHWA RD&T (Technology Deployment)	\$153 m	\$344m (\$144 m)	\$200M	\$175m
SHRP 2	\$49m	part of \$144m	\$50m	\$50m
Training and Education (LTAP program)	\$25m (\$10m)	\$40m (\$16m)	(\$20m)	(\$15m)
ITS Research	\$103m	\$110m	\$150m	\$110m
UTC	\$74m	\$72m	\$70m	\$70m
SP&R (2% takedown)	183m	\$206m	>\$183m	>\$183m [possible increase in takedown to maintain planning and research funding at current levels]
Cooperative Research Programs				
TCRP	\$10.5m		\$18m	\$10.5m
NCFRP	\$3.75m		\$12m	\$3.75m
HMCRRP	\$1.25m		\$5m	\$1.25m

\* Illustrative program adjustment if overall funding for the surface transportation program is substantially below what was recommended in 2008.

### Critical National Research Needs and Gaps

AASHTO has identified a number of focus areas of critical research needs and gaps. Funding to undertake this research should come from all of the interrelated research support components: U.S.DOT; FHWA's R&T Program; the Cooperative Research Programs largely funded by volunteer contributions from the state DOTs and housed at TRB; federal-state-private sector partnerships and funding support; and Congressionally authorized research support. It will take leadership, commitment and funding support across all components to undertake the research and innovation needed to ensure continuous improvement for maintaining a world-class transportation system.

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 the 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 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 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 hand-held 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.

AASHTO urges Congress to fund state data improvements at significantly higher levels than current ones, and AASHTO supports increased funding for federal highway safety research.

#### **Interstate Preservation**

We believe that it is essential to focus attention on preserving the trillion-dollar investment that has been made over the past 50 years on the roads and bridges that make up the Interstate Highway System. Many of the 55,000 bridges on the system and the 210,000 lane miles of pavement in the system are reaching 40–50 years of age. They may be at a stage where total replacement or more than routine reconstruction is required. These costs are not adequately taken into effect in today's bi-annual U.S. DOT conditions and performance reports.

We recommend that funding be authorized for U.S. DOT and State DOTs to jointly undertake a comprehensive study of the assessed (not modeled) needs and investment requirements of the Interstate system bridges and structures.

#### **Performance**

Performance management is a policy-directed, data-driven, performance-based business practice that links organizational goals and objectives to resources and results. The outcomes of performance-based management include more efficient dis-

tribution of limited resources and a focus on accountability of decision-making. Over the last 15 years, there has been a dramatic increase among state departments of transportation (DOT) in the use of performance management principles to plan, prioritize, track, and improve the effectiveness of nearly all DOT functions to achieve the agencies' fundamental goals. Performance information helps to guide decisions about priorities and resource allocation for capital project delivery and internal agency management and operations. The trend towards states adopting performance management has been the result of several factors, including the demand for more accountability from government programs and agencies (both state and Federal), the pressure of scarce financial resources, and the recognition of best business practice.

Currently, all state DOTs use some type of performance management process. The most common is to track asset condition and safety data and the majority of states provide comprehensive performance data to decision makers to both increase accountability to customers, and achieve the best possible transportation system performance with current investment programs. The primary challenge for many agencies is the lack of funding to maintain and expand the current transportation system. However, by using a performance-based management approach, DOTs can maximize existing resources and justify recommendations for additional funding.

In order to continue the work that state DOTs are doing with regard to performance management more research needs to be conducted. The following are several research priorities which AASHTO believes are necessary in order for states to fully embrace and implement transportation performance management:

- **Transportation Data Program-** A fundamental component necessary to the development of performance measures and in performance management is data. Research is needed on how best to develop a data program that can be used to support a robust performance management process.
- **Development of Performance Measures-** AASHTO, with its metropolitan planning organization partners, and FHWA has identified a select number of performance measures for safety, pavement and bridge assets that could be used by all states. However, additional work is needed to standardize data collection and reporting for those measures. Beyond the initial highway asset and safety fatality measures, additional research is needed to identify appropriate measures. For example, how do we measure freight mobility—by measures of delay, reliability or access?
- **Comparative Analysis of Performance Measures-** The usefulness of performance management may be enhanced when the performance measures used by one state DOT are comparable to those of other state DOTs. AASHTO's members, through NCHRP, support a robust research program that voluntarily compares performance for certain variables, such as fatalities, across all the states. Many state DOTs would like to continue this type of research extending comparison of performance to additional performance indicators which all states agree to measure.
- **Development of Performance-based Planning and Programming-** The current focus on performance measures is transforming the transportation planning process to one that is performance-based and focused. The planning process is where performance management can drive transportation investment decisions—linking performance and return on investment. Support for research, including the development of innovative tools and techniques along with training and peer-to-peer exchange of best practices, is need to accelerate the adoption of performance-based planning and programming.

AASHTO supports sufficient funding for federal highway research to enable the agency to continue its research and technical assistance on performance measures and management.

#### **Environment: The AASHTO Center for Environmental Excellence**

In 1992, AASHTO established the Center for Environmental Excellence (Center) in partnership with Federal Highway Administration as a continuation of its efforts to find innovative ways to assist state transportation agencies and their partners in improving public trust, environmental performance and program delivery. The mission of the Center is to promote environmental excellence in the delivery of transportation services by encouraging environmental stewardship and disseminating innovative ways to advance the state of the practice in environmental management and mitigation. The vision for the AASHTO Center is to broaden and enhance the environmental tools and resources available to state transportation agencies and their partners.

The Center provides State DOTs, our local partners and the transportation community in general with technical assistance, training, information exchange, partnership-building opportunities, and access to innovative environmental tools. One example of technical assistance and information exchange is the development of Environmental Practitioners' Handbooks which help advance the state of the practice by describing the latest practices and procedures for addressing environmental considerations in transportation project development, design, construction, maintenance and operations.

Another key function of the Center is to serve as a convener for problem solving to bring together the states, resource agencies and stakeholder to address pressing environmental concerns with the objective of identifying and reaching consensus on potential solutions. For example, the Center organized a meeting with the state DOTs, State Departments of Natural Resources, the Fish and Wildlife Services, FHWA and the Indiana State University Center for North American Bat Research and Conservation to discuss and identify the problems states were confronting with the Endangered Species Act process related to the Indiana bat and discuss programmatic approaches to solve this problem. The programmatic approach that resulted from this process provides for enhanced recovery and protection of the species and eliminates most of the project-by-project review related to the Indiana bat, therefore allowing needed transportation improvements to proceed. This effort was awarded the U.S. Fish and Wildlife Services 2007 Transportation Environmental Stewardship Excellence Award.

In 2006, the Center developed the Transportation and Environmental Research Ideas (TERI) Database. TERI provides an organized structure to capture and catalogue research ideas by environmental topic. The State DOTs use the data base to evaluate and prioritize the environmental research needs from among a constant flow of new research ideas that come from federal, state, metropolitan and local transportation agencies, TRB, federal and state resource agencies, non-governmental organizations and other stakeholders.

AASHTO urges continued funding to support the AASHTO Center of Environmental Excellence in its commitment to technical assistance, training, and information sharing to help transportation professionals to advance environmental sustainability and stewardship and to deliver transportation improvements more efficiently and expeditiously.

#### **Funding and Finance**

Established in the 2005 SAFETEA-LU transportation authorization act, the mission of the AASHTO Center for Excellence in Project Finance (the Center) is to provide support to State DOTs in the development of finance plans and project oversight tools, and to develop and offer training and state-of-the-art finance methods to advance transportation projects and leverage funding.

The Center provides four primary services:

- Professional Education
- Research Services
- Information Dissemination

In education the center has implemented the Wharton Transportation Executive Program which is designed to provide executive education in finance to senior state DOT officials. The program is conducted by AASHTO and the Wharton School of Business at the University of PA. The Center also offers forums in Public Private Partnership's education. This past September the center offered a one day Congressional forum for Members and staff on revenue and financing options.

The Center conducts research on cutting-edge project finance techniques and topics. The Center's Research Services aim to undertake objective research into specific financial management and policy issues, many of which are actually suggested by State DOTs. These findings are summarized in a series of Occasional Papers, as a resource for project sponsors and policy makers. Most recently the Center joined with the National Conference of State Legislatures in a research project to compile the first comprehensive set of material on how State DOTs are organized for making investment decisions including programming, and project funding and finance.

Other examples of research and information exchange include the development of case study instructional materials for use by the Center and other educational organizations, and interdisciplinary academic assessments of project finance techniques. The Center also collaborates with other entities, such as TRB to help organize such symposiums as the National Conference on Transportation Finance to aid in the development of state-of-the-art project finance tools and methods.

Using the center's website as its primary dissemination tool, the Center is a comprehensive source of information on transportation finance, financial management,

and policy for the transportation community in the United States. The Center's website provides access to all activities and products under one umbrella functioning as a central clearinghouse for all issues relevant to transportation finance, providing extensive information on transportation funding and financing including tools and programs, information on legislation, a comprehensive calendar of domestic and international events and seminars on project finance, a glossary of terms, and links to extensive resources germane to transportation finance.

AASHTO urges continued funding to support the AASHTO Center for Excellence in Project Finance in its commitment to technical assistance, training, and information sharing to help transportation professionals to advance environmental sustainability and stewardship and to deliver transportation improvements more efficiently and expeditiously.

### **Freight and Economic Competitiveness**

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 in Public/Private Freight Projects.** 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 most importantly 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.

Furthermore, 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. Research can support the advancing the state of the practices in a number of areas including areas identified above as research priorities and also including:

- 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

AASHTO supports sufficient funding for federal highway research to enable the agency to continue its research, technology and innovation deployment, and technical assistance to advance all aspects related to freight.

#### **Conclusion**

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

Chairman QUAYLE. Thank you very much.

Mr. Gehr, you are now recognized for five minutes.

**STATEMENT OF DAVID GEHR,  
SENIOR VICE PRESIDENT, HIGHWAY MARKET,  
PARSONS BRINCKERHOFF;  
CHAIRMAN, AMERICAN SOCIETY OF CIVIL  
ENGINEERS TRANSPORTATION POLICY COMMITTEE**

Mr. GEHR. Thank you, Mr. Chairman and Members of the Subcommittee. I am David Gehr. I am Chairman of the Transportation Policy Committee for the American Society of Civil Engineers. ASCE is pleased to offer our views on how to maximize funding for transportation research priorities.

The Highway Trust Fund has been an essential source of funding for surface transportation research and technology for decades and has led to critical benefits for the development of a 21st century surface transportation system.

While research has provided benefit, in ASCE’s 2009, “Report Card for America’s Infrastructure,” roads received a D-, bridges a C, and transit a D. To bring these three categories into a state of good repair would require a five-year investment of about \$1.2 trillion. While an investment of this magnitude is very unlikely, a number of targeted research programs could extend the life span and effectiveness of our transportation infrastructure. As passed, the 2005 Surface Transportation Research Development and Deployment and the University Transportation Research sections in

SAFETEA-LU were completely programmed or earmarked and over-authorized, thus creating a difficult environment to allocate funds.

Additionally, the Federal Highway Administration had no discretionary funds to maintain certain core research programs, meaning critical efforts like the biannual conditions and performance reports struggled for funding. This speaks to the need for minimal earmarking and free and open competition among non-federal entities performing research utilizing federal funding.

Currently the entire transportation research community focuses on short-term, applied problem-solving research instead of the advanced, higher-risk, multi-year projects which would lead to the development of a more efficient system. The longer we delay the necessary research, the longer the Nation delays implementation of a 21st century transportation system.

The University Transportation Centers Program should be continued, but the program can be improved. Universities work well in high-risk, long-term research, so new legislation should emphasize their role and ensure that the best universities are selected through a competitive process. The existing program levels should be simplified, and authorized funds should be subject to open competition.

Given the large number of entities in the UTC Program, coordination of research activities is a challenge, and we run the risk of duplicative research. Efforts have been made to improve coordination but more needs to be done. The program needs to reduce the number of UTCs in order to increase competition, and all centers should receive the same level of funding.

Awarding each center 2 million annually would provide enough critical funding for each center to develop significant research projects. To help facilitate a more competitive selection process the current match should also be adjusted. Changing the match to 80 percent federal UTC program funding and 20 percent match from the centers would allow a break from using State DOT funding as the matching source. Centers would then not be obligated to focus on short-term solutions for State DOTs and could focus on long-term research endeavors.

Technology transfer activities are critical to the successful completion or implementation of research results. The transfer of technology from the research stage to the application stage must be emphasized in surface transportation research. The application of improved or new technology is the ultimate goal and must be supported by funding.

While there are some research and publication successes, many university programs do not have proper channels for assuming ownership of the technology transfer process. A research project should need to have an implementation plan worked out with the funding agency during the proposal process. Adding this step will increase the actual implementation of research.

Furthermore, the Long-Term Bridge Performance Program should be continued in the authorization bill. There is a need to study long-term bridge life to develop a better understanding of how bridges age and deteriorate. This allows engineers to better predict bridge behavior and should lead to improved maintenance

and management practices. The Long-Term Bridge Performance Program can lead the way in this effort.

Finally, the Intelligent Transportation Systems section must be more long-term in nature. ITS is a cost-effective means of addressing rising demand by increasing the efficient utilization of our transportation systems. The technology revolution in transportation will require a wide range of independent yet coordinated actions by public and private sector interests.

Improvements resulting from research and technology remain critical to achieving national transportation goals. Therefore, funding for research should be increased to levels that will provide high returns on investment.

ASCE looks forward to working with Congress as it develops a robust surface transportation system for the future. Thank you very much.

[The prepared statement of Mr. Gehr follows:]

PREPARED STATEMENT OF MR. DAVID GEHR, SENIOR VICE PRESIDENT,  
MARKET, PARSONS BRINCKERHOFF; CHAIRMAN, AMERICAN SOCIETY OF  
CIVIL ENGINEERS TRANSPORTATION POLICY COMMITTEE

The American Society of Civil Engineers (ASCE)<sup>1</sup> would like to thank the Technology and Innovation Subcommittee for holding a hearing today on how to maximize funding for transportation research priorities. The Society is pleased to present to the Subcommittee our views on investing in surface transportation research.

The Highway Trust Fund has been an essential source of funding for surface transportation research and technology (R&T) for decades. Research results have led to many benefits including: materials that improve the performance and durability of pavements and structures; design methods that reduce scour (and consequent threat of collapse) of bridges; intelligent transportation systems technologies that improve safety and reduce travel delay; methods and materials that radically improve our ability to keep roads safely open in severe winter weather; innovative management approaches that save time and money; analytical and design approaches that reduce environmental impacts that support sustainable development and improve the aesthetic and cultural aspects of transportation facilities. These benefits are provided through several major transportation research programs and have proven critical in developing a 21st century surface transportation system.

However, while research has provided many benefits for the nation's surface transportation systems, in ASCE's 2009 Report Card for America's Infrastructure roads received a D-, bridges a C, and transit a D. Furthermore, to bring just these three categories of infrastructure into a state of good repair would require a five year investment of \$1.2 trillion from all levels of government. While an investment of this magnitude seems unlikely at a time of economic uncertainty, a number of targeted research programs could extend the life span and effectiveness of our built environment. In the long term, investment in research and development technologies and processes can help reduce the gap between the current transportation funds available and the \$1.2 trillion necessary for road, bridge, and transit repairs. Research funding will prove critical to achieving national transportation goals in safety, quality of life, economic health, environment impacts, sustainability, and security in the next surface transportation authorization bill.

ASCE supports several general principles in the reauthorization of research and technology programs in the nation's surface transportation legislation. Improvements resulting from research and technology are critical to achieve national transportation goals, therefore funding for these activities should be increased to levels that will continue to provide high returns on investment. Research programs should be conducted according to the highest scientific and engineering standards, from priority setting to the awarding of contracts and grants, to review and evaluation of research results for implementation.

<sup>1</sup>ASCE was founded in 1852 and is the country's oldest national civil engineering organization. It represents more than 140,000 civil engineers individually in private practice, government, industry, and academia who are dedicated to the advancement of the science and profession of civil engineering. ASCE is a non-profit educational and professional society organized under Part 1.501(c)(3) of the Internal Revenue Code.

ASCE supports the following actions regarding specific surface transportation R&T programs:

- The research and technology portion of the State Planning and Research (SPR) program should be maintained to help support state-specific activities while continuing to encourage the states to pool these resources to address matters of mutual interest.
- University research should continue to be supported through the University Transportation Centers (UTC) program using a competitive selection process that guarantees quality participants and fairness in the allocation of funds.
- The Federal Highway Administration's (FHWA) program should be strengthened by giving it sufficient funding and flexibility to implement the recommendations of Transportation Research Board (TRB) Special Report 261 "The Federal Role In Highway Research and Technology" to focus on fundamental, long-term research; to perform research on emerging national issues and on areas not addressed by others; to engage stakeholders more consistently in their program; and to employ open competition, merit review, and systematic evaluation of outcomes.
- The recommendations of TRB Special Report 295 "The Federal Investment in Highway Research 2006–2009, Strengths and Weaknesses" should be implemented.
- The Strategic Highway Research Program (SHRP II) should be continued beyond the life of SAFETEA–LU, ensuring that critical research will be continued in key areas of surface transportation.
- Total Research and Technology funding for activities corresponding to Title V in SAFETEA–LU should be at least \$750 million per year.
- The Federal Transit Administration's (FTA) research program should be free of earmarks and allocations and given flexibility to work with its stakeholders to develop and pursue national transit research priorities. The Transit Cooperative Research Program should be funded at a minimum of \$20 million per year.
- The Research and Innovative Technology Administration (RITA) should have a well-defined scope and responsibility and appropriate funding, in addition to currently authorized research funding, so that it may supplement and support the R&T programs of the modal administrations.

#### **University Transportation Centers**

University research should continue to be supported through the University Transportation Centers (UTC) program. However, the program could be improved in several ways. The existing multiple levels of the program should be simplified and funds authorized for this program should be entirely subject to free and open competition. At this time there are approximately 80 to 100 different universities participating in the UTC program. Given this large number of entities, coordination of research activities, so that each institution's research efforts are complementary and not duplicative, is a significant challenge. Efforts have been made to improve coordination, but more still needs to be done.

The program needs to be competitive in order to award approximately forty UTCs through the research title and five to ten through the transit title. Additionally, the different types of UTCs should be eliminated, in order to allow all UTCs in the research title to fall into the same "tier" and therefore receive the same level of funding. The funding should amount to approximately \$2 million per center annually. This would provide enough critical funding for each center to develop significant, long-term research projects, rather than projects that only last one year. Transit title centers should be selected on a competitive basis as well and receive the same level of funding as those in the research title.

Currently the entire transportation research community focuses on short term, applied, problem solving research. By shifting primary research toward advanced, higher risk, longer term, multi-year projects, the surface transportation system that this nation will need in 40 years can begin to be developed. At this time very little high risk, long term research is occurring and the longer we delay the necessary research, the longer the nation delays implementation of a true 21st century surface transportation system.

Much of the technology necessary for a future surface transportation system already exists, however UTCs can properly apply that technology for the greatest benefit of the nation. Universities work well in high risk, long term research, which is why new legislation should emphasize their role and ensure that the best universities are selected through a competitive process.

To help facilitate a more competitive selection process adjusting the current match would be beneficial. The current match required for centers funded through the research title is dollar for dollar, however the match should be changed to 80% federal UTC program funding and 20% match from the centers. The revised match system would allow for centers to break away from using state department of transportation dollars as the primary matching source, therefore allowing UTCs to delve into advanced research, instead of focusing on state departments of transportation (DOT) problems. In general, state DOTs are more focused on short-term solutions rather than long-term, high risk research endeavors. With UTCs relying on state DOT funding, this limited focus is carried over into the research programs at the centers. ASCE believes that the revised match would not inhibit centers that are already very aggressive from securing more than a 20% match, but there will be some centers that can only raise the minimum revenue necessary.

#### **Technology Transfer**

Technology transfer activities are critical to the successful implementation of research results. The transfer of technology from the research stage to the application stage must be emphasized among all participants in surface transportation research. The application of improved or new technologies is the ultimate goal, and must be emphasized to the point of being supported by research funding. However, while the Federal Highway Administration research program, the National Cooperative Highway Research Program, the Strategic Highway Research Program, and state DOT research funded by State Planning and Research funding each has a mechanism in place for technology transfer, many research programs do not have a similar system in place.

While there are some research and publication successes like the Accelerated Bridge Construction program being undertaken at the Utah Department of Transportation, many other programs do not have proper channels for assuming ownership of the technology transfer process. Many times research reports from universities are sent to a funding agency, such as a state DOT, but the application of the research outcomes are not implemented. Instead, as part of a research project there needs to be an implementation plan worked out with the funding agency during the proposal and contract process. After the research a follow up report on the implementation successes or failures should then be prepared. Adding this step to the process will increase the actual implementation of research and will provide the primary federal research administration with evidence of research implementation, which is currently lacking.

It should be understood that high risk, advanced research does not always have an implementable outcome. Since UTCs are currently unable to push state DOTs to implement applied research, this provides another example as to why UTCs should instead focus on higher risk projects that do not necessarily require an implementation process.

#### **Improving Transportation Research Programs in a Reauthorization**

As originally passed, the Surface Transportation Research, Deployment and Development and the University Transportation Research sections in SAFETEA-LU were both completely programmed or earmarked and over-authorized, creating a difficult environment within which the Federal Highway Administration and the Research and Innovative Technology Administration (RITA) had to allocate funds. An additional effect was that the Federal Highway Administration had no discretionary funds to maintain certain core research programs, which meant that such critical efforts as the biannual Conditions and Performance Report struggled for funding. These problems were partially relieved by the SAFETEA-LU Technical Corrections Bill in 2008. However, the research programs continue to be adversely impacted by the level of programming and earmarking. This speaks to the need for minimal earmarking and free and open competition among non-federal entities performing research utilizing federal funding.

Specifically ASCE would better define a UTC program with approximately 40 centers funded at \$2 million annually, which focus on long term, advanced research. Additionally, there needs to be a larger Exploratory Advanced Research Program, funded with at least \$20 million annually. The exploratory advanced research program should then fund only large, multi-year, high risk projects.

Furthermore, the Long Term Bridge Performance Program, a planned 20 year research program, should be continued in the authorization bill. There is a need to study long term bridge life to develop a better understanding of how bridges age and deteriorate. This allows engineers to better predict and model bridge behavior and could lead to improved maintenance practices and better bridge management.

The FHWA's Long-Term Bridge Performance Program should lead the way in this effort.

Bridge maintenance is based on the funding available and which bridge is most in need of repair. That usually means deck repair, not the structure of the bridge. When the public notices problems, such as potholes, these get attention. The public rarely notices severe structural problems unless concrete is falling from the bottom of an overpass bridge. Obviously, to properly maintain bridges, more funds are needed, and more of those funds need to go into the maintenance of the structure, not just the deck. It is ASCE's hope that the Long-Term Bridge Performance Program will help to provide answers as to how to properly channel our nation's bridge maintenance funds.

Finally, the Intelligent Transportation Systems (ITS) section must be more long term in nature, rather than looking at five year horizons. A transportation system for the 21st Century will be developed in part by ITS research and therefore must have a long term outlook. Intelligent Transportation Systems are a cost-effective means of addressing rising demand by increasing the efficient utilization of our transportation systems. The technology revolution in transportation will require a wide range of independent yet coordinated actions by public and private sector interests, which must be sustained by a major federal commitment. The federal government should provide the leadership and commitment to direct the complete deployment of ITS for consumers of passenger and freight transportation across the nation.

At a minimum Congress should maintain the funding that is currently in place for surface transportation research in the new authorization. By investing in smarter, more efficient transportation systems now, operations and maintenance costs in the future could be significantly reduced. In order, to acquire these efficient systems in the nation must invest in research programs today.

#### **Conclusion**

Surface transportation infrastructure is a critical engine of the nation's economy. It is the thread which knits our nation together. To compete in the global economy, improve our quality of life and raise our standard of living, we must successfully rebuild America's public infrastructure. Faced with that task, the nation must begin with a significantly improved and expanded surface transportation system. A surface transportation authorization must be founded on a new paradigm; instead of focusing on the movement of cars and trucks from place to place, it must be based on moving people, goods, and services across the economy. Beyond simply building new roads or transit systems, an intermodal approach must be taken to create a new vision for the future.

The nation's economic competitiveness will be tied to the ability to reduce congestion, reduce use of fossil fuels, and reduce the production of greenhouse gases. This work can only be done through high risk, advanced, long-term research. The transportation research title in the new surface transportation authorization bill, must emphasize this need and therefore should focus on the UTC program, the ITS section, the surface transportation research section that supports the Federal Highway Administration, and the Exploratory Advanced Research Program. ASCE looks forward to working with the Congress as it develops robust surface transportation authorization legislation which is founded on a strong national vision, adequate funding and new technology and research, and creates an integrated, multi-modal national transportation system.

Chairman QUAYLE. Thank you.

The chair now recognizes Dr. Feller for five minutes.

**STATEMENT OF DR. IRWIN FELLER,  
PROFESSOR EMERITUS OF ECONOMICS,  
PENNSYLVANIA STATE UNIVERSITY;  
SENIOR VISITING FELLOW, AMERICAN  
ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE**

Dr. FELLER. Good morning, Mr. Chair, Ranking Member Wu. It is an honor to testify——

Chairman QUAYLE. Dr. Feller, could you put your microphone up?

Dr. FELLER. It is an honor to testify before this Subcommittee.

Over several decades and under the leadership of several distinguished chair and subcommittee chairs, this Committee has played a distinctive and essential role ensuring that federal investments in research and development are allocated to those ends and performed in ways that maximize the taxpayer returns, be these in the form of increased standards of living, safer, healthier lives, and other forms of monetary and non-monetary benefits.

The questions I have been asked to answer relate to the vitality, productivity, and efficiency of those taxpayer returns of surface transportation of specific applications of these overarching Subcommittee concerns. My answers derive from a career studying and evaluating federal and State government science and technology programs and the organization and performance of university research centers. These studies have been enlivened and enriched by service and chairing of several federal advisory panels, National Research Council panels, as well as service on the Transportation Research Board, Research and Technology Coordinating Committee.

Let me start with an overarching answer to the questions that the Committee posed to me, and recommendations about changes in the highway bills' reauthorization of its research titles. They are as follows.

Deregulate the surface transportation R&D system by removing earmarks. Earmarks constitute a deadweight tax on the performance of federal investments and surface transportation R&D. Steer funding to longer-term, more fundamental research questions prioritized through consultation among Congress, the Executive Branch, major stakeholders, and the research community.

Allocate these funds by opening all competition and merit review processes. Reshape the UT system into a smaller number of centers as now being proposed by the Department of Transportation's Research and Innovative Technology Administration with provision for placing at least one center in each of ten regions to ensure geographic dispersion.

Modify and expand DOT's Technology Transfer Programs to mesh with changes that occur in the underlying research and development system, and here I would simply extend a previous speaker's statement about understanding a broader conceptualization of technology transfer and working with universities on related measures to form closer cooperation.

Provide funding for systematic, independent, state-of-the-art assessments of the public's return to federal investments in surface transportation. One of the clear limitations addressed in the question to me was how to measure public returns to transportation R&D. There are very few studies that I am aware of and to a large extent they fall behind the state-of-the-art now being developed by other agencies.

Let me just expand upon these comments. The existing surface transportation R&D system obviously produces a steady stream of new knowledge, products, and techniques that yield benefits, and the UTC System is an important source for replenishing and upgrading the transportation sectors' need for technically-trained labor force.

With all these benefits, both the design and performance, the current system operates under constraints that significantly impair its performance, producing a return to the taxpayer well below obtainable levels. Earmarking is not innovative. Earmarking reduces the incentives that the faculty have to seek ambitious, challenging, larger, more complex, but competitively awarded projects. Earmarking reduces the basic quality controls both at the input stage in terms of the selection of products and projects and performance, and at the output stage in terms of systematic, rigorous, independent evaluation of taxpayer returns.

Earmarking, and here I speak from reviewing the research programs of many other federal agencies, transportation research is isolated from the larger stream of research being conducted across many fields and many agencies and many university activities. Earmarking essentially provides no incentive for faculty to collaborate with faculty in other fields. It provides no opportunity for researchers in other fields to collaborate or to enter into research with transportation research. Transportation research, in effect, has become a backwater, which is inconsistent with the changes in science and opportunities for collaborative, interdisciplinary work.

And lastly, I would emphasize that these are not my views alone. I am privileged to say that I believe I am reflecting the views of many of the leaders of the transportation research system.

Thank you, Mr. Chair, Ranking Member Wu.

[The prepared statement of Mr. Feller follows:]

PREPARED STATEMENT OF DR. IRWIN FELLER, PROFESSOR EMERITUS OF ECONOMICS,  
PENNSYLVANIA STATE UNIVERSITY; SENIOR VISITING FELLOW,  
AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

Mr. Chairman and Members of the Subcommittee,

It is an honor to be invited to testify before the House Committee on Science, Space, and Technology, Subcommittee on Technology and Innovation.

Over several decades and under the leadership of several distinguished committee and subcommittee chairs, the House Science, Space and Technology Committee and its Subcommittees have played a distinctive and essential role in ensuring that the Federal Government's investments in research and development are allocated to those ends and performed in ways that maximize the taxpayer's benefits, be these in the form of increased standards of living, safer, healthier lives, or comparable monetary and non-monetary returns. Spanning the R&D, technology transfer and related educational activities of individual Federal agencies and departments, it has assumed responsibility for monitoring the performance of major components of the larger Federal R&D enterprise. It thus has contributed and continues to significantly contribute to the vitality, productivity, and efficiency-and thus taxpayer returns-of this enterprise.

#### CONTEXT

The questions that I have been asked to respond to in today's testimony on Transportation Research Priorities are specific applications of the Committee's larger purview. Correspondingly, my answers are specific applications to the field of surface transportation research of overarching principles and findings about how best to allocate Federal R&D funds to achieve maximum benefits and how to assess the performance of those receiving these funds.

These answers distill findings from a career as a researcher into technology transfer, evaluation of Federal and state government science and technology programs, performance measurement, and the organization of university research centers. This research has been enriched, and enlivened, by service as a member and chair of numerous Federal agency advisory and evaluation panels, related experiences on several National Research Council committees charged with studying the effectiveness of the Federal R&D programs, and similar international experiences, including advisory and consulting work for the European Commission, the Organization for Economic Development and Cooperation and several countries.



My work on technology transfer was the basis for an invitation to become a member of the Transportation Research Board's (TRB) Research and Technology Coordinating Committee (RTCC), on which I served between September 1, 1997, and August 31, 2003. Likewise, my work on comparative national science and innovation policies has led to my current membership on the National Research Council's Committee on National Research Frameworks: Application to Transportation.

My answers to Questions (2)-(5) in the Committee's invitation thus blend facts and findings that span most of the Federal Government's domestic R&D activities, with working knowledge of specific Federal surface transportation R&D program and policy issues. My expertise regarding the technical contents of specific R&D programs and projects though is limited. My answer to Question (1), which requests a brief overview of the Transportation Board's roles and responsibilities is taken from the TRB's website and communications with TRB staff.

In key respects, my answers restate long recognized, well documented, and articulately expressed concerns about the shortcomings of the current system of Federal funding of surface transportation research that can be found in numerous independent, expert reports and in previous testimony before this Committee and other Congressional committees. These shortcomings include the excessive earmarking of transportation funds that limits the ability of Department of Transportation agencies to shape a coherent, sustainable national transportation R&D program and the dilution of the impact of Federal R&D research dollars associated with having to disburse them through an unduly large number of University Transportation Centers (UTCs). Each condition drives the transportation research system to short-term, incremental research undertakings at the expense of the higher priority, longer term, more fundamental, more collaborative and thereby more impactful research topics that could be funded with the same research dollars. Simply put, current arrangements constitute systemic obstacles to garnering the maximum benefits from Federal surface transportation R&D outlays.

If there is a value-added to be found and generated by my testimony, it rests perhaps in two things. First, as evidenced by enactment of the Government Performance Results Act and recent salutary reforms already taken to reduce earmarking across the swathe of Federal government expenditures, Congress has demonstrated an increasingly unwillingness to accept inefficient budget practices and ineffective programs. Thus, on this Committee, as well as hopefully on related authorization and Appropriations Committee, old words may be heard by new ears.

Second, viewing transportation R&D from the enlarged cross-agency perspective that weaves through my answers offers additional, new insights into why current arrangements for funding and organizing transportation R&D are inconsistent with basic principles for justifying Federal government investments in domestic R&D. Equally importantly, as my answers detail, current arrangements are inconsistent with the internal dynamics of scientific discovery and technological innovation. It is not that some beneficial results do not emerge from current surface transportation research programs. Of course, they do. Rather, it is that the benefits are small relative to what is needed and what is possible.

## QUESTIONS

### *(1) TRB in the National Academies*

TRB is one of six major divisions of the National Research Council—a private, nonprofit institution that is the principal operating agency of the National Academies in providing services to the government, the public, and the scientific and engineering communities. The National Research Council is jointly administered by the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine.

TRB was created in the 1920s to be an intermediary between newly formed state highway departments and research programs and the federal government, then the Bureau of Public Roads. Since the 1980s TRB has also convened committees under the auspices of the National Research Council, which advise Congress and federal agencies on transportation policy issues and evaluate and advise agency research programs.

TRB is supported by state transportation departments, federal agencies including the component administrations of the U.S. Department of Transportation, and other organizations and individuals interested in the development of transportation. Since its inception, TRB has provided opportunities for dialogue, information exchange, and sharing of research activities (to avoid duplication of effort) and research results. For more than 40 years TRB has been a multimodal research organization with activities in all modes. TRB provides an extensive portfolio of services, including:

- Information exchange on current transportation research and practice,
- Management of cooperative research and other research programs,
- Analyses of national transportation policy issues and guidance on federal and other research programs, and
- Publications and access to research information from around the world.

These activities annually engage more than 7,000 engineers, scientists, and other transportation researchers and practitioners from the public and private sectors and academia, all of whom contribute their expertise in the public interest by participating on TRB committees, panels, and task forces.

## (2) *Earmarking*

Earmarks are a tax on the rate of return to the national investment in transportation R&D. Earmarks constrain the publicly funded transportation research system's ability to produce other than incremental solutions to incremental problems. Legitimate objectives to insure that the national transportation R&D portfolio take into account geographical, climatic, and demographic differences while simultaneously providing geographically dispersed opportunities for the education and training of technically trained transportation personnel do not require earmarks. These objectives can be met by far simpler, more cost-effective policies and programs.

Indeed, to someone who has only recently migrated into the domain of transportation R&D, its most striking landscape feature, as documented in several TRB reports and the overview article, "Earmarking in the U.S. Department of Transportation Research Programs," by Ann Brach and Martin Wachs (Transportation Research Part A 39 (2005), 501–522), is the pervasiveness of earmarking in the allocation of transportation R&D programs. Both in terms of total DOT transportation research and the allocation of UTC funds, earmarking has gone viral. Its causes have moved from the opportunistic actions of influential members of Congress to designate funds for selected purposes and/or performers within their jurisdictions to what I have termed a race to the bottom among academic administrators and faculty who increasingly "view earmarks . . . as an acceptable way to get financial support for projects and facilities that might not survive review procedures based on merit" ("Research Subverted by Academic Greed," *Chronicle of Higher Education*, January 16, 2004; B6ff).

Only in my earlier work on the U.S. agricultural research and technology transfer system have I encountered such pervasive earmarking. This comparison, I believe, is an especially telling one in considering the future. Earmarking contributed to "same old/ same old" research agendas—some of it highly productive, some of it mundane-of agricultural researchers in the USDA's Agricultural Research Service and university faculty receiving funds via State Agricultural Experiment Stations. It thus was a factor in the limited role of these research communities in the genetics-biotechnology scientific and technological revolution that has since transformed plant and animal research. The major scientific and technological advances that spawned this revolution came from researchers in the life sciences whose work was funded by other Federal agencies and other sources. Indeed, the backwater nature of mainstream agricultural research even gave rise to proposals, some of them originating in this Committee, for moving funding for agricultural research from USDA to other Federal agencies. Even today, the mix of formula funding and competitive awards in the funding of agricultural research remains at issue, but at least it is one openly debated, leading to some acceptance, albeit at times grudgingly, that some provision for all-comer, competitively awarded grants is needed to insure the continuing vitality and thus productivity of the underlying research.

Earmarking, by definition, is a method for circumventing the quality control contained within competitive, merit review processes. The result is not necessarily that earmarked projects do not produce useful findings. Research by definition involves uncertainty; not inconceivably, as in selecting single entries from two sample distributions, one may find some earmarked awards producing results that are at least as good or better by some standard than those allocated by competitive merit review processes. But one has every reason to expect that a comparison of overall statistics—mean, mode, lower and upper tails—will document the greater return on the public's investment to those allocated via competitive, merit review processes.

Beyond the quality control issue, there are increasingly compelling reasons to expect this difference. These differences derive from the dynamics of faculty and institutional behavior and the dynamics of scientific and technological discovery.

Earmarking of academic R&D funds is enervating. It provides researchers and their institutions with assured funding that need not necessarily require their best efforts. It reduces the incentives faculties have to respond to new scientific or tech-

nological advances or new sources of funding. As a dean of engineering once lamented during an interview I conducted during a study of the determinants of university research competitiveness, he had little ability to motivate his faculty to seek larger, more technically challenging but competitively awarded grants because they were “comfortable” with the support for summer salaries and graduate research assistants they received from a congressional earmark.

Insulation from competitive, merit review processes also removes opportunities for constructive learning. Painful and idiosyncratic at times that it can be, and here I speak from considerable experience, running the gauntlet of competitive merit reviews can contribute significantly to the improvement of one’s work. The judgment and advice of peers about ways to reconceptualize a problem or to attend to otherwise overlooked analytical techniques or data sources are low cost ways of increasing the yield from specific projects. These opportunities are missed or diluted when earmarking occurs.

My current research into the dynamics of scientific and technological advances across many fields of endeavor highlights yet another debilitating effect of earmarking on the returns to Federal investments in transportation research. As cross-disciplinary, cross-sector/collaborative research becomes an increasingly essential element in generating significant/transformational/impactful discoveries, other Federal R&D agencies have responded by increasing their support for multi-year, multi-institutional R&D awards. A key requirement in this new mode of funding academic science is the requirement that the research program involve participation by faculties in multiple disciplines, departments, and colleges.

Cross-fertilization of ideas, techniques and discoveries are increasingly the seedbed of significant advances, not only in “basic” science but also in mission-oriented/problem-focused research. To cite but one of numerous contemporary examples, the University of California-Santa Cruz’s Center for Adaptive Optics research efforts to improve the precision of telescopes used in astronomical research also have yielded important advances in vision science that ultimately will enter into practical applications in optometry.

Existing earmarking arrangements limit these possibilities in transportation R&D. In particular, earmarking serves to isolate the transportation research community from researchers in cognate disciplines. Isolation occurs because the recipients of earmarks have little incentive to seek out or engage colleagues in disciplines whose work may enhance their own. Further contributing to this isolation is that faculties outside of the transportation field have little opportunity to extend their techniques or findings to transportation related problems. Isolation in turn contributes to making transportation R&D an academic research backwater.

Indeed, writing now clearly as a lay person and not a technical expert, I continue to be struck by the opportunities for collaboration and cross fertilization of ideas and techniques—all pointing to higher returns on the nation’s investments in R&D—in the thematic areas I have encountered during my participation in a recent assessment by the American Association for the Advancement of Science of the National Science Foundation’s Science and Technology Center’s program and those identified in several TRB reports about opportunities and needs in transportation R&D. New materials, nanotechnology, remote sensing, optics, computer software, and more, are but a few such examples of the research being conducted by these centers that appear to connect directly to the larger transportation R&D agenda. A more open, flexible and competitive transportation system that fosters such connections would contribute both to more impactful findings and by narrowing the gap between discovery-oriented and mission-oriented work also serve to accelerate the incorporation of new scientific and technological discoveries into socially beneficial practices.

The essential point to my answer about earmarking is that it is mainly a restatement of views already expressed by key performers and users of transportation R&D. One of the most striking, and indeed gratifying experiences, I had as a member of the RTCC that prepared the 2001 report, *The Federal Role in Highway Research and Technology* (Transportation Research Board, Special Report 261) was to observe its members-representatives from industry, state government, universities, not-for-profit organizations, and professional association-advance as a core recommendation that:

“University transportation research funded under the UTC program should be subject to the same guidelines as FHWA’s R&T program—open competition, merit review, stakeholder involvement, and continuing assessment of outcomes—to ensure maximum return of the funds invested (p.9).” Similarly, the 2008 RTCC report, *The Federal Investment in Highway Research 2006–2009*, offers as a recommendation:

“To the maximum extent practical, research funding should be awarded through competition and merit review” (TRB 295, p.4).

Far more important than may be my views, it is the stakeholder community that is asking for relief from current earmarking arrangements. It is they who are asking to be allowed to be all that they can be.

(3)

This is a multi-part question, with my answers limited to the two areas—measuring returns to Federal investments in research and technology transfer—on which I have conducted research and professional activities. My answer to the question, “How is the value of Federal transportation measured,” is based on a general impression, augmented by a review of FHWA’s Office of Research Development and Technology’s 2007 “Synthesis of R&D Benefits Case Studies,” which reports on findings from 3 contractor studies.

At present, assessment of the value of transportation R&D appears to be based heavily on expert review panels, augmented, as above, with infrequent contractor studies. Expert review is a mainstream technique, widely used by and for Federal agencies to assess R&D programs. But it is not state-of-the art. Increasingly, both Congress and the Executive Branch are demanding or requiring that expert judgment be augmented and/or supported by “evidence,” typically of a quantitative nature.

As the author of several recent review articles on measuring the returns to Federal government R&D and as an active participant in recent workshops and forums relating to the “science of science policy research,” I recall no participation of anyone whose work bore upon transportation R&D. Noting that I have not had time to conduct a full review of the above cited contractor studies or the larger published literature, I am not presently aware of any studies related to transportation research that have employed the concepts—e.g., knowledge spillovers; social savings—or employed the methodological techniques—e.g., network analyses, patent analysis, bibliometric analysis—that are becoming standard components of efforts to measure the value of Federal R&D in other domestic domains.

The cause and consequences of this lag are circular. Without the type of evidence now being demanded of research programs in budget reviews, advocates for Federal support of transportation research are at a competitive disadvantage relative to those in other fields who have advanced beyond review panels and are tackling the admittedly formidable challenges of deriving valid and credible estimates of outcomes and impacts from what is inherently a long-term, circuitous and probabilistic process. Lacking funds, and especially discretionary funds to support policy oriented research, which is not cheap, DOT and its subunits cannot gather the type of evidence needed to make a “convincing” case about the value its research activities have generated.

My answer to the question, “Is technology transfer from federally-funded research and development effective,” and “How could it be strengthened” is an indirect one, in part again because of what I perceive to be the limited availability of quantitative evidence that would permit program level assessments along cost-effectiveness or benefit-cost lines, and in part because the processes of technology transfer are so variable and context dependent that it is difficult to generalize from one or a few cases—successes or not—to a program level assessment.

Certainly, one can point to notable successes in technology transfer. Moving beyond the justifiably oft-cited example of SuperPave, my favorite example based on personal experience as a taxpaying consumer is the increased adoption of roundabouts. According to TRB 295, the diffusion of roundabouts was spurred by an FHWA 2000 report, Roundabouts: An Informational Guide, which is described as having lent “legitimacy and credibility to an alternative intersection design.” (p. 78) that has considerable safety benefits. I now encounter roundabouts on Route 15 crossing over between Virginia and Pennsylvania and most especially, and thankfully, on Route 179 between Oak Creek and Sedona, when my wife and I spend time there in the winter. I also believe that I am about to get a roundabout in my local neighborhood as construction continues on a new intersection between Old Gatesburg Road and Pine Hall Road in Ferguson Township, Pennsylvania.

DOT’s existing technology transfer programs consists of information dissemination, technical assistance, and demonstration projects. These are the tried and true technology transfer techniques of most Federal agencies. Thus FHWA’s Priority, Market-Ready Technologies and Innovations List which offers clear, concise, and informative information about “vetted” new technologies is one means of reducing the technical and regulatory uncertainties associated with trying new things, thereby making them more attractive to potential adopters.

What needs to be considered here is less the present than the future. The design and operation of a technology transfer system must be based on the design, operation and outputs of its parent R&D system. Whatever may be the current level of

effectiveness of DOT's technology transfer activities, a new, expanded Federal role and set of techniques will be required if the recommendations relating to the restructuring of the direction and conduct of transportation research contained in the other answers are adopted.

In particular, a shift to a system directed at longer-term, more exploratory research, especially one predicated heavily on the participation of universities, requires a broader conceptualization of meaning and implementation of technology transfer. Only sketching here the elements of such a system, added emphasis would need to be given on how the Federal government could assist in the development of university-industry-state and local government cooperative agreements or research centers that provide for closer, upfront connections between research agendas and user needs. Also, under a similar revamping of the research agendas of UTCs, additional attention would need to be given to policies and terms relating to patent and licensing arrangements between Federal labs and universities and private sector firms. Again, focusing on technology transfer from the UTCs, added attention would need to be given to the role that the placement and mobility of graduates of university research centers or of other university degree programs plays in disseminating new practices into the agencies and firms in which they work.

#### *(4) University Transportation Centers*

I am aware that in the interval between the Subcommittee's invitation to me to address this topic and submission of my written testimony, important administrative actions have been taken by DOT to modify the program. Specifically, it is my understanding that the Research and Innovative Technology Administration (RITA) has decided to end funding for all 59 UTCs (including those selected through competition) and hold a new competition that will select a total of 20 UTCs.

Recognizing then that I address a situation much in flux, my answers relate to the previous setting, while in the process being consistent with the general thrust of RITA's recent actions.

My recommendations for improving the University Transportation Center program essentially extend the above answers about the need to curtail the earmarking of transportation research funds to specific projects and performers, with the added observation that specific provisions of the UTC program further sap its potential to be a significant contributor to a vibrant national transportation R&D program. In particular, the requirement that UTCs match their federal funding with nonfederal funding on a dollar-for-dollar basis and the peanut butter spreading of program funds among such a large number of recipients cannot but serve to drive research agendas to short-term, applied projects. Basing my answer on my experience as a social science researcher accustomed to the modest size awards offered by NSF but also as the director for 25 years of a social science research institute in which single investigators received competitive multi-year awards for several hundred thousand dollars, the \$500,000 annually awarded to the earmarked Tier II schools is below the threshold needed on average to engage in a substantial, sustained research program.

The program's 4 tier categorization serves little purpose but to ensure that each state has 1 center, each doing what it states it can do best, with little regard for an integrated, priority-driven national transportation R&D agenda. Moreover, quality control checks on the program's performance are reported as weak or lacking. According to the 2008 TRB, *The Federal Investment in Highway Research*, only 38 percent of the Title V UTCs are awarded their funds competitively (p. 77). More strikingly, in contrast to the increasingly rigorous evaluations already undertaken or being planned for the R&D programs of agencies such as NIH, NSF, NIST, DOE, and USDA, "There is little program oversight for the earmarked universities" (TRB, 2008; p. 73).

Overall, whatever its initial merits as both a research and educational program, at present the UTC program is poorly designed to produce substantial returns. The program requires fundamental re-engineering based on the design principles of providing adequate funds for some smaller number of competitively selected universities so that they can engage in longer term, more fundamental research. The original design principal of one UTC in each of 10 districts should be retained, with the collective university research agenda closely linked to a clearly articulated set of national transportation R&D priorities. Rather than relying on earmarking to insure participation of other universities (and political jurisdictions), one of the selection criteria used to competitively select host institutions should be the extent to which the proposed host institution can demonstrate partnership relationships with other universities and stakeholders within the region.

*(5) Recommendation*

The above answers not surprisingly lead to this final answer about recommended changes in the highway bill's reauthorization of its research titles. My overarching recommendation is to deregulate transportation R&D. Existing provisions are overly restrictive, prescriptive, and inflexible. New titles should be based on setting forth broad national transportation objectives—economic productivity/competitiveness/efficiency; safety and the like, as have been identified in earlier national reports; funding for these objectives should reflect mutually arrived at agreement among Congress, the Executive, and stakeholders about the relative priorities to be assigned among these objectives along with the assessments of existing and newly consulted relevant research communities about the feasibility and the opportunities predicted for research and development; funding should be provided for a modest number of multi-year research centers in order to foster longer-term, interdisciplinary research, with awards made on the basis of competitive merit review; funding also should be provided for all-comer, unsolicited proposals directed at stated research priorities, with awards again based on competitive, merit review; and procedures should be put in place for systematic, independent, expert assessment of the quality of research and of subsequent impacts.

In one sense, these are very modest recommendations. They integrate best R&D organizational design, management practices, and evaluation procedures from across Federal agencies. They are clearly grounded in the oft expressed views of transportation R&D leaders and users across levels of government as well as the private, public and not-for-profit sectors. In another sense though they clearly are stretch goals for the Congress and for the relevant stakeholder and performer communities for they represent far reaching changes in the status quo.

They are presented here today in the view that this Subcommittee is in a unique position to substantially increase the national return on Federal investments in transportation R&D by catalyzing long recognized and much needed changes.

There are more specific recommendations to the transportation research title made in the 2008 report of the Research and Technology Coordinating Committee referenced earlier. Although I was no longer a member of the committee when this report was developed, it is relevant to your work and I recommend that the Subcommittee request a briefing on it from the Transportation Research Board.

Thank you, Mr. Chairman

Chairman QUAYLE. Thank you.

The chair now recognizes Ms. Peterson for five minutes.

**STATEMENT OF MS. LYNN PETERSON,  
TRANSPORTATION POLICY ADVISORPR,  
OFFICE OF GOVERNOR JOHN KITZHABER (OR)**

Ms. PETERSON. Good morning, Chairman Wu and Ranking Member—I am sorry. Chairman Quayle and Ranking Member Wu and Members of the Committee. I am Lynn Peterson. On behalf of the governor's office of the great State of Oregon, thank you for the invitation.

You know, I have spent my career as a transportation engineer, and you know, really trying to find ways to reduce costs within the entire transportation system and as a whole in designing construction. As an entry-level engineer in Wisconsin, I was told that because I was designing for the public infrastructure my number one priority was public safety, and while I completely and utterly agree with that, what we were taught was basically take everything from the 13 three-ring binders that I was told to memorize my first couple months and basically look at adding 20 percent plus 20 percent in order to make sure that we were accommodating for public safety.

But over the 20 years that I have been out of school that over-design because we didn't know, and there were a lot of myths out there, that over-design is slowly going away, and we are getting to a much more cost-effective delivery system.

So let me just give you an example. If it said a 12 foot lane, add 20 percent, 14 feet wide must be better. We now know that depending on the context of how you are building, what the land uses are or what the users of the system are, you may or may not need that width or the width may be needed for something else.

So we are really looking to reduce costs. In these tough times we can't afford to continue not having the research, especially in safety and all of the other things that these fine gentlemen have pointed out in order to reduce costs. And we also cannot allow ourselves to kind of dip into the point of getting back into the myth creation by not having a workforce that is either being trained or retrained in what actually the experiments have shown, what the testing has shown, whether it is concrete or the turn radius for a roundabout.

So we have to continue these robust engineering research programs, and I want to just call your attention to page 2 of my testimony where we talk about the types of things that—savings that we have been able to achieve both in the Oregon Department of Transportation and OTREC, our Transportation University Research Center. The first example that I would point to is our cracked bridge program, where we spent \$1.3 billion in replacing bridges, but we were able to save \$500 million by looking at the research over a series of years and demonstrate that given allowable revisions to load rating procedures, many of these bridges did not need repair or just needed small repairs.

We also did an applied research with Transportation Research Board that saved about \$73 million on expediting project delivery while improving environmental outcomes by moving to an outcomes-based environmental approach.

And then just let me bring up the example of Missouri DOT, who has moved into what they call practical design. Based on safety research they have been able to figure out how to reduce costs for delivery of projects and do more projects, and has seen significant reductions in the number of fatalities over the last five to six years.

This applied research such as ODOT examples must be paired with the Transportation Research Board and local advanced research development such as the university transportation centers. OTREC or Oregon Transportation Research and Education Consortium is doing that by integrating and looking ahead of the research development arm of the State by working with all of our universities to coordinate research and expertise. Each one of our universities in the State has a specific expertise which I think while we talk about needing to reduce the number of university transportation centers, we also need to recognize geographic diversity and uniqueness of where that expertise is housed from past years of how—where is that research coming from.

Which is important because we need to be able to implement lease cost planning within our infrastructure. One of the largest gaps in advanced research is the integration of freight and bicycling into regional travel demand models. It is something we really need to pay attention to.

And as I sum this up, probably the most important thing to remember is that we need to support workforce development. Let me just emphasize that we have a lack of engineers in this country. Just like Intel which is in Congressman Wu's district, they only

look for the best and the brightest, and they are not looking in the United States as much as they looking abroad.

We need to actually develop the workforce here in this country, and we can't do that without being able to provide research-type opportunities for them in order to be able to have commonsense judgment on the ground when they are implementing. They need to be able to test and experiment. Our University Transportation Research Centers allow that to happen, and without that we are not teaching strategic thinking.

Let me just finish by saying that the Federal Government should continue to play an integral role in financing and setting performance measures in transportation because from a local street to the interstate, from a local airport to the international airport, between the actual local bus stop to busses and other forms of public transit options between cities, the transportation system is a connected system, and the user doesn't care who owns what. This is a shared system that only works if all the pieces are working together, and since research is learning and learning is necessary to compete and create a skilled workforce, competition for economic prosperity is tight worldwide and in order to keep the U.S. moving, we need to keep our research strong to keep our economic advantage.

Thank you.

[The prepared statement of Ms. Peterson follows:]

PREPARED STATEMENT OF MS. LYNN PETERSON, TRANSPORTATION POLICY ADVISOR,  
OFFICE OF GOVERNOR JOHN KITZHABER (OR)

Good morning Chairman Quayle, Ranking Member Wu and Members of the Subcommittee. My name is Lynn Peterson and I am the Sustainable Communities and Transportation Policy Advisor to the Governor of the State of Oregon.

I would like to begin by thanking you for this opportunity to share our views and perspectives on our ongoing research and development activities. On behalf of my colleagues in academia, government and industry, I appreciate this chance to address the technical, regulatory, social and financial challenges to implementing new measures and integrating new technologies into existing transportation networks.

The State of Oregon has a long history of research and development, and we learn from the cutting edge application of policies and technology we have put in the field. This has encouraged an environment of learning within the state. I have benefitted as a professional of having this environment by receiving two masters degrees from Portland State University (transportation planning and engineering), and the citizens have benefitted with increased efficiencies, choice of modes, environmental quality and safety.

Oregon has focused on applied research, which has allowed us to do more with less. In order to maximize this approach, we need all federal programs to be as flexible as possible so that Oregon and other states are allowed to make the most effective use of limited funding, leverage resources and maximize their economic competitive advantages.

There are four things I hope you will take to heart from this testimony. The first is that you will appreciate the key role that research plays in continuing to meet the mobility needs of Americans and building stronger communities.

The second is that virtually every aspect of our transportation system needs to be transformed in the short and medium term future, and this challenge can only be met through innovations developed through research. Congestion threatens our economic viability and our quality of life. Fuel taxes, which currently provide the core of transportation funding in America, are not able to keep pace with the cost of preserving, maintaining and operating our transportation system, much less improving it. Energy consumption by the transportation sector frustrates efforts to achieve energy independence. The future transportation system needs to be safer, cleaner, more efficient, more equitable, more reliable and more cost-effective. Research will play an indispensable role in achieving those objectives. We value research in spite of limited resources because research spurs innovation and helps to tackle difficult transportation issues.



The third is that in Oregon our research needs exceed our research resources. The scope of our research activities are largely limited to applied research which has applicability primarily to local conditions in Oregon. Oregon and other states rely on other programs to carry out applied research that has regional and national applicability. We also rely on other programs, such as research conducted by University Transportation Centers (UTCs) and sponsored by USDOT and the Transportation Research Board, to pursue more advanced research. Advanced research, like applied research, also has a practical objective, but it tackles bigger and less tractable problems in transportation. The next transportation authorization needs to continue to provide a means of addressing the needs of applied and advanced research which is regional and national in scope.

Fourth, in Oregon we have developed a very successful model of collaboration between our research universities and between the Oregon Transportation Research and Education Consortium (OTREC), the state department of transportation (ODOT) and local governments. This collaboration allows us to stretch our resources further and leverage our expertise and funding across our institutions, and it ensures that research is able to be put into practice more effectively. Oregon's model can be used by other states and universities as a way to build a successful research partnership.

### **The Value of Research**

I would like to offer a number of instructive examples of how research efforts can be applied in the real world and help government agencies stretch public resources further and address emerging challenges.

**Cracked Bridges.** A decade ago, ODOT discovered a widespread cracking problem in a specific type of reinforced concrete girder bridge that affected approximately 500 bridges statewide. Under existing load rating criteria these bridges would have to be replaced, repaired, closed or weight-restricted for heavy trucks, causing significant economic costs to our trade-dependent state. ODOT undertook the \$1.3 billion Oregon Transportation Investment Act (OTIA) III State Bridge Program to repair and replace hundreds of bridges, which was by our state's standards a massive investment. In the meantime a series of ongoing research projects were able to demonstrate that given allowable revisions to load rating procedures, many of these bridges could be shown to be safe with only repairs or without any work. As a consequence, almost 200 bridges were either downgraded from replacement to repair or removed from the list of bridges needing work entirely. This research saved Oregon almost \$500 million.

**Effective Bridge Repairs.** Oregon has many older reinforced concrete bridges still in service that are showing signs of cracking and need to be strengthened or replaced to maintain safe and efficient travel, particularly for heavy trucks. However, ODOT simply does not have enough money to replace all of these bridges and instead is focusing its limited resources on cost-effective repairs that keep bridges in service longer. To do this, ODOT has conducted research to test effective repair techniques. Of particular concern is the capability of girders and cross-beams in bridges to withstand forces caused by bridge self-weight and truck traffic. ODOT has used a number of methods for increasing the capacity of girders and cross-beams, but there was no comparison of these techniques that could help engineers decide which method was most appropriate for a particular situation. ODOT contracted with Oregon State University to conduct testing on large-scale beams in order to compare the various repair methods, analyze the expected life and make recommendations for repair approaches. The outcome of the research provides bridge designers with a basis for selecting repair methods, and it provides guidance on calculating design capacity for the repairs.

**Expediting Project Delivery While Improving Environmental Outcomes.** The Transportation Research Board's Strategic Highway Research Program 2 (SHRP2) funded research carried out by OTREC faculty members to develop an Ecological Assessment Method for Highway Capacity Projects. This research built on earlier work by ODOT to develop a method for systematically aligning transportation and conservation priorities to achieve improved environmental outcomes and accelerate project delivery. ODOT used this approach in securing environmental permits under the \$1.3 billion OTIA III State Bridge program. ODOT saved \$3 for every dollar it invested in this approach during the bridge program, with total savings of \$73 million. TRB has now funded a smaller metropolitan planning organization in Oregon to test the methodology. This approach could potentially transform environmental permitting for transportation projects from a prescriptive command and control approach to an outcome-based approach that saves time and money and leads to better environmental outcomes.

Energy Independence and Economic Competitiveness. OTREC is conducting research that will help develop tools for local governments in reducing air pollution and meeting energy independence goals, all of which links back to mobility and the economic competitiveness of our communities. OTREC research has paved the way for advances in a number of areas. In the area of emissions, breakthroughs have been made on linkages between the impact of emissions and health of pedestrians, bicyclists, public transit users and residents due to exposure to particulate matter. Important advances are also being made in the area of fleet replacement models that consider hybrid and alternative fuels in addition to impacts on emissions.

Researchers are currently analyzing the relationship between vehicle miles traveled (VMT) and economic activity to see if there is reason to be concerned about the impact that VMT reduction might have on local economic activity. Researchers are helping to explore wider application of land use models and adapting analytical methods to better reflect the relationship between land use, transportation and travel demand for specific land use types. This is extremely important in determining the impact of different development types on the transportation system.

Examples of non-motorized travel research completed and underway include integrating bicycling to improve the regional travel demand model, understanding bicyclist route choice, investigating the effectiveness and safety implications of various bicycle infrastructure and the relationship between bike infrastructure and cycling activity to the patronage of local businesses. As it relates to commercial goods movement, one particularly innovative and completed research project focuses on the development of multi-criteria tools for measuring and analyzing the impacts of congestion on freight and the impact on reliability, delay, costs and emissions.

While no single strategy will significantly reduce the transportation system's energy consumption, together these efforts will move us toward meeting state and national goals.

#### **Overview of Transportation Research in Oregon**

The two key components of Oregon's transportation research system are the Oregon Department of Transportation (ODOT) and the Oregon Transportation Research and Education Consortium (OTREC).

Our model in Oregon has been based on partnerships and collaboration since day one. Oregon's research program has been more successful than many state DOT programs in finding common ground with and leveraging assistance from University Transportation Centers. Part of the mission of University Transportation Centers is service to and collaboration with state transportation departments, and OTREC has been a strong partner with the state and local governments, including MPOs, transit districts and Port authorities.

#### **ODOT's Research Program**

Again, transportation research needs of the states are primarily applied research to solve specific problems. The state Departments of Transportation generally expect a research project to deliver a product that can be put directly to use by the agency. Research interests are broad and eclectic, though most states do have well-defined priorities that change as problems are solved and as conditions change. Because states expect our research results to be used, these state programs also have a strong technology transfer or implementation component.

The research and development that Oregon carries out independently focuses on the unique circumstances of the state: its geography, geology, climate, state laws and existing practices. For example, most states use the same engineering design manuals and guidebooks for structures, pavements, highway capacity, safety and traffic control devices. When these manuals are revised or updated, additional research is needed to adapt them to local conditions. Recent major revisions to the pavement design guide and the release of the new Highway Safety Manual triggered research efforts in Oregon and in other states to make these tools more readily usable given local conditions.

State DOTs receive research funding through the Federal-Aid Highway Program. Under the State Planning and Research Program (SP&R), two percent of each state's federal transportation funding is set aside for planning and research activities. This system allows each state to address its top concerns and identify solutions at the state level. Since the research program is a portion of each state's federal funding, any reduction in federal funding for surface transportation in the next authorization bill will reduce funding for research as well, just at the time that more resources will be needed to find the best ways to stretch public dollars further.

States rely on others to conduct applied research which is regional or national in scope and to pursue advanced research. For research that is of interest for more than one state, Oregon and most other states use the Transportation Pooled Fund

(TPF) Program and/or the Cooperative Research Programs administered by the Transportation Research Board. These programs allow states to easily partner and leverage resources to solve common problems of a regional or national scope. For example, Oregon and other states recently teamed up for a pooled fund research project to examine strategies and best practices for state DOTs to support commercialization of electric vehicles and infrastructure, a key emerging technology that has strong potential to advance energy independence.

#### **Oregon Transportation Research and Education Consortium (OTREC)**

The Oregon Transportation Research and Education Consortium (OTREC) is a National University Transportation Center that was established in December 2006 through a partnership between Portland State University, the University of Oregon, Oregon State University and the Oregon Institute of Technology.

OTREC has chosen three focus areas: advanced technology, integration of transportation and land use and healthy communities. Each of these four institutions of higher education bring their unique expertise to the table, providing a relatively small state like Oregon the best opportunity to have a world-class transportation research center. The figure above illustrates how the many disciplines at the four campuses are interrelated around the consortium's theme.

OTREC has funded 100 research projects involving 89 faculty members and 13 laboratories and research groups. All projects include external public and private matching partners with a total of 42 different entities involved. OTREC is multi-disciplinary, with 22 different academic disciplines currently participating in our projects.

Collaboration is strongly valued by OTREC, our partner universities and our many stakeholders, and it has been woven through our activities as an important cornerstone:

- **New Collaboration Among Faculty.** Faculty are encouraged throughout the proposal and project process to think of innovative and collaborative approaches to research, education or technology transfer. To date, 32 projects involve faculty at more than one campus and 78 have multiple investigators.
- **Strong Ties to ODOT and Transportation Community.** More than 42 external partners provide matching funds of cash or in-kind support for faculty-led projects. ODOT is a primary partner, jointly funding nearly half of OTREC's research projects selected to date.
- **Regional Collaboration.** OTREC is part of the Region X Transportation Consortium, made up of UTCs in Oregon, Washington, Idaho and Alaska, as well as the four state DOTs, with input and participation by representatives of the USDOT. The Consortium funded one joint project focusing on regional impacts of climate change and teamed up to offer the first long-distance, multi-campus class between Oregon and Idaho.
- **National Connections.** OTREC strives to meet national transportation research and education needs and is active with the American Association of State Highway and Transportation Officials (AASHTO), the Transportation Research Board (TRB), the Council of University Transportation Centers (CUTC) and other national activities.

OTREC uses the national DOT priorities to guide its research program. It is encompassed in the strategic plan, and every research proposal needs to relate back to one or more of the national priorities. One of the more significant activities that ensure that federal research efforts are coordinated at the state level is the involvement of OTREC staff and affiliated faculty in the TRB committees and research panels. Fifteen OTREC-affiliated faculty and staff represent 30 different committees and panels at the national level. Participation in national-level research activities ensures that research is better coordinated and avoids duplication.

ODOT and OTREC work very closely together to address research needs, using State Planning and Research funding to leverage UTC funding, thereby stretching state resources further. ODOT employees are involved directly in governance of OTREC, and OTREC has a direct role in governance of ODOT's research program. State Planning and Research Program funding, which is eligible as match for UTC activities, is a very valuable tool for fostering partnerships. State funding beyond the State Planning and Research Program has been used to leverage federal funds and has contributed to advancing issues of national significance.

OTREC has also fashioned similar relationships with Oregon's MPOs, transit districts, local governments and Ports. Joint research efforts have been established around freight and goods movement, transit operations, active transportation and healthy communities. Those relationships help to further leverage UTC funds.

Alongside research, OTREC's mission includes educating the current and future workforce and sharing and implementation of research results. OTREC has been particularly successful in elevating the number of graduates enrolled in transportation degree-granting programs. OTREC requires that every research project involves undergraduate or graduate students—a strategy that helps to train the future transportation workforce. OTREC estimates that approximately 102 graduate students and 48 undergraduate students have worked on OTREC-funded projects over the last four years. The most prominent outcome is helping to establish a graduate program at Oregon Institute of Technology that attracts students from the smaller and rural communities in Southern Oregon.

### **Disseminating Research**

The research conducted in Oregon has broad-reaching impacts on public and private sector work in transportation, helping to better inform and educate professionals and institutions. Researchers work hard to communicate their research results to transportation professionals who can put that research into action.

ODOT and OTREC have undertaken a number of efforts to disseminate research to a broad audience. For example, ODOT Research publishes brief summaries of research reports for use by practitioners. These are available online and are distributed through the state's Local Technical Assistance Program (LTAP) Center. ODOT Research staff routinely attend agency-sponsored training events both to market research services and to disseminate research results.

OTREC, along with many local partners, coordinates the annual Oregon Transportation Summit. The Summit is an opportunity to showcase important advances in research as well as an opportunity for stakeholders to provide insight into the most pressing needs of their agencies and organizations. The feedback obtained from the Summit has been used to guide research emphasis areas for OTREC's annual solicitation process.

Similarly, the Northwest Transportation Conference brings nationally known speakers and supplements them with research and subject matter experts from Oregon universities and transportation agencies as well as the private sector. Presentations are often based on recently completed research and research in progress. The program is developed to offer something for the entire spectrum of the transportation workforce from the snowplow operator to the chief executive.

ODOT Research also offers a number of training events. Street maintenance and collection schools that target the blue collar end of the public works workforce in Oregon. Courses address recent innovations in equipment, employee and work zone safety, signing and roadway marking materials, storm water management and other topics concerning innovations and new technology relevant to city and county road maintenance supervisors and workers.

Over the past year, OTREC has focused on disseminating research results in more usable formats and has developed a communications strategy for what information, to whom and at what stage during a research project the information should be communicated. OTREC recognizes the need to translate the work of academics in a format that can be easily understood by agencies, decision-makers and the general public. Through a more concerted effort to develop project briefs and news articles, OTREC has seen an increase in the media and public interest in our research results. OTREC has also had good success in sharing results in weekly OTREC seminars open to the public and streamed over the Internet.

Since inception, OTREC has funded 19 education and 14 technology transfer activities. Among the array of workshops and technology transfer activities offered, the most significant interest nationally is OTREC's light rail short course.

One other key element in the system of getting innovations out to local governments is FHWA's Local Technical Assistance Program. This program funds a center in each state, the role of which is training and technology transfer serving the state, local and tribal transportation agencies within the state. LTAP is the primary conduit through which innovations developed throughout the system are put into the hands of potential users at the local level, in a form that they can use.

### **Transportation Research Needs of the States**

Each state differs in funding and priority needs for transportation research, but we share many in common. These needs are necessary for all states to increase economic competitiveness, especially in times of recession. Increasing focus on practical design, context-sensitive solutions, maximizing the efficiency of the existing system and preserving the system and freight movement will allow states to do more with less when investing their transportation dollars.

### **Oregon has identified a number of gaps in research:**

- **Efficiency.** In the future, increasing highway capacity cannot be relied on exclusively to address transportation needs. We need to find ways to use existing capacity more efficiently, encourage development and use of alternative modes and manage growth through strategic and effective land use planning. Research is desperately needed in all these areas, in Oregon and nationally.
- **Seismic Activity.** Seismic vulnerability is a major concern in the Pacific Northwest region because of new and better understanding of the Cascadia subduction zone 200 miles off the Oregon coast, which presents the potential for a magnitude 9 earthquake and an attendant major tsunami. The Japanese experience has taught the importance of keeping lifelines open for emergency response. Research is needed to pinpoint the risks and to prioritize remedial actions.
- **Mileage-Based User Fees.** Fuel taxes are rapidly becoming an obsolete tool for transportation funding as fuel efficiency improves and alternative fuels become more prevalent. Oregon has been a leader nationally in the move toward mileage-based road user fees. Making a transition to a suitable alternative has a significant research component.
- **Energy.** One way states can help advance energy independence and combat global warming is to use the transportation system itself to produce clean energy. ODOT's Solar Highway program has taken the first steps in that direction, and there are a number of promising nascent technologies that need to be explored, evaluated and tested.

### **Advanced Research**

As noted previously, states focus on applied research. Advanced research, in contrast, seeks to make progress toward a solution to a critical transportation problem, but without expecting to reach a solution within the scope of a single project. Advanced transportation research currently falls within the scope and responsibilities of University Transportation Centers and the various advanced research initiatives of the USDOT. While the DOTs do not engage in advanced research, it is important to Oregon and to the rest of the states that someone is tackling the bigger problems in transportation.

### **Stakeholder Needs Identified in USDOT**

Prioritization Oregon supports the top five key USDOT priorities. However, a number of other key areas could be emphasized and are perhaps not fully captured in the key priorities as currently stated. These include the following:

- ***Resiliency in the Face of Natural Disasters.*** Given the real and present impacts of recurring natural disasters and climate change on transportation infrastructure and communities across the country, more research and inclusion of resiliency across all key priorities is needed. Communities that are designed for change such as economic conditions, fuel prices and climate will be better adept at bouncing back in harrowing times. There are clear examples such as the rebuilding efforts that currently continue as a result of Hurricane Katrina and the communities recently devastated by flooding and tornadoes.
- ***Consider Equity Issues Across All Priorities.*** Vulnerable populations from the elderly to the socio-economically disadvantaged need greater consideration across all key priority areas. Similar to resiliency, transportation equity is yet another cross-cutting issue. For example, those who are most at-risk on the roads are older adults, the poor who cannot afford more advanced vehicle safety features and kids (where vehicle crashes are the leading cause of unintentional injuries and deaths). Another example is providing good access to sidewalks and better linkages between transit, pedestrian and bike facilities that make these viable transportation options for the vulnerable populations that cannot drive or own a vehicle. And equity needs to include a joint transportation and land use component to better link social and community services with disadvantaged populations.
- ***Align Performance Measures With New Policy Direction.*** Useful measures help states and MPOs better allocate scarce transportation dollars and better describe system performance to the public. Prevailing performance measures that have been used to historically characterize our transportation system are at odds with the direction that policy decisions are headed. Measures of success are evolving to reflect cross-modal benefits and better represent the transportation system as a whole. The research strategic plan should evaluate the applicability of traditional measures such as benefit-cost ratios or volume-to-capacity

ratios across all modes and explore other options that support the Department's policy direction.

- *Consider Health as Another Key USDOT Priority.* Given the obesity, diabetes, asthma and other chronic disease epidemics stemming from the lack of physical activity and air pollution in addition to the exorbitant health care costs the U.S. is facing, health should be included as a sixth priority. This would address issues such as increasing walking and bicycling, as well as the issues that relate to an aging population and safety and accessibility issues of all users of the transportation system. Health impact assessments are also being integrated across the country as part of the transportation planning process and this perspective is gaining momentum at local levels.
- *Recognize Active Transportation as a Mode.* Active transportation, such as bicycling and walking, needs to be recognized as a mode, particularly because it is among the most cost-effective investments in improving the transportation system. This national recognition may be a catalyst for cities and regions that are seeing significant increases in bicycling, walking and non-motorized travel to help further implement infrastructure and safety programs. It would also encourage other areas to see active transportation as a practical strategy among others that can help address climate change, congestion, safety, health and equity issues.

#### **Recommended Changes to Reauthorization of Surface Transportation Bill**

In looking ahead, we feel there are some opportunities for policy changes that would help to improve research both at the national and state level. For the next surface transportation bill, we urge you to consider some small but important changes that would encourage collaboration, in turn further leveraging existing resources. These changes include:

##### **Broadening Federal Match for University Transportation Centers (UTCs)**

USDOT should re-examine match requirements and allow other federal sources as match (e.g., other USDOT, NIH, CDC, NSF, etc.). The next iteration of the USDOT research strategy should foster closer cooperation with other federal agencies such as the U.S. Environmental Protection Agency to work on greenhouse gas emission issues, the National Institute of Health to examine linkages between transportation and health policies, the Department of Housing and Urban Development and the Department of Energy to explore alternative energy for transportation. Allowing federal match dollars from these potential partners would encourage cross-agency and cross-discipline collaboration. In addition, federal transportation dollars from a metropolitan planning organization (MPO) should be eligible as match. Having a comparable program for MPOs similar to allowing federal State Planning and Research (SP&R) funds to be used as match would accelerate research innovation and adoption of federal priorities. For example, Metro (the Portland regional MPO) is an active research partner with OTREC making significant advances in modeling. They are seen as a leader nationally in adopting and applying innovative transportation planning and operational strategies.

While there is widespread cooperation and collaboration between Metro and OTREC faculty, the inability to use Metro federal funding sources (both in-kind and/or cash) is a real barrier for leveraging local resources. In addition, the smaller MPOs in Oregon want to partner on research but have no non-federal funding available for research. Broadening the federal match eligibility would broaden local partnerships, reduce duplication and improve efficiency.

##### **Streamlining the Adoption of New Innovations**

The current processes for adopting best practices and innovation need to be examined to find ways of encouraging or rewarding research with visible outcomes. For example, the current process for adopting and updating the Manual for Uniform Traffic Control Devices is difficult and stifles innovation. The state of the technology and innovative treatments being developed locally and regionally are constantly evolving. However, a shortage of funding directed at evaluating new, innovative technologies (including traffic control devices) limits the amount of innovation possible. Innovation that is proven and could help to advance the state of practice across the country is often hampered by slow policy changes. A new integral part of the DOT research program could be a way to help streamline the process for researching, evaluating and adopting new innovations.

##### **Research on Mileage-Based User Fees**

In order to transition the transportation system to a user fee that is more sustainable in the long term, the next surface transportation authorization should create

a research program designed to develop a mileage-based user fee system. This should include creation of a policy group within USDOT to oversee development of a mileage-based user fee system, as well as funding research and development efforts consisting of pilot projects and implementation trials that will identify the best option for a mileage-based user fee and design the system and technology required for implementation.

#### **Making Better Linkages Between Research Groups**

We encourage more visible connections with and between national laboratories and research groups, including UTCs. The USDOT Research and Innovative Technology Administration should continue playing that role and help to communicate the work that is happening among the various groups. These connections again would help to broaden partnerships and promote collaboration.

#### **Flexibility in Research**

Oregon's success in working with University Transportation Centers is not typical across the country. UTCs are expected to carry out advanced research within a defined topical subject area. State DOTs are interested primarily in applied research across a broad spectrum of topics. This can make common ground difficult to find.

If the expectation is that states and UTCs should work together then there needs to be more flexibility in the expectations placed on UTCs regarding their research mission, so that they can respond to both national priorities and at the same time be responsive to the needs of the states.

#### **Leadership and Strategic Direction**

There is a need for leadership and guidance from the USDOT on national research priorities. In order for the various players to do their parts, goals need to be articulated and hard choices need to be made about what is important enough to focus scarce resources on.

In a few areas there are detailed, well-articulated roadmaps for research. An example is the Concrete Pavement Roadmap, a ten-year strategic plan that outlines approximately \$250 million in needed concrete pavement research that will help develop a comprehensive, integrated and fully functional system of concrete pavement technologies. However, for most topic areas we have little more than very high-level summaries such as Highway Research and Technology: The Need for Greater Investment, the report of the National Highway R&T Partnership. Development of more detailed research roadmaps in DOT priority areas may help to provide clearer direction.

#### **Conclusion**

Thank you once again for the opportunity to address the Subcommittee regarding transportation research needs of the states. In a down economy, research and innovation prove invaluable in providing new ideas and developing innovative solutions to help us do more with less and address rapidly changing realities.

Oregon is a model for coordination and dissemination of research. The work of OTREC and ODOT has been very successful at maximizing the effectiveness of the money we invest in transportation research, and our state has seen the benefits of that in several instances discussed in this testimony.

Chairman QUAYLE. Thank you very much, and I would like to thank the whole panel for their testimony today. I want to remind Members that—of the Committee rules limit questioning to five minutes.

The chair will at this point open the round of questions, and I will recognize myself for five minutes.

Mr. Appel, one of Secretary LaHood's strategic objectives is to support "livable communities". How does the Department define "livable communities"?

Mr. APPEL. Livable communities in the context——

Chairman QUAYLE. Could you turn on your mic?

Mr. APPEL. Livable communities in the context of transportation primarily is about transportation options. Realizing there are many different types of communities in the country and we want to ensure our citizens have good access to transportation to get to their

libraries, their schools, their hospitals, and their retail establishments.

And realizing that different segments of the population such as older Americans might not have the same access to automobiles or other modes of transportation as others, we want to make sure that, to the extent possible, members of our population are provided these options, so if one mode of transportation is not available, there might be others. In an urban area that might involve more transit. In a rural area there might be other creative options to provide multiple ways to get from point A to point B.

But there is no cookie cutter answer to the question of what is a livable community because it really does depend on the nature of the community, but the transportation options is a major part of it.

Chairman QUAYLE. So will we be able to quantify success on trying to basically achieve the objective of livable communities? I am just trying to think of what sort of objective ways we will be able to make sure that what DOT is doing and what we are trying to do is actually going to be accomplished?

Mr. APPEL. Yeah. Part of the Research and Innovative Technology Administration that I have is the agency known as the Bureau of Transportation Statistics, and so BTS is one of several groups within the DOT that are looking at things like performance measurement associated with strategic goals.

So to take an example of a project that the Bureau of Transportation Statistics that is relevant to this question, we are looking at what we call the inter-modal connectivity database, looking at to what extent our communities are making good connections between one mode of transportation such as a rail line to another such as bus line or something else.

To measure transportation options you often want to measure is it feasible to use a mode of transportation to get from point A to point B and if you take that mode of transportation, are you going to be able to connect to another mode to get where you want to get. There are quantitative ways to measure this by looking at the level to which one mode is providing connectivity to another.

So that is one area that we are looking at. Do we have all the performance metrics in place right now? Not yet. It is kind of an ongoing process, but we are looking at that kind of metric, that kind of measure to say are we providing these transportation options.

Chairman QUAYLE. Okay. Great. Mr. Halikowski, one of the challenges within the Transportation Research Committee has been to balance the immediate means for the short term while also not forgetting about long-term research goals.

Besides increasing the federal cost share what other policy changes might allow the research conducted by the UTCs to be more focused on the long-term national needs?

Mr. HALIKOWSKI. Well, thank you, Mr. Chairman. I will answer that this way. Arizona, as you know, does not have a UTC at this time. Right now the Department of Transportation is working with the three State universities to establish a UTC, and to put it in more practical terms of what we are looking and trying to do with the UTC is this, as some of the previous speakers have pointed out,



the States do a pretty good job with applied research. For example, pavement durability, you know, bridge design, things like that. However, when it comes to some of those larger questions of economic issues and what effect transportation projects will have on the environment, on the social demographic, and on the economy, we look to the UTC to perhaps answer those larger questions and guide us through let us say a state-wide transportation plan.

So as I look out into the future as to what UTCs might be able to do on a national level, it would be more of that idea of what is the national plan and how do you coordinate that across 50 different jurisdictions.

Chairman QUAYLE. Okay. Thanks, and Dr. Feller, in your testimony you spoke very strongly about the harm that earmarks and the existence of too many UTCs have done—in setting research priorities. Do you think that the Administration's decision to make the UTC Program completely competitive and increase the grant size to about \$2 million per consortia addresses that concern?

Dr. FELLER. I have limited detailed information about the proposal, but certainly I would certainly endorse going to a smaller number. In fact, I would start from a premise of starting at least one in each region, but building it as an award criteria, inter-state, inter-institutional collaboration. Two million dollars is certainly better than the \$500,000, but I am not even sure that is enough. I would go for multi-year, long-term funding, and if I could just turn to your previous question, the way to ensure that the UTCs address important questions is to make this competitive and make the award based upon the importance of the novelty of the challenge of the questions that they are willing to address and show the capability of addressing, and if they do that, in most cases this will require collaboration with institutions in other states and other jurisdictions and other partners.

Chairman QUAYLE. Okay. Thank you very much.

The chair now recognizes the Ranking Member, Mr. Wu, for five minutes.

Mr. WU. Thank you very much, Mr. Chairman, and if I have enough time in five minutes, I am going to ask three hopefully quick questions, all aimed at, well, moving from the amount of research to earmarking to long term versus short term.

In the background materials for this hearing and also for the hearing in the last Congress and the Congress before that what I have seen is that about one percent of the federal transportation budget is allocated towards research. To the extent that you all know, how does this compare with other fields? Is this an under-allocation to research?

For anyone to address.

Okay. All right.

All right. We will come—well, then let us jump to the earmarking of projects.

Mr. Gehr and Dr. Feller, you both addressed in your testimony how you feel that this damages federal research. Is it the case that the entire federal allocation to research at UTCs and more is earmarked by the time it goes out the door?

Mr. GEHR. That has been our experience under SAFETEA-LU. When it was passed, as I mentioned, it was over-programmed.

There were more projects identified than there were funds authorized to pay for those.

So when that occurs, it takes away the flexibility that the research centers have to provide the creativity and the innovation when things have already been designed what they are to do rather than put it on a performance-based or an outcome-based program, you know, with appropriate competition for the award of those dollars.

Dr. FELLER. If I may add, the TRB report, special report 295: Federal Investment in Highway Research, contains the statistic that about 62 percent of the UTC funds are earmarked. I think the point that I would note is earmarking is not a one-time thing. Earmarking as I pointed out in my paper is a contagious issue. It is viral. Once one group gets earmarking, you reduce the opportunity for competitive funding. I have interviewed university provosts and vice presidents for research who have had checklists of things that they were coming to Congress for to be earmarked.

So, again, why compete in a game that essentially provides for lobbying and earmarking? It all—so it becomes systemic. It is not a one-time thing. The same groups, the same researchers get the earmarks year after year, and essentially the system runs downhill. You have no quality to check. I think Mr. Gehr—you have no opportunity to assess the quality of the work that is being done.

Mr. WU. And the earmark projects tend strongly toward short-term rather than long-term research. Is that correct?

Dr. FELLER. That is the general observation that has been made.

Mr. WU. And in addition to the 80/20 allocation, what are some other mechanisms that you or the panel have in mind for shifting from short-term toward more long-term, more high-risk and high-return projects, research projects?

Dr. FELLER. If I could turn the question upside down, and I have seen this and just in terms of evaluating NSF's Science Technology Centers, researchers seek to answer the most important question for which they can get resources. So if you deregulate the system and have open competition, you will essentially unleash the creativity, the opportunity of researchers in the transportation field and in those fields that believe that their work can contribute to safety, cost reduction.

Once you do that, the question really—you will have the Congress, the transportation, Department of Transportation will be able to see what is out there rather than prescribe who gets what to do what. I would not focus so much on the 80/20. That is valuable. It is certainly an important step forward, but I would basically say if you provide for an open competition geared against the set of overarching priorities that the Congress sets, that the DOT is charged with implementing, you will be both—you will be delighted and the transportation community will be delighted at the richness and the creativity of American engineers and scientists.

Mr. WU. Thank you very much, Dr. Feller.

With a couple of seconds I have left, Ms. Peterson, you addressed in your testimony the need to ensure resiliency in the transportation infrastructure in case of natural disaster, and this is a particular interest of mine and a particular—of importance to the Pacific Northwest.

Can you expand upon that and the current state of research in disaster resiliency, and I think that we have learned some particular lessons in the Chilean experience.

Ms. PETERSON. Well, within Oregon itself just with the tsunami that hit the West Coast of Oregon I think we have a lot of examples of economic, communities that are going to be at an economic disadvantage if we don't find ways to make sure that our transportation infrastructure can be put in place quickly after something happens in terms of environmental streamlining and the way we have done outcomes-based type of work but also with the type of pavement and how the pavement can drain. I mean, there are all sorts of technologies to allow for high water and that sort of thing.

So I guess I would point to the type of research going on and the type of infrastructure we build and the type of environmental streamlining that we have shown to be able to do in Oregon to be able to get infrastructure back in place as quickly as possible with still good environmental outcomes.

One thing I just wanted to mention in terms of competition is that competition is a good thing, especially when we are trying to achieve federal objectives. There are smaller local objectives that we also need to keep in mind that could become federal over time, and we need to be able to have some sort of consistent funding for those localized things that could at some point become part of a federal agenda.

We also need to make sure that the flexibility of the types of money that can be used for match is a key part of moving forward. If we increase the match, if we continue the match, there is all sorts of federal money that is not allowed to be matched at this time. So I would love to follow up with you on those types of things in the future as well.

Mr. WU. Thank you, Mr. Chairman.

Chairman QUAYLE. Thank you.

The chair now recognizes the gentlelady from Illinois, Mrs. Biggert, for five minutes.

Mrs. BIGGERT. Thank you, Mr. Chairman, and thank you for holding today's important hearing on transportation research, and my first question is for Mr. Appel.

Under DOT's new approach for allocating for fiscal year 2011, funding for the UTC Program, the agency—you said that there will be 20 consortia to conduct research, and my concern is that this has just discontinued the funding for fiscal year 2011, for the 59 programs that are now in existence. What greater benefits does DOT's new approach of selecting 20 consortia seek to achieve when compared to the current UTC System? And do you plan on or anticipate capitalizing on the expertise that has been developed by many of the institutions participating in the program in order to ensure that we build on the expertise? Or is the objective to, just to created entirely new centers?

For example, the new idea of competitively bidding to the 20 university-based consortia appears to exclude the National Laboratories where there has been extensive modeling, university—and simulation with the universities and simulation capabilities being used by DOT, and it seems that if we are going to make good use of our existing dollars in a tight budget year, we should use those

existing shared resources like high-performance computing capabilities that the government, universities, and the private sector already depend on. It seems like you are just cutting everything off to start over.

Mr. APPEL. Certainly we want to capitalize on some of the great capabilities that are out there at the universities. Yesterday in Portland, Oregon, I met with the leaders of many of the existing 59 University Transportation Centers, and I made clear to them that one of the primary criterion moving forward in the University Transportation Center Program is a demonstrated track record of excellence in transportation, research, education, and workforce development. And I would fully expect that a lot of the existing programs will demonstrate such a track record and will be very well positioned in a competition moving forward.

That is not to say that there are not other universities outside the program that can also show or demonstrate a track record in that area. So we anticipate that there will be a mix of programs that already exist and perhaps programs that are new to the game to build the strongest pie of Transportation Research Programs moving forward.

Mrs. BIGGERT. With this rapid transition in funding, how is that going to—everything stops until you have a competition, and when will that be—when will the awards be available?

Mr. APPEL. Yeah. We certainly have to recognize that universities have timeframes, and they have schedules, and they have deadlines, and getting as consistent as possible a flow of funding is an important thing to them. In the context of that we also had to look at the process that Secretary LaHood was asked to undertake, which is to review all programs in this category in the Department, not just the university programs but research programs in general to determine whether earmarks or other term-limited programs were, indeed, sufficiently funded. And the Secretary and his team across the Department went through a rigorous process to make that determination and ultimately made the determination that these programs had been sufficiently funded. The funds still are important to be used for the University Transportation Center purpose, and we want to very rigorously, yet very expeditiously move forward in getting the next rendition of the program.

So, no, we don't want to stop and start over again. We want to maintain as much momentum as we can, and so in the design of the competition we are trying to do this in the most, not only rigorous, but fastest way we can.

Mrs. BIGGERT. Okay. The other question was, will the National Labs be involved, or will they be included?

Mr. APPEL. The national labs play a very major role in transportation research across the Department. The UTC Program is just one of many research programs of the Department, and the national labs such as the national lab——

Mrs. BIGGERT. But they have been involved in this with the universities.

Mr. APPEL. There have been partnerships with the universities, and there also have been grant funding that has flowed directly to National Labs, and we fully anticipate that the kinds of advanced computing capabilities, super computing capabilities at some of the

National Labs and modeling capabilities will be part of the mix in research moving forward.

For the university program itself, we are trying to drive a combination of research, transportation education, and transportation workforce development, and we want the core of that program to be universities, but at the same time we are very open to partnerships with other entities, including National Laboratories.

Mrs. BIGGERT. And these will be \$2 million awards?

Mr. APPEL. We are still working out what the request for proposal is going to look like for the UTC Program. We are actually currently looking somewhere in the range closer to 4 million, but nothing is finalized until we work through the details to prepare a request for proposals, but, yes, something closer to the \$4 million range per university consortium.

Mrs. BIGGERT. Thank you, Mr. Chairman.

Chairman QUAYLE. Thank you, Mrs. Biggert.

The chair now recognizes the gentleman from Illinois, Mr. Lipinski, for five minutes.

Mr. LIPINSKI. Thank you, Mr. Chairman.

I want to follow up on a lot of the questions Mrs. Biggert was asking. I think a number of those questions are the same questions that I have about what is going to happen with the UTCs with the fiscal year 2011 funding.

As you know, I strongly support the work of UTCs and was proud to help author the research title of the last surface transportation authorization, SAFETEA-LU, in 2005, that designated and funded UTCs.

In particular I want to point out the work of one in the Chicago area, Northwestern University, and some of the work that they have done, including work related to structural health monitoring which provides real-time strain data on structures and the ongoing collaboration of the Business Advisory Committee there which brings together industry, academia, and government to identify key transportation issues and implement workable solutions. And these are the types of things I think that we all want to see going on at UTCs.

My understanding is that the Department, in the redistribution of the fiscal year 2011 UTC dollars, said that, and I think you just mentioned this, I just want to better understand it, the Department believes that all 59 UTCs designated in SAFETEA-LU have been sufficiently funded to carry out their original purpose.

Now, what exactly does this mean that they have been sufficiently funded that they have completed their purpose or I just want to get a clear sense of that.

Mr. APPEL. Well, they were originally set up in SAFETEA-LU as a four-year program, and they have completed the purpose set out of over a four-year period, in each case setting out a different strategic objective, and over a four-year period addressing that objective.

We believe there has been great work done across these 59 centers and ultimately the Secretary made a determination that based on what was originally laid out for this term of the program they have done that, and yet in anything involving ongoing research or

education, we believe that there are opportunities for building upon that and moving forward.

Mr. LIPINSKI. I just wanted to also make sure I understand that so universities can partner up with national labs, and what you are—the plans right now, I know the RFP is not out yet, but is that part of your——

Mr. APPEL. We are still working it through, and there are multiple types of partnerships. There is sort of the core program at what are the universities affiliated with the core program, and then who will they partner with to achieve further results. We are still working out the details of that, but we certainly want to be in contact with this Committee, with individuals that helped prepare the original SAFETEA-LU. We want to align as much as possible with the principles of the original SAFETEA-LU, at the same time building upon it to make an even stronger program.

So bottom line it is an important question to address. We haven't finalized it in the development of the RFP.

Mr. LIPINSKI. I just wanted to—I would say I think we all agree that we want to be spending our money wisely, and but I do share Ms. Biggert's concerns about money running out at these UTCs that are doing good work.

Mr. APPEL. And I have toured the UTC you are talking about, and you are absolutely right. There are—there is some incredibly good infrastructure work being done, not only at that university but their ability to collaborate with other strong engineering programs around the country is exactly the kind of spirit we are talking about, which is to take very good programs and encourage partnerships with other good programs around the country.

Mr. LIPINSKI. And I want to make sure that we are—another concern is limiting the amount of money. I am not sure that that—the \$2 million or the \$4 million as you say you are considering now is enough money, but the last question I have is what is your time-frame right for announcing more information on having the RFP out there?

Mr. APPEL. We have a team very much focused on planning for this RFP in the weeks ahead. We hope to get a good solid amount, more information in the next few weeks or a small number of months, and we want to launch the competition as soon as we can as long as we have done that in a rigorous way. I had a good dialogue with the existing university transportation leaders yesterday as I mentioned, and we heard from them about what is on their mind. They want to make sure that they have enough time to respond to the RFP. This is coming out in the summertime where a lot of faculty are perhaps traveling or away from the university, so we want to hear from everyone about what timing works best for everyone, both for existing programs and potential future programs.

Mr. LIPINSKI. If the chair would indulge me 1 more minute, I have one quick question.

Chairman QUAYLE. One more minute.

Mr. LIPINSKI. I just want to follow up, Mr. Appel, on your testimony discussing RITA's efforts to improve the accessibility in exchange of high-quality transportation information through partnerships with the National Transportation Library.

Mr. APPEL. Yeah.

Mr. LIPINSKI. This is similar to a proposal I believe that I put forth two years ago when the Science Committee marked up the surface transportation R&D title. That proposal that I put in would have established a national clearing house for transportation R&D results at NTL.

Could you tell me a little bit more about your initiative including whether it includes any efforts to promote the dissemination of or transfer of R&D results to industry and to government transportation workers?

Mr. APPEL. First of all, we are extremely appreciative of your leadership on the—on this topic of national transportation library collaboration. We have, as you know, we have a national transportation library at DOT, and it is a virtual library with connectivity to State DOTs and their libraries and universities around the country, and we are developing a broader effort known as the Transportation, National Transportation Knowledge Network, to as much as possible maximize that connectivity.

So we are moving very aggressively down this road of finding databases around the country that are relevant to transportation decision making, making sure that the widest range of stakeholders has access to them, and we want to continue to build on that. We feel that these are very highly-leveraged dollars. In other words the investment we make in setting up frameworks for this kind of communication has a very high payoff because we are providing access to information that essentially already exists and can be much more applicable when you provide better access to it.

Mr. LIPINSKI. Thank you, Mr. Appel. Thank you, Mr. Chairman.

Chairman QUAYLE. Thank you, Mr. Lipinski.

The chair now recognizes the gentleman from Tennessee, Mr. Fleischmann, for five minutes.

Mr. FLEISCHMANN. Thank you, Mr. Chairman, Ranking Member Wu. Panel, thank you very much for being here this morning. This is very important to me. This morning I found out that I am going to be serving on the Transportation and Infrastructure Committee in addition to this Committee and very excited about that. In addition to that, ORNL, the lab, is in my district, third district in Tennessee, and I know they do a lot of research.

I am trying to get a handle on, and I want to hear from all of you all about this. What do you think is—and it is a two-part question, the highest value of research activity that you all do or that DOT does, what is the best and in the event that we have to cut, which is likely, what should be cut and why?

So I would like to know what you all think the best is and where you think if we have to cut, what should go and why? And Mr. Appel, I will start with you, sir.

Mr. APPEL. That question would take a lot of thought. We have—I mentioned earlier in my testimony that we have 14 what are known as research clusters, basically different scientific disciplines of research that all contribute to the overall research efforts, and so for example, a couple of the clusters involve human factors like lifting the effect of fatigue on either a truck driver or a pilot of an aircraft. So that is a human factors cluster.

Or there might be—there is a cluster more towards infrastructure, which looks at getting better pavement in a roadway that is going to last longer or provide a safer environment. It is actually very difficult to compare the results of the research in something like human factors or pavement design because they come at transportation from very different angles, and they both contribute to safety. We are not—we try not to be in a position of ranking one versus the other. What we try to do is look at the resources we have in each area and make the best possible use of those dollars to drive the best human factors work, the best infrastructure work, the best structure work, and the like.

So I am not in a position right now to pick one program that is the best or one program that could go. I would just say that within each scientific discipline we try to prioritize to show high-impact work within that discipline.

But you mentioned Oak Ridge National Lab. I just want to take a quick opportunity to thank the people of your district for Patricia Hu, who is our new director of the Bureau of Transportation Statistics, which is part of RITA, she served on the team at Oak Ridge National Lab for close to 30 years, and we recruited her last year, and she is now leading our national transportation statistics efforts, and we know that she was a loss to Oak Ridge National Lab, she is a tremendous gain for DOT, and we appreciate it.

Mr. FLEISCHMANN. Thank you, sir.

Mr. HALIKOWSKI. Mr. Chairman, I assume I am next in line for that question. Mr. Chairman, Mr. Fleischmann, I am going to give you an answer that I think folks who are looking for a definite yes or no probably dislike, and that answer is they are all important because about a little over a year ago I became Chair of the Standing Committee of Research for AASHTO, and when I looked at the picture, it is complex, and it is diverse of the types of research that are done for transportation, but there is a reason for that.

The research takes place at many different levels, whether it be local, State, or federal, and as we see we have got research that these panelists have talked about on technology transfer. There is particular research that may be conducted by the U.S. DOT. You have various agencies within the DOT with transit, highways, safety, motor carrier safety, railroad, and innovative technology.

So it is very difficult to give you a definite answer. To say which one of those are the most important depending on where you are standing at any particular time it may be very important.

In response to your second question as to which of those I would cut, again, my answer would be since they are all important, I don't think any of them should be cut. You might want to look at perhaps some sort of—if you are going to do a reduction, something more proportional along those lines, but to pick a particular one out to cut out of the program I think is very difficult to do because this research system is very intertwined.

Mr. FLEISHMANN. Thank you. Mr. Gehr.

Mr. GEHR. Yes, Mr. Fleischmann. Kind of like the previous speaker let me hit your second question first, and I will go back to Mr. Wu's question earlier of all of us about how much is spent in research in other areas, and while we are not in a position to know what that is, I would tell you that if—and I will take Mr.



Wu's word that it is one percent of the Federal Transportation Bill spent on research, I will also say that about one percent of our GDP is invested in transportation in this country.

And while I would not suggest we cut that one percent, in fact, it should be increased, I would not suggest that we cut the one percent of our federal transportation dollars that are going to research because they are all important.

Some of the more important areas, you know, as I mentioned, the Long-Term Bridge Performance Program, which is a long-term, 20-year program, needs to keep moving forward. Bridges are critical elements of our transportation system, whether it is for highways or transit or rail. All of those systems have bridges associated with them, and all it takes is for one bridge to go out, and you have lost an entire system. So that should continue as a very critical element.

The Intelligent Transportation System Program, again, is another long-term investment looking to the future to make the more—most effective and efficient use of the systems that we have, and that is what technology does for us. We have to look beyond the short term to do that. We have to look at the very, very long term, and the federal labs such as ORNL and some of the others working on concert with the State DOTs, the Federal Government, and even those of us in the private sector are looking at those kinds of issues, and so they, too, should continue and not be cut.

Mr. FLEISCHMANN. I think my time is up, isn't it, Mr. Chairman, or——

Chairman QUAYLE. Your time has expired, Mr. Fleischmann.

Mr. FLEISCHMANN. Yes, sir. Thank you all.

Chairman QUAYLE. Thank you, Mr. Fleischmann.

The chair now recognizes the gentleman from Minnesota, Mr. Cravaack, for five minutes.

Mr. CRAVAACK. Thank you, Mr. Chair. Appreciate you allowing me to be here a little bit late. Sorry. I was in another committee, so may apologies to the panel.

Ms. Peterson, thank you very much for being here, and I just have a couple questions. Very interesting in my district is the mileage charge, and could you kind of tell me how much it would cost to actually implement a program such as that? I live in a very rural community. Going to the grocery store might be an hour event, so if you could comment on that, I sure would appreciate it.

Ms. PETERSON. Chairman Cravaack, the—Oregon has been looking at this in very small steps towards a vehicle miles-based utility fee. We started with two very small communities in Oregon and looked at the effectiveness of it and how it would be implemented.

I think the question that you have raised is the question that our legislature has raised. I think that what we have done is we have looked to two more small steps. One is to in this legislative session that ends in a couple of weeks, one is to charge electric vehicle users a VMT because right now they are not paying anything, so the legislature is still mulling over how that would work, and it wouldn't have been implemented if passed until 2017.

So because of those questions that you raised and others that have been raised around privacy, how do you actually implement

a system where people's information is protected. So we are working towards the answers to those questions.

The other issue specifically on costs for the entire system was something that was going to be looked at in the five years between now and implementation.

The second part of the proposal was to do an opt-in, a voluntary opt-in, whether you are electric or a gas-powered vehicle, and the rate that they were talking about charging that would be equivalent to a gas tax was about \$1.60 per—I am sorry. One point six cents and that was too high in the estimation of the electric vehicle folks in terms of getting an incentive over the next five years to get those vehicles out on the road. So we were looking at having that and then bringing it up over time.

So that is where it is right now. It is still in conversation. I think what we are going to end up with is an all-voluntary opt-in, second-stage program. But in the rural communities I highly doubt we would get any voluntary opt-in. I think this is more geared at this point towards the urban areas.

Mr. CRAVAACK. Okay, and just to—make sure I understand, you really don't know what your initial upfront costs will be for the capital investment?

Ms. PETERSON. No, because I think what they would do once given permission from the legislature is go out for an RFP.

Mr. CRAVAACK. Okay. All right.

Could I get just some other comments from the panel on what your feelings are in regards to a mileage tax versus how we currently tax right now and what moving forward, obviously we have to take care of our infrastructure. It is vital we take care of our infrastructure, but can you give us some comments on what your feelings are regarding mileage-based tax and how it can be—actually be implemented.

Mr. APPEL. From the research and technology perspective at U.S. DOT we come at it from a perspective of if we look at intelligent transportation systems infrastructure that will help relieve congestion, help improve safety, we want to ensure that any investments we make in technology provide the maximum flexibility for different financing systems moving forward.

So from the research perspective I don't want to weigh in specifically on what form of financing is the best versus another, but what I do want to say is that we want to look at technologies that are as accommodating as possible to whatever the future environment would look like, and one great thing about intelligent transportation system investment is the benefits can really extend to future frameworks that we might not even anticipate today. If we put in a good infrastructure that involves good communication between vehicles and infrastructure, it can accommodate lots of ways of doing business in the future.

Mr. CRAVAACK. With that said, can you ensure the privacy of the U.S. citizen at the same time?

Mr. APPEL. We think that is a fundamental priority of any intelligent transportation system. If an intelligent transportation system technology is about safety and efficiency and environmental sustainability and good finance and techniques, it requires the buy-in from the users, from the people, and in order to get that buy-

in we need to absolutely ensure privacy. So that will be top of our list for any implementation.

Mr. CRAVAACK. Thank you. Appreciate that.

Mr. HALIKOWSKI. Mr. Chairman, a VMT issue is something that I think you have to look at from a national perspective. Certainly the technology I think is probably there to do such a system, but as you point out, Mr. Chairman, Mr. Cravaack, there are many, many other questions that go into what you do with the VMT system involving the number of miles traveled in less populated areas, privacy, all of those issues.

However, having said that, the other fundamental question we face, of course, is does gasoline tax as a method of funding transportation continue to be the workhorse it was since the 1950s, and the answer to that is obviously with an 18.4 cent a gallon federal gasoline tax, fuel, economy, and inflation continues to erode that. Whether it is VMT or some other solution, there is a funding gap that has to be addressed. All of them have difficult questions surrounding them.

Mr. GEHR. Mr. Cravaack, I would agree. I have been in transportation for 40 years in this country. We have been talking about the death of the gas tax for most of that time. When that comes, I don't know, but it still has to be part of the mix.

But at the same time, you know, through the research that we are talking about today, we need to investigate all other options available to us, you know, for augmenting revenues for transportation. VMT is one, and yes, the technology is there, it can be done, but as in many of these it is more the institutional issues on, you know, how you collect it, how you distribute the revenues, and the privacy issues, and those sorts of things that become more and more difficult or more difficult than the technology aspects.

So it is VMT that we are talking about today, and it may be something else tomorrow, but all of those other issues need to be dealt with as they are moving forward.

Ms. PETERSON. I would just add that Oregon was the first State in the union to have a gas tax, so the fact that we are looking to move away from it, I mean, it shows you the difficulties in transportation as a utility model. We just don't have it set up, and so as resources get tight, you know, with federal government aid, just like sewer and water we need to figure out how do we provide the infrastructure as a utility.

Mr. CRAVAACK. Well, thank you very much, and thank you for the indulgence, Mr. Chair.

Chairman QUAYLE. Thank you, Mr. Cravaack.

I would like to thank the witnesses today for their valuable testimony and to the Members for their questions. The Members of the Subcommittee may have additional questions for the witnesses, and we will ask you to respond to those in writing. The record will remain open for two weeks for additional comments from Members. The witnesses are excused, and this hearing is adjourned. Thank you.

[Whereupon, at 11:19 a.m., the Subcommittee was adjourned.]



Appendix I:

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ANSWERS TO POST-HEARING QUESTIONS

## ANSWERS TO POST-HEARING QUESTIONS

*Responses by The Honorable Peter Appel, Administrator, Research and Innovative Technology Administration, U.S. Department of Transportation*

**Questions submitted by Chairman Ben Quayle**

*Q1. You mentioned in your testimony that one of the Administration's goals is to "simplify the existing surface transportation research program." Could you elaborate on what this means? Please provide details.*

*A1.* As detailed in the Department's technical assistance provided to the Committee, the Administration seeks to maximize the effective use of scarce surface transportation research resources by eliminating the multiple earmarks, designations and funding categories as found in Title V of the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy For Users (SAFETEA-LU). As has been often shown, the over-designation of Title V resources within SAFETEA-LU's multiple programs has severely limited the Department's ability to apply resources where they are most needed to address the most urgent national transportation research needs.

In addition to pursuing the research principles I noted in my testimony, the Department specifically seeks to:

- Authorize the Secretary to develop and implement incentives to accelerate multimodal deployment of Intelligent Transportation Systems (ITS) technologies and research results flowing from the ITS Research Program, and to enhance transportation investments and the return on those investments.
- Focus the Federal role by restructuring the highway research and technology development and deployment program activities in the following core areas:
  1. Improving highway safety,
  2. Improving infrastructure integrity,
  3. Strengthening transportation planning and environmental linkages,
  4. Reducing congestion, improving highway operations, and enhancing freight productivity,
  5. Assessing policy and system financing alternatives, and
  6. Exploring next generation solutions, capitalizing on the Turner-Fairbank Highway Research Center, aligning national challenges, and disseminating information.
- Authorize a highway technology and innovation deployment program to test, evaluate, and accelerate the delivery and deployment of technologies ready to be implemented or in the last stages of development.
- Focus the transit research program on nationally significant research, development, demonstration, deployment and evaluation projects that the Secretary determines will improve public transportation.
- Enable cooperative research and evaluation programs addressing priority highway safety countermeasures.
- Conduct motor vehicle safety research, development, and testing programs and activities, including new and emerging technologies that may impact motor vehicle safety.

**Questions for the Record from Representative Lamar Smith**

*Q1. Some competing legislative proposals before the Congress seek to extend the federal weight limit on trucks to 97,000 pounds while equipping the tractor-trailer with an additional sixth axle. Such a weight increase and lengthening of tractor-trailers raises several safety concerns, especially with the wear and tear on brakes of such trucks and ability of such larger trucks to operate safely on our roads with other vehicles. However, larger semi-trucks would generally mean fewer trucks on the road, which could also save money in operating a fleet of such trucks.*

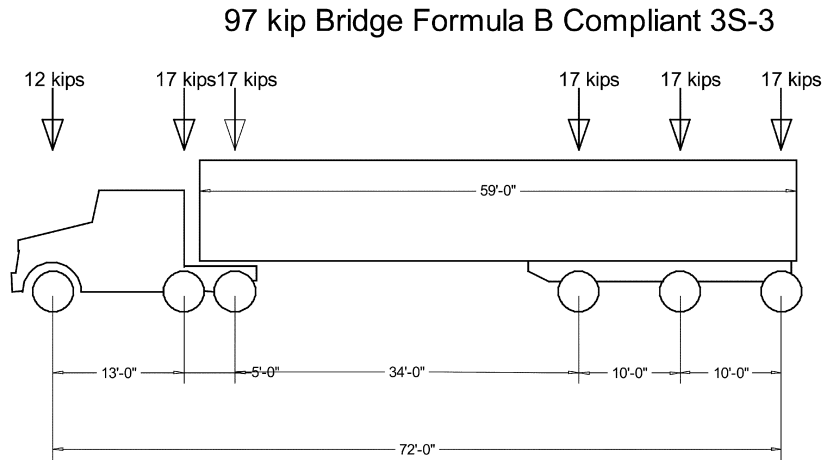
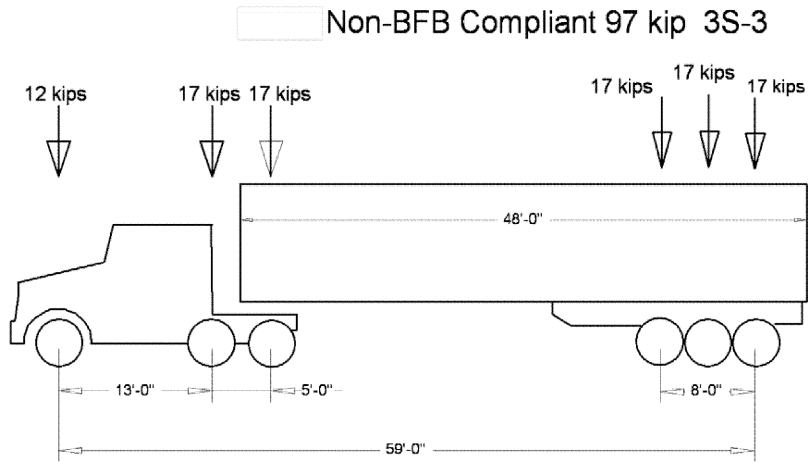
- a. Has the Department of Transportation researched the pros and cons of increasing vehicle weight limits on tractor-trailers?*

- b. *Has the Department reached any conclusions based on this research about the economic benefits and ability of trucks with increased weight limits to operate safely?*

A1. On the National Network, which covers approximately 200,000 miles, States are required to allow access to commercial motor vehicles (CMV) that have a 48-foot trailer or twin 28-foot trailers, and are up to 102 inches wide. On the Interstate Highway System, a subset of the National Network, Federal law limits the gross vehicle weight of CMVs to 80,000 pounds (there are, however, multiple grandfathered provisions allowing higher weights in various States). There is no Federal weight restriction on the rest of the National Network or on State and local roads beyond the National Network.

In some legislative proposals, a 6th axle is proposed to be added to the tractor-trailer combination, to form a tridem axle arrangement at the rear of the trailer. The Department of Transportation researched the potential impacts of changing truck size and weight in the 2000 Comprehensive Truck Size and Weight (CTSW) Study, and has recently done additional analysis on pavements. The CTSW study examined impacts on pavement, bridges, roadway geometry, safety, traffic operations, rail freight, shipper costs and vehicle miles traveled for several scenarios. The 97,000-pound 6-axle tractor semitrailer was one of the configurations analyzed in the international scenario (see Figure 1). This scenario allowed up to 51,000 pounds on a tridem axle group for a 4-axle short wheel base truck, an 8-axle double trailer truck and the 6-axle tractor semitrailer. Regarding pavement impact, follow-up analyses related to pavements found that tridem axles do not result in more pavement damage than tandems. However, the loading of the trailer is critical. If the trailer is evenly loaded with the additional weight, it results in the load on the forward tandem being greater than the 34,000 pounds currently allowed and less than 51,000 pounds on the rear tridem. This overload on the forward tandem axles will cause additional pavement damage.

Regarding bridge impact, a 6-axle 53-foot tractor semitrailer configuration would not meet the current Federal Bridge Formula B (BFB) and would not be allowed to operate on the Interstate system. To remain within the requirements of the BFB, the trailer would need to be lengthened to 59 feet and the rear tridem spread to 20 feet (see Figure 2). Even though this extended configuration would conform to the BFB, the configuration would increase the stresses on most bridges by up to 15 percent more than the stresses produced by the currently legal 80,000-pound 5-axle tractor semitrailer. Additionally, due to the spacing of the tridem axles the tires would scrub and chaff, causing the vehicle to handle very poorly in turns. A 59-foot trailer would also present safety and roadway geometry challenges, as the turning radius for this configuration would be increased compared to a current 53-foot trailer and would require a change to current law to amend the length restrictions in almost all States.



Based on current research, the Department has not reached final conclusions concerning the ability of trucks with increased weight limits to operate safely. However, the Federal Highway Administration and the Federal Motor Carrier Safety Administration have found that loading additional weight within existing trailer dimensions raises the center of gravity, increases rollover propensity and reduces vehicle stability and control. There are significant safety concerns when a used tandem rear axle trailer is modified to a 3-axle trailer (by addition of an axle), as the trailer may not be structurally sufficient to withstand the added stresses placed on the frame and body when turning and braking due to the added 17,000 pounds (approximately 20 percent) of weight.

The commercial truck roadside inspection vehicle Out-of-Service rate for trucks for 2010 was 20.3 percent, meaning that over 1 in 5 trucks inspected were placed Out-



of Service for vehicle-related safety deficiencies. Raising the Federal weight limits on trucks will not improve the safety of the motoring public without commensurate increases in commercial truck safety enforcement programs.

From a fleet perspective, versus that of an individual truck, allowing higher productivity trucks will result in less fuel consumption, emissions reduction, and fewer trucks on the road for a given tonnage of freight. Balancing these economic benefits with safety and infrastructure preservation concerns is the challenge in adjusting CMV weight limits.

#### **Questions submitted by Representative Randy Neugebauer**

*Q1. Secretary LaHood recently decided to discontinue funding in FY 2011 for University Transportation Research Centers (UTC) and make the program completely competitively-funded. I believe competition is a good thing, and is a driving force behind the innovation and prosperity our country has always enjoyed. I understand that UTC's structure may be reworked in the next surface transportation authorization bill, on which the Transportation and Infrastructure Committee is working tirelessly. Since this issue may come up again, I'm interested in knowing how the Department of Transportation proposes to ensure continuity and stability of transportation research during the transition period to implement Secretary LaHood's decision. How do you plan to make sure of that? Additionally, how can you make certain that current research initiatives will not be disrupted as a result of the changes?*

A1. The FY 2011 UTC competition is a primary vehicle for ensuring the continuity and stability of transportation research during the transition period. In light of the determination that a project or activity received sufficient funds to carry out the purpose for which the project or activity was authorized, the Secretary is using program funds to continue the competitive component of the UTC Program per SAFETEA-LU Sections 5506(e) and (f) to ensure that a strong cadre of university-based transportation research and education programs receive funding. At the same time, RITA continues its work with existing UTCs during their grant closeout periods. This will ensure that ongoing research projects are completed and that existing UTCs can meet the commitments they have made to graduate-level students working towards advanced degrees in transportation.

Relative to the upcoming UTC competition, RITA formed a multi-modal task group which includes the Federal Transit Administration (FTA), Federal Highway Administration (FHWA), Maritime Administration (MARAD), Federal Railroad Administration (FRA), National Highway Traffic Safety Administration (NHTSA), Federal Motor Carrier Safety Administration (FMCSA), Pipeline and Hazardous Materials Safety Administration (PHMSA), and the Office of the Secretary (OST). The group was charged with developing priority research areas, based upon U.S. DOT strategic goals, for the UTC Program Request for Proposals (RFP) that was published on Grants.gov on July 26, 2011.

*Q2. An important aspect of maximizing return on investment in research and development is identifying and addressing duplicative programs. How does the Department of Transportation identify redundancies? Can you assure us that they will be addressed properly? Since other agencies conduct similar transportation-related research, could you explain how DOT coordinates with other offices to leverage resources and eliminate duplicative efforts?*

A2. The Department coordinates research in a variety of ways—internally, across the Administration and with stakeholders. Through the Research, Development & Technology (RD&T) Planning Council and RD&T Planning Team, the Department addresses critical research areas and ensures that RD&T resources are invested wisely to achieve measurable improvements in our Nation's transportation system.

The RD&T Planning Council is composed of the heads of the operating administrations, and other senior DOT leaders. It works to ensure coordination at the highest levels of the Department. The RD&T Planning Team is comprised of each operating administration's Associate Administrators for RD&T. Through monthly meetings the Planning Team is aware of each other's RD&T activities and can identify additional opportunities for coordination and collaboration. The RITA Administrator chairs the Planning Council and RITA's Associate Administrator for RD&T chairs the Planning Team. Working together, these two entities create an environment of cross-modal planning and collaboration of Departmental RD&T. This collaborative environment identifies, addresses redundancies, and adds significant value as research leaders come together and learn from one another.

In addition, U.S. DOT engages in cooperative and joint research with stakeholders and partners across the transportation sector, including other Federal agencies, State and local agencies, academia, industry, and not-for-profit institutions, including the American Association of State Highway and Transportation Officials (AASHTO), the Transportation Research Board (TRB), and the American Public Transportation Association (APTA).

During the past year and working closely with the Planning Team, RITA formed 14 Research Clusters. These clusters were departmentally-funded and composed of U.S. DOT elements and stakeholder researchers which facilitated information sharing and research collaboration at a working level. A key component of the effort is a social media portal <http://www.transportationresearch.gov/dotrc/default.aspx>, which is fostering cross-cutting, multi-modal collaborations among RD&T stakeholders, both inside and outside of the Department. Furthermore, RITA convenes bimonthly, DOT-only meetings of these clusters to improve information sharing and collaboration within the Department.

RITA actively works to move transportation research and technologies into the marketplace. When making research grants, RITA requires all of its grantees to submit research in progress and final research reports to TRB's Transportation Research International Documentation (TRID) database and the Research in Progress (RiP) database, both of which are publicly searchable. TRID, which contains published research reports, is the world's largest and most comprehensive bibliographic resource on transportation information. RiP contains abstracts of transportation research in progress, and allows researchers and other users to search for proposed research ideas in order to foster collaboration and reduce duplicative research projects. RITA uses the TRID and RiP databases to serve as a repository for all research conducted by the UTC and Advanced Research Programs, including final peer-reviewed research reports and research that is in progress. RITA also encourages other modes to do the same.

#### **Questions submitted by Representative Daniel Lipinski**

*Q1. Could you elaborate on the recently initiated Transportation Technology Transfer program at the Research and Innovative Technology Administration (RITA)? How does this program enhance DOT's ability to identify and support technology transfer or product commercialization of University Research Centers? Is there a need for a single transfer technology coordinator to unify DOT's diverse efforts across the modes?*

*A1.* RITA initiated and is now leading U.S. DOT's technology transfer efforts in support of its mission, the Technology Transfer Commercialization Act of 2000 (42 U.S.C. 7261(c), and the Stevenson-Wydler Technology Innovation Act of 1980 (15 U.S.C. 3701 et seq.). RITA is actively involved in technology transfer activities within and outside the Department, a few examples are:

- Initiating the transfer of research into application;
- Engaging the DOT laboratory representatives in discussions about establishing an intra-DOT working group to refine the technology evaluation process;
- Leading webinars for Departmental researchers to share their results widely; and
- Involvement of RITA's Office of Chief Counsel (OCC) on intellectual property issues. (DOT Order 1100.75A, September 30, 2008, specifically identifies that the OCC "provides legal advice to the RITA Administrator and provides a comprehensive program of legal services to RITA and intellectual property legal services to the U.S. Department of Transportation.")

Also, RITA works with other Federal agencies on technology transfer activities. RITA's roles include being U.S. DOT's representative in the Federal Laboratory Consortium for Technology Transfer and an active participant in the Inter-agency Working Group on Technology Transfer, which is chaired by the Department of Commerce. Through these efforts and others, RITA is finding ways to leverage technology transfer practices from other Federal agencies to the Department.

Within U.S. DOT, RITA works closely with other operating administrations in support of university research centers. RITA organizes events for university researchers to demonstrate their work, particularly the work that has been deployed or is in the final stages of deployment.

Recently, at U.S. DOT, RITA hosted an event at which over 85 university researchers from 25 different universities demonstrated their deployed technologies

through exhibits and presentations. The event's theme was Technology Transfer and the presentations highlighted the deployment process.

Further, universities must inform the Department of potential inventions developed from Federal funding by submitting invention disclosures. This is a mechanism by which U.S. DOT tracks technology transfer activities of Federally-funded research to ensure that the appropriate "interest" language is included with provisional or full patent applications. Interest language clearly identifies that the Department has an interest in the invention and that "the Federal agency shall have a nonexclusive, nontransferable, irrevocable, paid up license to practice or have practiced for or on behalf of the United States any subject invention throughout the world." 35 U.S.C. § 209(d)

The Norman Y. Mineta Research and Special Programs Improvement Act (P.L. 108-426, 118 Stat. 243, November 30, 2004) specifically grants powers and duties to RITA, powers and duties as prescribed by the Secretary for "coordination, facilitation and review of the Department's research and development programs and activities" [The Mineta Act, § 4(a)(2), Powers and Duties of the Administrator]. Part of RITA's mission is to coordinate and foster research activities across all DOT modes, thus the modes are inherently RITA's internal stakeholders. These stakeholders play major roles in the diverse areas of the Department's research, and regardless of technology-transfer application, the technology transfer process will be similar. There are multiple means that RITA uses to effect technology transfer coordination with the modes; a technology transfer coordinator dedicated to improving the Department's technology transfer and commercialization results is one of those means.

*Responses by Mr. John Halikowski, Director, Arizona Department of Transportation; Chair, American Association of State Highway and Transportation Officials Standing Committee on Research*

#### **Questions submitted by Chairman Ben Quayle**

*Q1. According to your testimony AASHTO recommends the maintenance of the State Planning and Research Program in its current, formula-based configuration with a 25 percent minimum set aside for research, development, and technology transfer activities. What do you think the federal investment in research should be as a percentage of all highway programs?*

A1. Currently, less than 1% of the federal-aid highway program is spent on highway research by the Federal Highway Administration and the 50 states through their federally funded state planning and research program. Supplemented with significant additional funds from state, local, and private funding sources, the US transportation research program has been and will continue to be efficient and effective in providing us with solutions and advancing the technical knowledge needed to keep our system running smoothly. The State DOTs rely heavily on research that leads to practical solutions to their most challenging problems, and it is critical to ensure that the discoveries made through this research are communicated and transferred into practice.

As mentioned in the question, SAFETEA-LU requires that States set aside 2 percent of the apportionments they receive from the Interstate Maintenance, National Highway System, Surface Transportation, Highway Bridge, Congestion Mitigation and Air Quality Improvement, and Equity Bonus programs for State planning and research activities. Of this amount, States must allocate 25 percent for research, development, and technology. These activities involve research on new areas of knowledge; adapting findings to practical applications by developing new technologies; and the transfer of these technologies, including dissemination, demonstration, training, and adoption of innovations by users.

The current funding formula allows the transportation research program to ebb and flow with the size of the overall transportation program. While there is not enough funding for transportation in general to make needed improvements to our system, the proportion of research funding to overall funding has worked well in the past and we feel it will continue to allow for reasonable research and implementation efforts.

*Q2. Many of the witnesses mention that most states have instituted some type of performance management process, but these are not standardized. Does the Federal DOT require any performance measurements or evaluation when states applying for or after they receive research funding? What would states need to help standardize this process?*

A2. Currently, one of the requirements for using State Planning and Research (SP&R) funds is that the State DOT must develop its own unique management plan. This management plan establishes a process for conducting its research and technology (R&T) program. The processes that State DOTs use to manage their research programs vary based on such factors as the size and complexity of the program. Procedures also vary from State to State for developing the management plan and selecting needed research projects. Most States work with universities and other stakeholders as part of their research program.

Although States tailor their management processes to fit their individual needs, FHWA<sup>1</sup> has established minimum requirements for this process. The Federal Highway Administration (FHWA) Division Administrator certifies the State's management plan before it is implemented. The proposed use of planning and research funds must be documented by the State DOTs and any subrecipients of the funding in a work program that is acceptable to FHWA. Title 23, CFR Section 420.207, states that a State DOT's research, development, and technology (RD&T) work program must, at a minimum, consist of a description of the RD&T activities to be accomplished during the program period, estimated costs for each eligible activity, and a description of any cooperative activities, including the State DOT's participation in any transportation pooled fund studies, technology transfer activities, and the National Cooperative Highway Research Program (NCHRP). During the development of the work program, States are required to search the Transportation Re-

<sup>1</sup> <http://www.fhwa.dot.gov/publications/research/general/spr/staterd.cfm>

search Board's (TRB) *Transportation Research Information Services* (TRIS) database to ensure that another State is not already conducting the planned research.

In addition to these current requirements, the state DOTs, through AASHTO, have also identified a number of areas where coordinated, collaborative strategic policy research is needed. These areas include such traditional engineering-related topics as safety, preservation, and project delivery, but also performance management to ensure that we manage our systems as efficiently and effectively as possible. Performance goals are different from state to state based on the goals each is trying to achieve, the research they are conducting, the gaps in knowledge they need to fill to advance their particular programs, etc. At the national level, performance measures must be general enough to encompass the wide variety in programs and goals across the country. Thus, standardizing each state's process so that it becomes one-size-fits-all will not be as effective as if each state develops its own processes to meet its own needs.

*Responses by Mr. David Gehr, Senior Vice President, Highway Market, Parsons Brinckerhoff; Chairman, American Society of Civil Engineers Transportation Policy Committee*

**Questions submitted by Chairman Ben Quayle**

*Q1. In your opinion is the current UTC system overly focused on applied research in order to meet the needs of the state, instead of long-term national goals to create transformation technologies? Besides increasing the federal cost share, what other policy changes might allow the research conducted by the UTCs to be more focused on long-term national needs instead of immediate ones? What other recommendations do you have to ensure the UTCs are conducting research for the greatest benefit?*

A1. ASCE is concerned that the current UTC program is overly focused on applied research, which while meeting the needs of states, does not properly address the long-term, high risk research that will create transformational technologies and push forward the nation's surface transportation system. Much of the technology necessary for a future surface transportation system already exists, however UTCs can properly apply that technology for the greatest benefit of the nation. Universities work well in high risk, long term research, which is why new legislation should emphasize their role and ensure that the best universities are selected through a competitive process.

Competition will need to be the key component required to have UTC's perform the long-term advanced research. The program needs to be competitive in order to award approximately forty UTCs through the research title and five to ten through the transit title. Additionally, the different types of UTCs should be eliminated, in order to allow all UTCs in the research title to fall into the same "tier" and therefore receive the same level of funding. The funding should amount to approximately \$2 million per center annually. This would provide enough critical funding for each center to develop significant, long-term research projects, rather than projects that only last one year.

Additionally, in order to have UTC's do more collaborative research that is advanced in nature, the silos that exist in transportation research should be broken down, to expand the allowance for federal funds to match UTC federal funding. In SAFETEA-LU, State Planning and Research funds that go to state departments of transportation are allowed to match federal UTC funding, as is funding that goes to the states to support the Local Technical Assistance Program. In the upcoming authorization bill these funds should not be allowed to match federal UTC funding, but federal funds from other cabinet level agencies, for instance the Department of Energy or Department of Commerce, should be allowed to match federal UTC funding. This will encourage expanded, multi-disciplinary, advanced research.

*Q2. Many of the witnesses mentioned that most states have instituted some type of performance management process, but they are not standardized. Does the Federal DOT require any performance measurements or evaluation when states applying for or after they receive research funding? What would states need to help standardize this process?*

A2. ASCE is not familiar with the Federal DOT process for performance measurements or evaluations. In general, ASCE is broadly supportive of the inclusion of performance measurements, as it is a critical part of good governance, however the organization does not have a policy on the matter. Setting certain measurements and requiring evaluations to take place over the course of a research program allows for the government to guarantee that funding is being properly utilized. This level of transparency should be essential to any government program. It should be noted however, that measurements and evaluations during the course of research should not create an undue burden on research facilities, to the point that research results would be delayed. The federal government should use caution in developing performance measurements that could become another "unfunded Federal mandate" on the states. The measures should also have a degree of flexibility to allow for the measurement to be tailored to the research being performed and not a standard one size fits all type of approach.

*Responses by Dr. Irwin Feller, Professor Emeritus of Economics,  
Pennsylvania State University; Senior Visiting Fellow, American  
Association for the Advancement of Science*

**Questions submitted by Chairman Ben Quayle**

*Q1. In your testimony you remark that it is difficult to evaluate the value of transportation research because there is very little evidence to make a convincing case for its value. Can you explain what it would take to increase the evidence base?*

A1. Prefacing my answer to the question, “Can you explain what it would take to increase the evidence base (on the value of transportation research)?”, is again the qualifier contained in my written testimony that I have not conducted an extended literature review, and that there may be studies on the value of transportation research with which I am not familiar. More generally though, basing my answer on experiences with what has underlain evidence-based studies from other Federal agencies, I see 1 short-term and 1 long-term approach as offering a productive, complementary means of generating the desired evidence.

The short-term approach is to organize a more extensive and systematic review of the evidence on the value of transportation research than I am currently able to provide and to compare and contrast the methodologies and data bases found in this review with the state-of-practice currently employed by other Federal agencies. I have participated in or consulted similar such efforts for NIH, NSF, DOE, USDA, and NIST, and see few obstacles for conducting such an exercise for DOT. One standard approach would be for RITA to contract for such a literature review. Far preferable in my view would be to follow the practice of other Federal agencies and have RITA contract with the National Academies for such a workshop.

The longer term approach is for RITA to develop an evaluation program element specifically designed at providing systematic evidence of the value of transportation research. Here the preferred approach in my view would be to couple a strengthening of RITA’s internal evaluation capabilities with allocating via a competitive process some portion of UTC funds to those centers that develop a specialized capacity for program/project evaluation.

*Q2. In your opinion, is the current UTC system overly focused on applied research in order to meet the needs of the states, instead of long-term national goals to create transformational technologies? Besides increasing the federal cost share, what other policy changes might allow the research conducted by the UTCs to be more focused on long-term national needs instead of immediate ones? What other recommendations do you have to ensure the UTCs are conducting research for the greatest benefit of the nation?*

A2. My earlier testimony that the UTC system is overly focused on applied research in order to meet the needs of the states, based in large part on review of written TRB reports and interaction with transportation practitioners during my service on the RTCC, has been reinforced by my subsequent interactions with UTC administrators, who have confirmed and detailed this assessment. Increasing the federal cost share is only part of what needs to be done to have the UTCs direct their activities at national goals to create transformational technologies. Indeed, without additional policies/requirements, simply increasing the federal share may allow states to further leverage their modest investments to shape local rather than national research objectives.

Two additional, complementary steps, at a minimum are required to guide the UTCs to national objectives. First, UTC awards should be based on competitive, merit-review processes with proposals evaluated on the basis of their potential to achieve stated national transportation research objectives. Thus, following a consultative process involving stakeholders, members of the transportation research community, and researchers in cognate fields (e.g., materials research), DOT should identify and prioritize a set of national transportation research needs, allowing room for blue sky initiatives, towards which existing UTCs can respond. Selection panels likewise should be constructed broadly of individuals qualified to judge the national potential of the proposals under review. The second step is to establish formal review criteria to assess performance under an award, with substantive penalties, including termination, for non-performance, and to construct review panels broadly representative of the user and performer communities.

*Responses by Ms. Lynn Peterson, Transportation Policy Advisor,  
Office of Governor John Kitzhaber (OR)*

**I. In your opinion, is the current UTC system overly focused on applied research in order to meet the needs of the states, instead of long-term national goals to create transformational technologies? Besides increasing the federal cost share, what other policy changes might allow the research conducted by the UTCs to be more focused on long-term national needs instead of immediate ones? What other recommendations do you have to ensure the UTCs are conducting research for the greatest benefit of the nation?**

It is Oregon's view that University Transportation Centers (UTCs) should be striking a balance between applied research, and longer term national goals. Based on our experience with the UTCs in our region, that balance is being maintained. We cannot speak with authority regarding what may be happening in the rest of the nation. However, there are two points that we would like to make concerning the ability of University Transportation Centers to address a National Transportation Research agenda.

First, the "local participation" requirement provides a strong incentive for UTCs to serve clients who are willing to provide matching funds. For most Centers, the state Department of Transportation, along with MPOs and Transit districts, is apt to be the most significant source of cash match. This can be an incentive to become engaged disproportionately in applied research. A reduction to the matching ratio, or allowing other Federal sources of match (FHWA, NSF) would provide the means for centers to focus on longer term research goals.

Second, in the United States we have no clearly articulated national transportation policy, and we have no clear and coherent statement of national transportation research priorities. The USDOT has put considerable effort into developing both, but the truth is they start over with each new administration. In our experience working with University Transportation Centers, we have found it to be exceedingly difficult, at the level of specific project selection, to determine which addresses a national priority and which does not. Unless and until a national strategic plan for transportation research is in place, it will continue to be very difficult to focus our transportation research resources effectively.

**2. Many of the witnesses mention that most states have instituted some type of performance management process, but these are not standardized. Does the Federal DOT require any performance measurements or evaluation when states applying for or after they receive research funding? What would states need to help standardize this process?**

Oregon uses a few simple research performance measures for timeliness and effectiveness. Current Federal requirements for evaluation of state DOT research programs are process oriented, and include the development of a research procedures manual, the conduct of periodic peer exchanges, and quarterly and annual progress reports. There are also current discussions between the Oregon DOT and the FHWA Oregon Division on performance measures for research, which would include outcome oriented measures.

There have been attempts to encourage standardize performance measurement and reporting for state DOT research programs. Through the America Association of State Highway and Transportation Officials, and the National Cooperative Highway Research Program, a



performance measures system is in development, and trial versions of that system are in use in some states. Oregon may opt to adopt this system at some point.

It will be difficult to adopt a standard system for research performance measurement. The programs in the states are very diverse. Federal research funding to states ranges from \$800,000 to \$17,000,000 annually, with commensurate staff, numbers of projects and scope of projects. Outcome measures that work well for engineering and materials research do not work as well for policy oriented and other "soft" research topics. As a generalization, growth states have very different research needs and agendas than states with static or shrinking populations. Some states engage directly in research and development, while others put most of their effort into implementation of innovations developed elsewhere. A standard system of performance measures needs to address this range of diversity.



## Appendix II

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ADDITIONAL MATERIAL FOR THE RECORD

## ADDITIONAL MATERIAL FOR THE RECORD

*Statement Submitted by Representative Randy Neugebauer*

Mr. Chairman, thank you for holding this Technology and Innovation Subcommittee hearing on transportation research priorities. In a time that calls for severe fiscal restraints and strict consideration of all federally funded programs, prioritizing projects and maximizing return on investment is more important than ever. American families are being forced to stretch each and every dollar as far as they can, and the federal government should be doing the same. As such, I believe that this hearing is timely, I expect that we will hear important ideas on how we can improve the effectiveness of our transportation research investments, as well as how programs are currently undergoing efforts to make the most out of the funding they receive.

Administrator Appel: Secretary LaHood recently decided to discontinue funding in FY 2011 for University Transportation Research Centers (UTC) and make the program completely competitively-funded. I believe competition is a good thing, and is a driving force behind the innovation and prosperity our country has always enjoyed. I understand that UTC's structure may be reworked in the next surface transportation authorization bill, on which the Transportation and Infrastructure Committee is working tirelessly. Since this issue may come up again, I'm interested in knowing how the Department of Transportation proposes to ensure continuity and stability of transportation research during the transition period to implement Secretary LaHood's decision. How do you plan to make sure of that? Additionally, how can you make certain that current research initiatives will not be disrupted as a result of the change?

An important aspect of maximizing return on investment in research and development is identifying and addressing duplicative programs. How does the Department of Transportation identify redundancies? Can you assure us that they will be addressed properly? Since other agencies conducted similar transportation-related research, could you explain how DOT coordinates with other offices to leverage and eliminate duplicative efforts?

Thank you.