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, D.C. 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.[1] 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

[1] *Transportation Research: Value to the Nation – Value to the States*, 2008.

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 US. 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 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 US DOT's mission has been to promote innovation and improvement in American's transportation system. Over the course of the last few decades, this critical mission element has developed into a broad array of research and technology activities covering the spectrum of advanced research, applied research, technology transfer, and implementation. 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 US 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, development and technology transfer activities, including training. This research component of SPR can include highways, public transportation, and intermodal transportation systems; infrastructure renewal (including pavement, structures and asset management); activities relating to safety, operations and maintenance; environmental and real estate planning; and management, policy analysis, and systems monitoring.

The states 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.[2]

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.

[2] Indiana Department of Transportation-Joint Transportation Research Program (Purdue University), 2011

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 5½ percent of its SPR apportionment.

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

Frequently, key research efforts start in one or more states – through the SPR program – and other states and/or US 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 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.

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|---|---|
| Transit Cooperative Research Program | $ 10.5 million |
| National 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 Garrret 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<br>(Technology Deployment) | $153 m | $344m<br>($144 m) | $200M | $175m |
| SHRP 2 | $49m | part of $144m | $50m | $50m |
| Training and Education<br>(LTAP program) | $25m<br>($10m) | $40m<br>($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<br>TCRP<br>NCFRP<br>HMCRP | <br>$10.5m<br>$3.75m<br>$1.25m | | <br>$18m<br>$12m<br>$5m | <br>$10.5m<br>$3.75m<br>$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***

For safety, we know what the goal is – reducing deaths and injuries on our nation's transportation system – but we do not necessarily know how effective we have been in achieving that goal because we don't have 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 in 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 are 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 distribution 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 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.