

A Tour of the Research and Innovative Technology Administration

Implementing Transportation Solutions to Define a New Era

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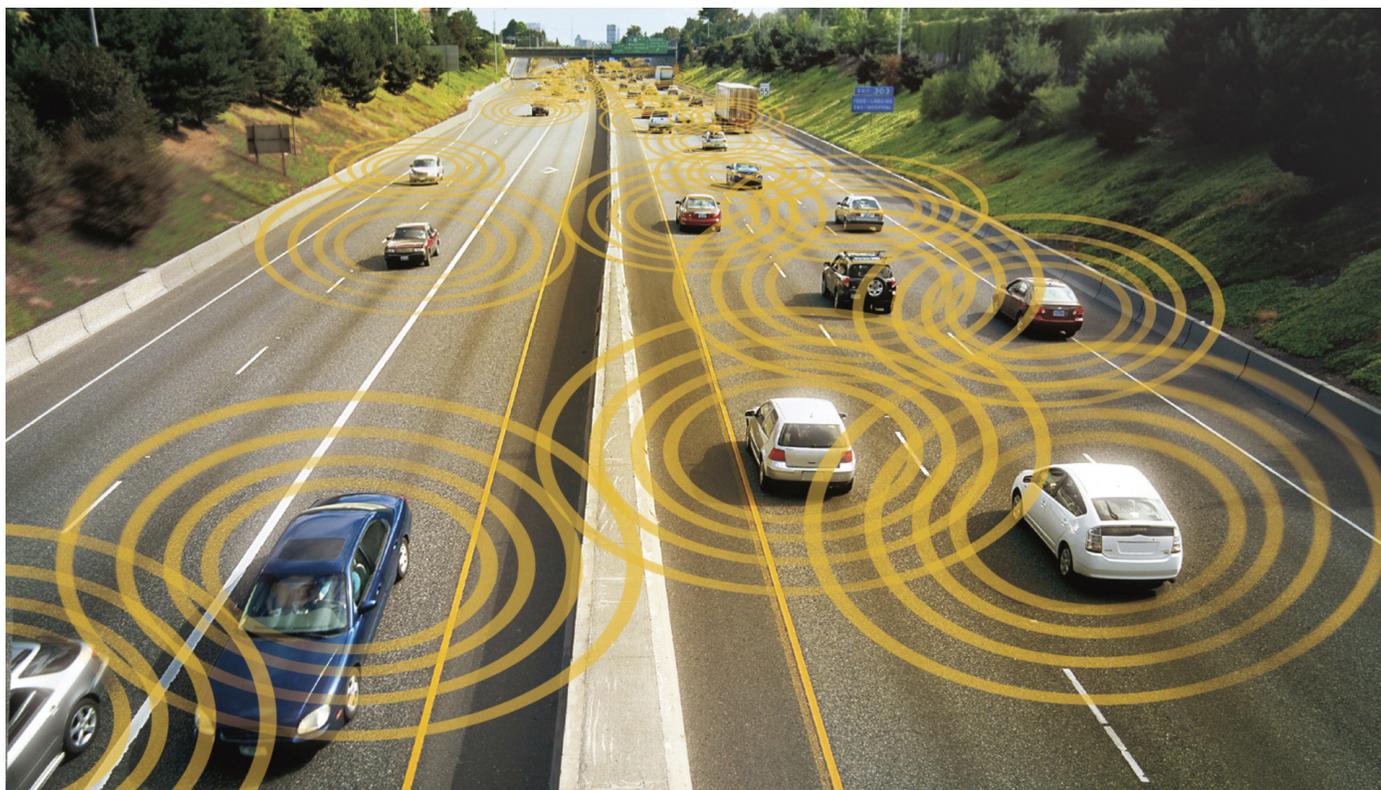


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The author is Administrator, Research and Innovative Technology Administration, Washington, D.C., and an ex officio member of the TRB Executive Committee.

Five years ago, Congress passed the Norman Y. Mineta Research and Special Programs Improvement Act, which created the Research and Innovative Technology Administration (RITA) within the U.S. Department of Transportation (DOT). RITA coordinates the Department's multimodal research and education programs, advances the deployment of cross-modal technologies into the transportation system, supplies comprehensive transportation statistics research and analysis, and supports education and training in transportation and transportation-related fields.

RITA is positioned to help researchers communicate across modes to share research and best practices in support of the nation's transportation goals. The Obama Administration is committed to making policy and investment decisions based on sound

science and rigorous analysis. Secretary of Transportation Raymond H. LaHood has strongly embraced this philosophy and has championed cross-disciplinary, multimodal research and analysis as the foundation for transportation policy making. RITA is working closely with its partners within the U.S. DOT operating administrations to advance the Secretary's priorities: safety, livable communities, environmental sustainability, state of good repair, and economic competitiveness.

(Photo above:) RITA's 5-year ITS Strategic Research Plan focuses on enhancements to the transportation system through technology and connectivity, such as vehicle-to-vehicle systems that allow vehicles to communicate with each other on the road and that have shown the potential to reduce crashes.

Harnessing Resources

RITA is harnessing U.S. DOT resources in a vigilant push for collaborative research and innovative transportation solutions—solutions that will define a new era and transform America's transportation system. The Transportation Research Board (TRB) community is invited to partner in this effort. RITA staff members are involved in a variety of roles at TRB; 53—or 7 percent of the administration's staff—are involved in 93 different TRB activities, including leadership roles on standing committees at the council, group, and section levels; and with the Cooperative Research Programs and the Second Strategic Highway Research Program (see sidebar, below). This level of involvement will continue and will increase.

RITA has made great strides in fulfilling Secretary Mineta's vision. Much more can be accomplished, however, to ensure that RITA effectively addresses the nation's transportation challenges. RITA's mission is crucial in ensuring that U.S. DOT's research investments produce results for the American people.

RITA is structured to bring together important research, technology, and data collection assets within U.S. DOT, including

- ◆ The Bureau of Transportation Statistics (BTS);
- ◆ The Intelligent Transportation Systems (ITS) Joint Program Office;
- ◆ The Office of Positioning, Navigation, and Timing (PNT);

RITA and TRB A Growing Partnership

From the RITA staff, 53 individuals—7 percent of the employees—are involved as volunteers in TRB, filling 93 roles:

- ◆ For the Executive Committee: 1 member;
- ◆ For Technical Activities: 1 council chair, 1 council member, 1 group chair, 2 group executive committee members, 4 section executive committee members, 3 committee chairs, 1 committee vice chair, 4 committee secretaries, 37 committee members, and 4 committee young members;
- ◆ For Cooperative Research Programs panels: 1 with the Airport Cooperative Research Program; 10 with the National Cooperative Freight Research Program (NCFRP); 11 with the National Cooperative Highway Research Program; and 7 with the Transit Cooperative Research Program; and
- ◆ For the Second Strategic Highway Research Program expert task groups: 2 members.

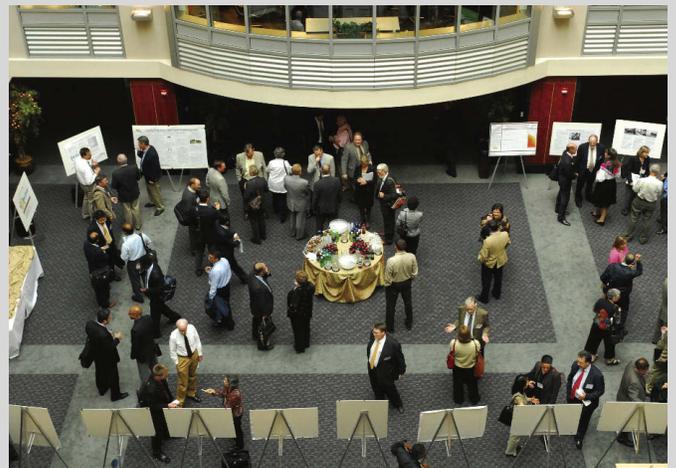
In addition to its sponsorship of NCFRP since 2006, RITA has sponsored the following activities at TRB from 2005 to 2010:

- ◆ Commodity Flow Survey Data Users Conference and Peer Exchange (July 2005);
- ◆ Freight Demand Modeling: A Conference on Improving Tools for Public-Sector Decision Making (cosponsor; September 2006);
- ◆ Meeting Freight Data Challenges Workshop (July 2007);
- ◆ Information Assets to Support Transportation Decision Making Peer Exchange with the AASHTO Standing Committee on Planning (April 2007);
- ◆ University Transportation Centers (UTC) Spotlight Conference on Radio Frequency Identification (October 2006);
- ◆ UTC Spotlight Conference on Research Issues in Freight Transportation: Congestion and System Performance (October 2007);

- ◆ UTC Spotlight Conference on the Impact of Changing Demographics on the Transportation System (October 2008); and
- ◆ UTC Spotlight Conference on Developing a Research Agenda for Transportation Infrastructure Preservation and Renewal (November 2009).

Planning is under way for the following:

- ◆ UTC Spotlight Conference on Transportation Systems for Livable Communities (October 2010);
- ◆ Commodity Flow Survey Workshop (November 2010); and
- ◆ TRB policy study on Strategies for Improved Passenger and Freight Travel Data (cosponsor).



A 2007 conference on Research Issues in Freight Transportation—Congestion and System Performance featured a poster session in the atrium of the National Academies' Keck Center.

- ◆ The Office of Research, Development, and Technology (RD&T);
- ◆ The Transportation Safety Institute (TSI); and
- ◆ The Volpe National Transportation Systems Center.

These programs provide valuable transportation data, research, education, and training for informed policy and decision making; combined, they allow U.S. DOT and RITA to become more than the sum of their parts.

Bureau of Transportation Statistics

Decision makers need data, information, and analyses to develop relevant and valuable transportation policies and programs for the nation. Data are at the heart of critical decisions that affect the American way of life. Comprehensive transportation data play a crucial role, from tracking the airline industry's efforts to reduce flight delays to analyzing the movement of passengers and freight across the country.

BTS provides key insights into the interconnections of the transportation system with the U.S. economy and livelihood. BTS collaborates with U.S. DOT modal administrations and with other agencies, such as the Census Bureau, to offer products and services essential to the transportation community.

Tools for Decision Makers

BTS also provides lawmakers with a lens into the dynamics of America's transportation networks, revealing how people, goods, and vehicles move through the system, as well as measuring the impact of social, economic, and environmental factors on system performance. Through the Transportation Statistics Annual Report and the National Transportation Atlas Database, BTS supports national efforts to improve the transportation system. BTS airline data—such as reports on flight delays or air traffic trends—supply tools for policy makers, the airline industry, and consumers evaluating the safety and performance of the aviation industry.

The Commodity Flow Survey (CFS) is a crucial tool for evaluating freight movement across the nation's ports, railways, roads, and airways. The volume of goods—including hazardous materials shipments—that flows across U.S. transportation networks is ever increasing; decision makers require robust, high-quality data to evaluate the safety, security, and performance of these flows.

BTS assembles economic indices to measure the trends in the U.S. economy; the Transportation Services Index, for example, synthesizes data on passengers, vehicles, and goods moving across the transportation system. As the nation's commerce



grows and transcends borders, comprehensive data about international freight traffic and its movement across borders and through the transportation system become essential. The BTS Transborder and Border Crossing data provide measures of these trade elements.

To reach their full potential, however, BTS data must match up with the emerging needs of decision makers. To improve its data products and services and position them to meet user needs, BTS continuously engages stakeholders and customers through a variety of outreaches. BTS works closely with TRB on several of these efforts, such as the CFS data users workshop scheduled for November 2010, the National Research Council-appointed Committee on Strategies for Improved Passenger and Freight Travel Data, and the North American Transportation Statistics Interchange.

The North American Transportation Statistics Data Interchange in June 2009 brought together representatives from Mexico, the United States, and Canada to share data.

Freight trucks at the primary inspection line at the United States–Canada border. BTS assembles and analyzes key data about the movement of freight across U.S. borders.



PHOTO: CANADA BORDER SERVICES AGENCY

Information Platform

BTS employs a variety of communication methods to connect customers to the most recent transportation statistics. The National Transportation Library, the BTS website, and a Twitter network disseminate statistical information.¹ BTS also sponsors the Advisory Council on Transportation Statistics, which examines the quality, consistency, objectivity, and relevance of the agency's statistics and analyses.

The National Transportation Library serves as a platform for organizing critical transportation information and for ensuring that stakeholders, the public, and other consumers have access to relevant resources. As a national transportation knowledge warehouse, the library maintains extensive digital and print collections—all available through its website—and supports many of the federal government's most complex data and statistical projects.

To ensure that BTS is best aligned with stakeholder needs, however, more proactive outreach to customers is needed. BTS is redoubling its efforts to request and to listen to feedback from its customers to improve products and to develop new ones to meet the needs of the transportation community. These listening sessions and other outreaches will be critical to position BTS to support complex transportation decision making.

Intelligent Transportation Systems Joint Program Office

In 2008, more than 37,000 Americans lost their lives, and another 2.3 million were injured in vehicle crashes on America's highways. Additional fatalities and injuries occurred across the other modes of transportation. Vehicle crashes remain the leading cause of death among persons 4 to 34 years old. Yet efforts to reduce roadway fatalities and injuries face an emerging challenge that Secretary LaHood has vowed to fight—driver distraction.

Advancing Safety Technology

Advances in safety technology—particularly for crash avoidance—show promise in contributing to unprecedented safety on the roads, on the rails, in fleets, in the air, in pipelines, and on the waterways. The ITS program, managed by RITA and with partners across U.S. DOT, in academia, and in the international transportation community, is pioneering research and development into systems that can achieve once-unimaginable safety benefits across all modes of transportation. The ITS program also focuses on the benefits of technology for mobility

¹ See sidebar, page 11, for a list of RITA websites that offer additional information about these and other initiatives described in this article.



PHOTO: MICHAEL CHAPMAN, UCAR

A prototype of IntelliDriveSM, a multimodal initiative to enable vehicles to communicate wirelessly with each other and with transportation infrastructure, was tested in Detroit, Michigan, in 2009. The onboard equipment collects, stores, and transmits weather data—future equipment will be smaller and integrated into the car design, instead of taking up trunk space.

and for the environment.

U.S. DOT has a legacy of cooperative research with major automobile companies, producing innovative safety advances. Although improved safety features in vehicles have made it possible for people to survive crashes that once were considered fatal, the ITS program is now advancing vehicle, transportation management, and roadway applications that move beyond mitigating crash severity to preventing crashes.

ITS technologies and applications that capture real-time data about weather and road conditions, traffic patterns, and other elements critical to safe and efficient transportation management will change how operators and users approach travel. State and local transportation agencies will have a new arsenal of cost-effective traffic management tools to ease gridlock and improve the quality of life in their communities.

Strategic Research Plan

Released in January 2010, the 5-year *ITS Strategic Research Plan, 2010–2014* outlines a comprehensive vision that builds on progress made and that positions the program for continued progress. The theme of the plan is Transforming the Nation's Transportation System Through Connectivity. The connectivity that defines the information age will have a similar impact on travel; harnessing this technology will benefit all Americans. Crafted with extensive input from stakeholders across the transportation enterprise, the plan moves beyond research, development, and demonstration to lay the groundwork for the deployment and integration of ITS in the United States.

At the core of this research plan is IntelliDriveSM, a multimodal initiative to enable vehicles to communicate wirelessly with each other and with transportation

infrastructure to alert drivers to—and to help prevent—potential crashes and to provide other safety, mobility, and environmental enhancements. Specifically, vehicle-to-vehicle (V2V) systems that enable vehicles to communicate with each other on the road have shown the potential to prevent up to 82 percent of the most severe vehicle crashes. V2V will create an awareness-driven environment for drivers.

V2V systems can alert drivers safely and reliably to imminent dangers on the road, such as sudden traffic stops ahead or a car in the blind spot during a lane change. The research will determine how to deliver warnings effectively to vehicle operators to enhance safety and to minimize driver distraction.

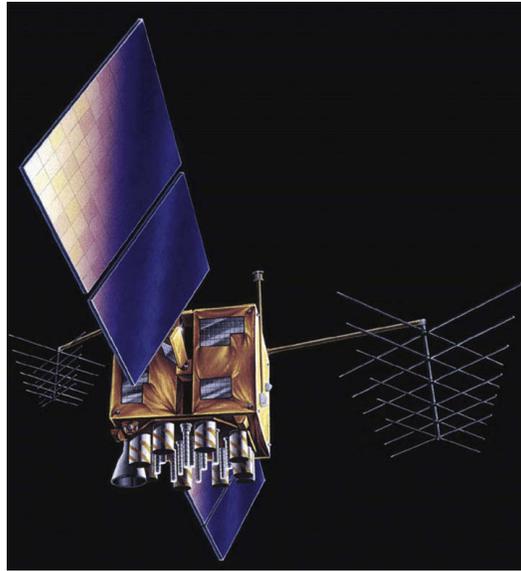
The plan focuses on proven technologies and accommodates developments that may support or improve on current research and development. Dedicated Short-Range Communications (DSRC) was established to underwrite time-critical safety applications like V2V; the plan ensures that DSRC remains the core technology. By answering the remaining questions for the program, the planned research will act as a catalyst for the implementation of IntelliDrive by enabling deployment.

The ITS strategic plan also provides state and municipal agencies with tools and applications to enhance the management and performance of the transportation system and to use their resources most efficiently. The 5-year program supports technology transfer and the development of the knowledge and skills of ITS professionals across the country. The plan envisions a transportation future that will be safer, greener, and more mobile.

Office of Positioning, Navigation, and Timing

All modes of transportation rely on the Global Positioning System (GPS) and its augmentations and on other PNT capabilities to provide safe and reliable operation of transportation systems. Increasingly, the use of the precise time available via GPS is supporting communication systems, finance and banking, freight logistics, and energy and other critical infrastructure systems on which shippers and carriers rely. RITA's Office of PNT ensures that all civil-sector users—not just those in transportation—are represented in technical and policy discussions about GPS and PNT across and outside the federal government.

PNT is crucial for planning and tracking shipments and for mapping routes; it is integral to the future of American transportation. For example, ITS safety applications will require reliable and accurate navigation to support vehicle crash avoidance and other safety features of IntelliDrive. In addition, FAA's Next-Generation Air Transportation System will rely



Global Positioning System (GPS) satellites are providing an expanding range of data for transportation systems; the Office of Positioning, Navigation, and Timing (PNT) conducts all-inclusive technical and policy discussions about GPS and PNT applications.

on GPS to support performance-based navigation, as well as aircraft surveillance, to improve safety in all flight phases, reduce airspace and airport congestion and environmental impacts, reduce weather impacts, and expand airspace capacity and improve the management of air traffic flow through Collaborative Air Traffic Management.

RITA leads the National PNT Architecture effort in cooperation with the Department of Defense, looking to 2025 and beyond to provide more efficient and effective PNT technologies and to overcome capability gaps, such as physically and electromagnetically impeded environments that hamper GPS.

Office of Research, Development, and Technology

RITA's mission involves transforming the ideal of coordinated, multimodal, and synergized transportation research and education into a reality. U.S. DOT's modal administrations traditionally have engaged in research that has led to historic advances.

RITA Administrator Peter Appel and U.S. Transportation Secretary Ray LaHood confer during the U.S. DOT's Distracted Driving Summit in 2009.





The National Cooperative Freight Research Program (NCFRP) Oversight Committee met to discuss upcoming projects in October 2009. NCFRP is a collaborative initiative of RITA and TRB.

Although much of the focus of this research reflects the agencies' missions, opportunities arise to find synergies across the programs.

Secretary LaHood's effort to confront the issue of distracted driving represents an excellent example. Distracted driving affects every mode of transportation—cars, trucks, buses, transit, trains, maritime vessels, and aircraft. When the Secretary convened the Distracted Driving Summit in 2009, RITA worked collaboratively with its modal partners to bring together the best thinking on the topic for each mode. The intent was, for example, to leverage research on aircraft pilot distraction to address emerging issues for drivers of other vehicles, or to leverage research by the National Highway Traffic Safety Administration to address issues confronting the railroad industry.

RITA is positioned not only to facilitate, support, and institutionalize the coordination of research between agencies or between a modal administration and a stakeholder, but also to facilitate communication and awareness that can identify synergies across research and among people to implement a technology.

Information Exchange

RITA seeks specific areas of common ground within scientific disciplines or research clusters—such as human factors—and identifies common pursuits, research issues, and technology products that can be leveraged across modes and research projects. Initiatives that expand across modal boundaries support U.S. DOT priorities and foster technological advances in the interconnected transportation system. Secretary LaHood has created an environment that facilitates communication among researchers in the department and across the transportation com-

munity through such forums as the Distracted Driving Summit, the U.S. DOT Safety Council, and the ITS Management Council.

RITA's Office of RD&T embraces this commitment to maintaining dialogues between stakeholders. The RD&T Planning Team comprises research leaders from each agency and outlines avenues for coordination and collaboration; the RD&T Planning Council, composed of the modal administrators, sets RD&T policy and priorities.

The RD&T office coordinates an information exchange to optimize the U.S. DOT's more than \$1 billion annual investment in transportation research, recognizing that the benefits of research do not accrue unless the results are implemented. The office also works to advance transportation technology by providing cross-modal research, analysis, and operational support; managing multimodal research programs; and advising U.S. DOT leadership on cross-modal research.

Sampler of Initiatives

Initiatives include the following:

- ◆ Sponsored by RITA and managed by TRB, the National Cooperative Freight Research Program carries out applied research on freight issues.
- ◆ The virtual Climate Change Center, an online, interactive knowledge base on transportation and climate change, includes information on greenhouse gas emissions, the potential impacts of climate change on the infrastructure, approaches for integrating climate change considerations into transportation decision making, and ideas for adaptation and mitigation.
- ◆ The Remote Sensing and Spatial Information Technologies Program leverages existing and emerging remote sensing and spatial information technologies and technology applications—such as satellite-based GPS and topographic technologies—



The Climate Change Center (www.climate.dot.gov) is an interactive online knowledge base on transportation and climate change.

to address multimodal issues through a university-based grant program.

◆ General and multimodal research is under way on alternative fuels, and technical support is being provided for RITA's leadership in hydrogen and alternative fuels research and development. RITA represents U.S. DOT on the Interagency Working Group on Hydrogen and Fuel Cells, which is facilitating the safe transport, delivery, and storage of alternative fuels.

Education and Training

Within the Office of RD&T, the University Transportation Centers (UTC) program funds transportation research at 136 colleges and universities and provides the education and training needed to advance the nation's transportation system. The research and education programs address critical national transportation challenges while developing the next generation of transportation professionals.

The UTCs focus on transportation issues aligned with U.S. DOT priorities and maintain vital partnerships with regional, state, and local transportation and transit agencies, to help find solutions to challenges affecting their communities. The projects are peer-reviewed, and the results are shared with the transportation community through the Transportation Research Information Services—housed on the TRB website²—and through other forums that encourage collaboration. UTC colleges and univer-

² <http://tris.trb.org/>.



sities trained 32,000 practicing transportation professionals in 2009.

The development of the U.S. transportation workforce is a priority for U.S. DOT, RITA, and the UTC program. In an initiative led by RITA Deputy Administrator Robert Bertini, the UTC program is partnering with internal and external stakeholders on a transportation workforce development program to ensure that the workforce of the future can address changing technologies, emerging environmental challenges, safety issues, and other evolving trends in the transportation enterprise.

The RD&T office recently began the development

RITA sponsors general and multimodal research on hydrogen and alternative fuels.

PEOPLE IN TRANSPORTATION

Peter H. Appel, RITA Administrator

Confirmed by the U.S. Senate as Administrator of the Research and Innovative Technology Administration (RITA) in April 2009, Peter H. Appel has worked with Secretary Raymond H. LaHood to advance key U.S. Department of Transportation (DOT) initiatives by leveraging effective research and cross-modal coordination. These initiatives include the Distracted Driving Summit, which convened key transportation researchers, advocates, decision makers, and other leaders to address a growing safety issue; the bolstering of the U.S. DOT Intelligent Transportation Systems Program to improve safety, efficiency, and environmental sustainability across all modes of surface transportation; and the establishment of the U.S. DOT Safety Council, convening all 10 modal administrators.



Appel

Before joining RITA, Appel worked with A. T. Kearney, Inc., a global management consulting firm, heading up business improvement initiatives for clients in the private and public sectors, with a focus on transportation and infrastructure. Appel has more than 20 years of experience in transportation and has supported organizations in the railroad, trucking, airline, and ocean shipping industries in growth strategy, supply chain improvement, postmerger integration, public-private partnerships, and other business and policy assignments.

He previously served as the Special Assistant to the Administrator of the Federal Aviation Administration and as Assistant Director for Pricing and Yield Management at Amtrak. Appel earned a bachelor's degree in economics and computer science with highest honors from Brandeis University and a master of science degree in transportation from Massachusetts Institute of Technology.



PHOTO: UNIVERSITY RELATIONS, UNIVERSITY OF ALABAMA

Jay Lindly, professor, and student researcher Zachery White investigate pupil seating patterns on school buses, under a 3-year pilot project at the University Transportation Center for Alabama, Tuscaloosa, to assess the efficacy of lap and shoulder seat belts.

of a strategic plan and has reached out across modes and to stakeholders to invite participation, input, and involvement.

Transportation Safety Institute

Located in Oklahoma City, TSI conducts worldwide safety, security, and environmental training for the public and private sectors across transportation disciplines, with transit, aviation, pipeline, motor carrier, highway safety, hazardous material, and risk management training sessions. The program supports the protection of life, property, and the environment across all modes. TSI differs from most federal organizations in that it receives no direct appropriation from Congress. Its entire funding comes through a fee-for-service structure—all costs are covered by sponsored project work.

Drawing on U.S. DOT and other sources, TSI has assembled a cadre of instructors with robust, multi-

The Transportation Safety Institute, Oklahoma City, maintains a plane crash "boneyard" that serves as a hands-on laboratory in training.



disciplinary expertise. The more than 700 innovative courses and seminars presented at the state-of-the-art facilities prepare safety professionals to handle emergencies and other critical incidents through a hands-on, real-world training experience. For example, aircraft crash investigation classes use staged debris fields, and another class presents a simulated scenario of a city bus hijacked by terrorists.

TSI has trained more than 750,000 transportation safety professionals since its inception in 1971; in 2009, class enrollments totaled more than 35,000. Each year, TSI trains more than 1,000 Department of Defense personnel, as well as 8,000 highway, enforcement, and motor carrier personnel in the safe transport and handling of hazardous materials.

TSI also trains officials from safety entities, such as the National Transportation Safety Board, in the skills needed to conduct investigations of aviation, transit, and rail crashes. TSI offers a variety of selected accident samples, including aircraft wreckage and parts, as well as a large, open-bay laboratory building for accident investigation exercises involving large wreckage, accident scene layout, and other hands-on activities for specialized training.

More than 85 percent of TSI courses are held off-site, and web-based training and other cost-effective approaches are offered, including a new Internet certification course for motor carrier safety. RITA will continue to work with transportation stakeholders to identify emerging workforce development needs for TSI to address and to incorporate innovative educational techniques and training technology into the courses.

John A. Volpe National Transportation Systems Center

RITA's John A. Volpe National Transportation Systems Center in Cambridge, Massachusetts, partners with stakeholders across government and the private sector to engage in research into emerging transportation issues and to develop solutions that meet the challenges of a rapidly changing world. Celebrating its 40th anniversary this year, the Volpe Center is organized into eight cross-modal Centers of Innovation, each focused on key issues. Each Center of Innovation is modeled for cross-modal collaboration and has the capabilities and expertise to support the priorities established by President Obama and Secretary LaHood.

Like TSI, the Volpe Center is funded through a fee-for-service structure—all costs are covered by sponsored project work. Volpe has more than 500 employees—including many leading experts in fields across transportation research and systems—with 75 sponsors for 400 projects. Strategic priorities include

high-speed rail, distracted driving, and next-generation air traffic control systems.

Volpe has established itself as a Center of Excellence in the transportation community; it recently received the Regional Laboratory Award, recognizing its national and regional technology transfer activities; and the Innovations in American Government Award for the development of the Maritime Safety and Security Information System (MSSIS). Created in partnership with the U.S. Navy, MSSIS is a web-based platform that provides a near real-time view of maritime vessel activity worldwide, enhancing surveillance and management and eliminating costly shipboard inspections and flyover surveillance.

The system has proved critical in strengthening global sea safety—reducing piracy, human trafficking, and contraband smuggling. Called a “wiki on the waves,” the program fosters an unparalleled level of cooperation among participating nations, which have partnered to enforce environmental and safety regulations, to prevent oil spills, and to reduce port congestion and collisions.

The Volpe Center is collaborating with U.S. DOT leadership on two priorities—environmental sustainability and livable communities. The Volpe Center is supporting U.S. DOT efforts to provide affordable housing and transit and to improve inter-agency collaboration on these issues, building on work with metropolitan planning organizations on quality-of-life issues, including transportation, jobs, and education. The work supports U.S. DOT efforts to ensure that livability and environmental sustainability are integral to transportation decision making.

Volpe’s newly appointed Director, Robert C. Johns, has more than 20 years of experience leading transportation research organizations and has played a leadership role within TRB, currently as chair of the TRB Technical Activities Council—he is well pre-



pared to build on the Center’s successes. Johns is committed to a new emphasis on workforce development at Volpe and will continue to strengthen ties to TRB and to the UTC communities by exploring partnership opportunities.

Moving Forward

These six components of RITA—some that have existed for decades, others that have emerged in the past few years—are positioned to work in coordination with each other and with stakeholders across U.S. DOT and the transportation community to address emerging challenges. The nation’s transportation challenges are increasingly difficult, and in an era of constrained resources and rapidly changing technology, RITA looks forward to collaborating with the TRB community to make the best and most integrated use of research, data, and education to confront these challenges.

A laboratory simulator is used to conduct research on locomotive cab technology integration at the Volpe Center.

Volpe Center Director Robert C. Johns conducts a meeting of the TRB Technical Activities Council, which he chairs.



Selected RITA Websites

- ◆ Bureau of Transportation Statistics, www.bts.gov
- ◆ Bureau of Transportation Statistics on Twitter, twitter.com/TransportStats
- ◆ Climate Change Center, www.climate.dot.gov
- ◆ Intelligent Transportation Systems, www.its.dot.gov
- ◆ *ITS Strategic Research Plan, 2010–2014*, www.its.dot.gov/strat_plan/strategic_plan2010_2014/
- ◆ John A. Volpe National Transportation Systems Center, www.volpe.dot.gov
- ◆ National Positioning, Navigation, and Timing Architecture, http://pnt.rita.dot.gov/major_initiatives/national_pnt_architecture.html
- ◆ National Transportation Library, www.ntl.bts.gov
- ◆ Research, Development and Technology Office, www.rita.dot.gov/ordt
- ◆ Research and Innovative Technology Administration, www.rita.dot.gov/
- ◆ Transportation Safety Institute, www.tsi.dot.gov
- ◆ University Transportation Centers, www.utc.dot.gov