Meet Volpe

The National Transportation Systems Center

Advancing Transportation Innovation for the Public Good

U.S. Department of Transportation
John A. Volpe National Transportation Systems Center

Letter from the Director

Robert C. Johns

Director

Volpe, The National Transportation Systems Center

As I reflect on my years as Volpe director since 2009, I continue to be proud of Volpe's role and accomplishments in working to advance transportation innovation for the public good. Despite the uncertain state of transportation funding, our multimodal portfolio of projects has stayed strong and so has our organization, through increasing levels of collaboration and successful efforts to improve our efficiency.

Our wake turbulence research was recently recognized as a catalyst for increasing capacity at a number of the busiest U.S. airports. Our highway-rail grade crossing research has fueled a nearly 80 percent reduction in the number of deaths and injuries at grade crossings. Our intelligent transportation systems research is providing key knowledge to guide implementation of life-saving vehicle-to-vehicle communications systems. Our Marine Safety and Security Information System, operating in more than 70 nations, is improving maritime safety and economic stability worldwide. And our modeling and analysis has supported rulemaking that will significantly raise the nation's corporate average fuel economy.

We have been working closely with the Office of the Secretary of Transportation to support a number of its priority programs, like the DOT Safety Council, Secretary Anthony Foxx's 30-year transportation vision, national freight initiatives, and international outreach to nations to strengthen their transportation systems. We have also initiated major new programs for our sponsors, such as high-speed rail development oversight and technical assistance, technology transfer activities for the second Strategic Highway Research Program, and the modernization of national safety data systems.

We have strengthened our technical capabilities through robust relationships with customers and stakeholders using our newly established Volpe Partners Forum and our recently completed customer satisfaction assessment. Our technical directors held face-to-face interviews with nearly 60 senior-level sponsors over the summer of 2014 to capture invaluable feedback that is helping us improve our communications with sponsors and identify skill development priorities for our staff. Furthermore, our efforts to increase efficiency have resulted in an 11 percent reduction of our project overhead rate.

Internally, we have implemented 18 initiatives that we identified in our 2010–2011 strategic plan and have engaged in a new round of strategic planning for 2014–2015. Our results include making Volpe work and products more visible with the release of a new website, a monthly newsletter, and a speaker and webinar series on emerging transportation issues. We have also strengthened internal relationships and knowledge sharing through an annual internal conference and an annual Innovation Challenge.

The following pages describe some of our current efforts to improve the transportation system. They are an exciting blend of diverse projects that help address DOT strategic goals and advance transportation systems for all of our sponsors. I know of no other organization that can contribute our breadth of talent in advancing transportation innovation. Through these pages—and through interactions with our staff—I invite you to meet Volpe and learn more about who we are and what we do.

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Public Service. Innovative Solutions.

Professional Excellence. Collaboration and Partnering.

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Powered by transportation thought leaders, driven by tough challenges, dedicated to making a better transportation system, and committed to the public good.

Meet Volpe

Volpe has been helping the transportation community navigate the most challenging problems for more than 40 years. As the National Transportation Systems Center, our mission is to improve the transportation system by anticipating emerging issues and advancing technical, operational, and institutional innovations.

Part of the U.S. Department of Transportation, Volpe is a unique federal agency that is 100 percent funded by sponsor projects. We partner with public and private organizations to assess the needs of the transportation community, evaluate research and development endeavors, assist in the deployment of state-of-the-art transportation technologies, and inform decision and policy making through our comprehensive analyses.

Home to renowned multidisciplinary expertise in all modes of transportation, we serve our sponsors with advanced technologies, research, and programs to ensure a fast, safe, efficient, accessible, and convenient transportation system that enhances the quality of life for the traveling public, today and into the future.

Multimodal, Cross-Disciplinary Expertise

Volpe's research, technical, and program professionals help sponsors thrive by applying best practices culled from more than 40 years of solving problems for multiple modes. We undertake new research to address emerging issues and advance innovation in transportation.

When we sit at our sponsors' planning tables, our technical, policy, and research experts listen and propose the most effective ways to meet their needs. We match their needs with a multi-disciplinary team that internalizes their missions.

Our multimodal experience enables us to consider unique approaches and champion ideas that make our sponsors' processes more efficient, their work more effective, and their solutions more fully realized.

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Measuring Aviation's Environmental Footprint

The Aviation Environmental Design Tool (AEDT) is used to model aviation-related noise, emissions, and fuel burn at local, national, and global levels. Developed by Volpe for the Federal Aviation Administration (FAA) and initially released in 2012, AEDT has helped the industry understand the effects of aircraft weight, performance characteristics, and weather conditions on resulting noise, air quality, greenhouse gas emissions, and fuel burn. AEDT is helping government, industry, and academia make important decisions about flight routing and runways. This tool has the potential to serve as the basis for environmental assessment across the transportation enterprise.

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The Relentless Pursuit of Safety

Our multimodal safety management expertise enables us to leverage proven practices from one mode to improve safety in others. Multidisciplinary teams supporting the Compliance, Safety, Accountability program for motor carriers, the new Safety Assurance System for aviation, and the Confidential Close Call Reporting System for rail help sponsors be innovative in their approaches to reducing deaths, injuries, and property damage caused by incidents. Volpe helps design, develop, and support many tools and methodologies used by DOT modal administrations to provide oversight of transportation operations. Whether we are developing an IT system for inspectors, creating a methodology to identify risk, or developing insights from analysis of inspection and crash data, we are relentless in our effort to help DOT achieve its primary goal: transportation safety.

Scenario Planning Helps Regions Address Climate Change and Growth

Planning for a rapidly growing region like Central New Mexico means addressing congestion, energy consumption, vehicle use, and water scarcity—all of which can be exacerbated by climate change. Volpe is using scenario planning to facilitate stakeholder dialog about ways to manage these intertwined challenges. This work is helping the Central New Mexico region assess the impacts of growth, evaluate the costs and benefits of various approaches to transportation and land use, and identify strategies to reduce carbon pollution.

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Transportation Planning at National Parks Improves Visitor Experience

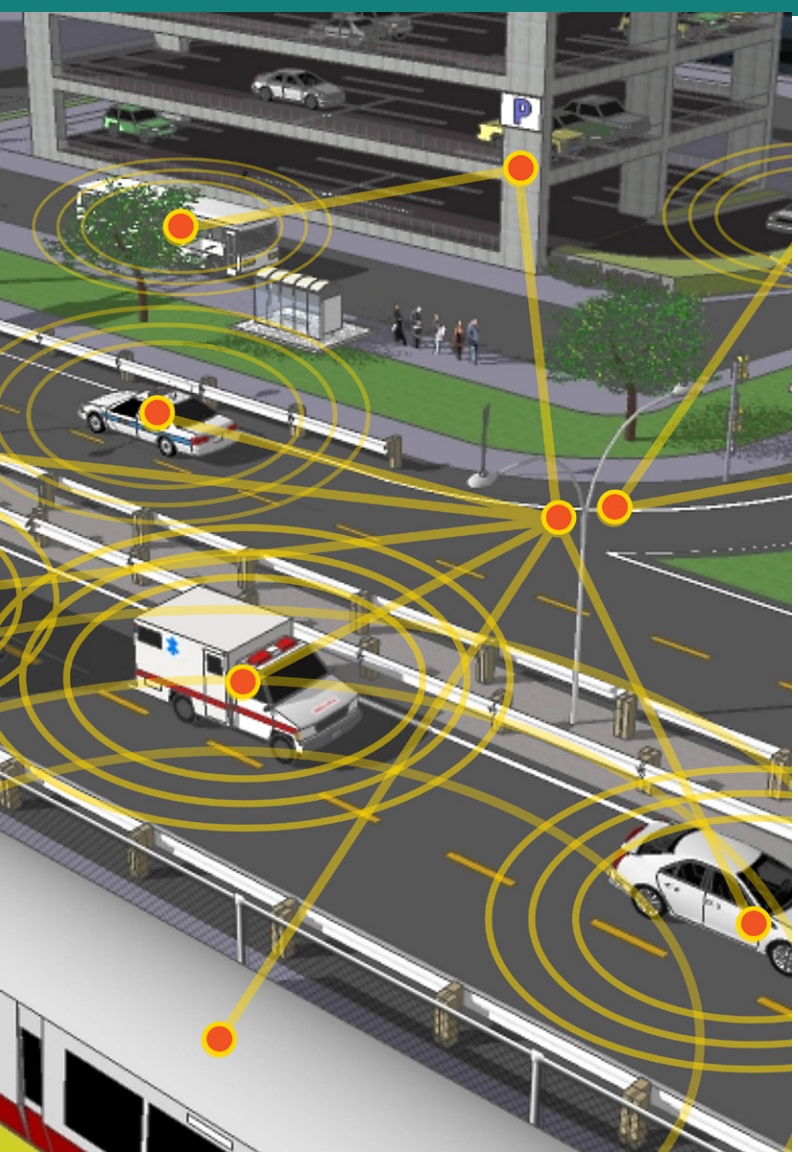
For over 15 years, Volpe has partnered with the Federal Highway Administration (FHWA) and federal land management agencies to develop transportation programs and solutions that improve visitors' experiences and mitigate environmental impacts on public lands. Each project draws from the expertise of Volpe's diverse team of engineers, planners, economists, and policy analysts. Volpe provides federal land managers with the knowledge to make informed decisions, whether it is the introduction of shuttle bus services or alternative fuel vehicles, enhanced bicycling and pedestrian routes, or relocated parking facilities or visitor entrances.

Transformative Solutions

Volpe is a proven leader in global transportation systems research and applications. We have responded to significant transportation challenges, including the need to modernize air-traffic management systems, address critical multimodal safety issues, guide implementation of connected vehicle technologies, meet energy and environmental challenges, and strengthen global maritime domain awareness.

Volpe has successfully contributed to major programs such as the following:

- Federal Railroad Administration's (FRA) highway-rail grade crossing safety effort
- Federal Motor Carrier Safety Administration's (FMCSA) Compliance, Safety, Accountability (CSA) program
- National Highway Traffic Safety Administration's (NHTSA) Corporate Average Fuel Economy (CAFE) standards



Reducing Vehicle Crashes—At the Nexus of Policy and Technology

Through engineering prowess and policy analysis expertise, Volpe is helping DOT agencies reduce motor vehicle crashes that result in deaths, injuries, and property damage. Volpe designs and conducts experiments and analyzes naturalistic driving data to evaluate how drivers respond to crash-avoidance systems.

Results of Volpe's work inform rulemaking, federal guidelines, and investment decisions on crash-avoidance technologies, such as those based on emerging vehicle-to-vehicle communications. Volpe's analysts examine effective policy options relating to crash-avoidance technologies and evaluate alternatives for policy makers and decision makers.

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Advancing Safety at Highway-Rail Grade Crossings

More than 95 percent of all fatalities and injuries on the national railroad system are caused by accidents at grade crossings and by trains striking trespassers. Decades of FRA-funded research—much of it conducted by Volpe—have been devoted to addressing this problem, resulting in a nearly 80 percent drop in injuries and fatalities at highway-rail grade crossings over the past 36 years. Volpe researchers study the root causes of incidents, assess and engineer leading-edge technologies, identify corrective actions and countermeasures, pioneer relationships with communities and industry, create and deploy solutions, and help FRA develop rail safety standards. Volpe has published more than 70 papers and reports on grade crossing safety and trespass prevention, making key research widely available to help stakeholders eliminate risks and save lives.

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VOLPE AWARDS

Best Paper Awards

"An Evaluation of Several Stall Models for Commercial Transport Training"
– ***Judith S. Bürki-Cohen***
American Institute of Aeronautics and Astronautics Modeling and Simulation Technologies Conference (June 2014)

"Potential Countermeasures to Mitigate Suicides on the Railroad Rights of Way"
– ***Scott Gabree***
Global Level Crossing Safety and Trespass Prevention Symposium (August 2014)

"A New Approach to Monitoring and Alerting Congestion in Airspace Sectors"
– ***Eugene Gilbo and Scott Smith***
Air Traffic Control Association's 59th Annual Conference (October 2014)

Transformative Solutions

Volpe also assists small businesses in accelerating commercialization of their innovations.

Accelerating Small Business Innovation

For over 30 years, Volpe has administered the U.S. DOT Small Business Innovation Research Program (SBIR), a competitive program aimed at developing technological innovation from the small business community. Volpe administers the program and conducts outreach to small businesses. Volpe also assists small businesses in accelerating commercialization of their innovations. Recent innovations include tools for assessing rail track condition and detecting corrosion and other damage in pipelines. The program is also supporting the use of solar-powered road panels as part of the Solar Roadways Phase II research project.

Crush Zone Research: Making Rail Travel Safer for Passengers

Protecting passengers in the event of a collision or derailment is an ongoing area of investment for FRA. FRA relies on Volpe engineers to improve its understanding of the factors involved in passenger protection and impact absorption, focusing on the type of structural modifications that can prevent rail cars from crushing. Volpe experts have investigated severe passenger-train accidents, staged impact tests, analyzed car-crush zones, and studied train and occupant dynamics to improve accident survivability. Volpe's crashworthiness research is being applied to FRA regulations and new industry standards.

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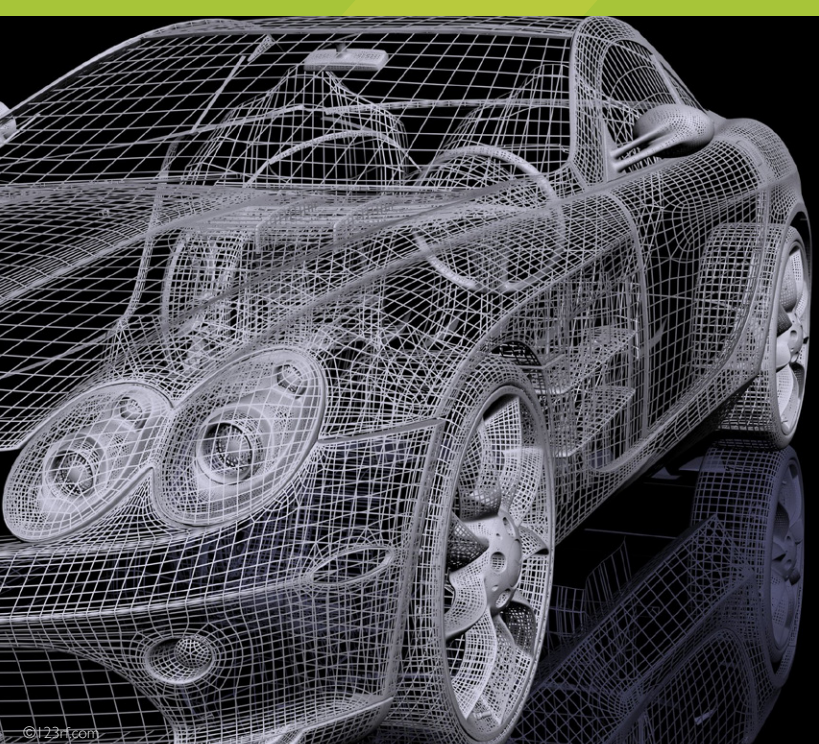
Transforming the National Airspace

FAA tapped into Volpe's expertise in program management and system engineering to help create a highly accurate and reliable system for tracking aircraft, called Automatic Dependent Surveillance-Broadcast (ADS-B). ADS-B-equipped planes broadcast their locations to ground stations and surrounding planes using global positioning systems in lieu of en-route radar. ADS-B is a critical component of FAA's Next Generation Air Transportation System (NextGen). NextGen is increasing airspace capacity, decreasing congestion, improving safety, and mitigating environmental impacts. Based on decades of proven experience with aviation systems, FAA looks to Volpe for help in developing, testing, and managing the deployment of NextGen.

Entrepreneurial, Objective, Efficient

Volpe is a unique federal agency because it is 100 percent funded by sponsor projects. We receive no direct appropriations from Congress, ensuring that we are efficient in our work, agile in our approach, and entrepreneurial in our nature. **Working with Volpe offers the accessibility and collaboration of an in-house resource with the flexibility and responsiveness of a consultant.**



As a vital partner and objective advisor that is fully fluent in federal practices and protocols, Volpe often serves as an extension of staff. We internalize sponsors' goals to deliver technologies and systems that support the global transportation mission.

Volpe serves agency and public interest with a highly educated and creative team.

Researching the Impacts of Congestion Pricing

In addition to raising revenues for maintenance and improvements, congestion pricing schemes significantly impact everyday travelers, particularly on stretches of road that were once toll-less. Volpe's experts in travel survey methods conducted before-and-after household travel surveys to assess congestion pricing efforts on Interstate 85 in Atlanta and on the SR-520 bridge in Seattle. These surveys capture a dynamic picture of how congestion pricing shapes travel choices for households and how these impacts vary across income levels.

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SafetyHAT: A Technology Transfer Success Story

Volpe developed a new, publicly available software tool to assist transportation professionals in conducting hazard analyses. The Safety Hazard Analysis Tool (SafetyHAT) is software that facilitates System Theoretic Process Analysis (STPA), a hazard identification method based on a top-down system engineering approach and control systems theory. It provides a guided analysis process that identifies the causes of system hazards, including hardware component failures, software errors, complex system interactions, human errors, and inadequate organization management, policy, and procedures. SafetyHAT received the Federal Lab Consortium's 2014 Excellence in Technology Transfer Award for the northeast region.

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Applying SHRP2 Solutions to Transportation Challenges

Volpe supports FHWA as it deploys more than 65 innovations developed by the second Strategic Highway Research Program (SHRP2)—including software, guidelines, decision-making protocols, and other technologies—that improve how transportation professionals plan, operate, preserve, and maintain safety on America's roadways. Volpe developed and executed an outreach strategy to foster the rapid implementation of these products and helped identify options for long-term stewardship and ownership of the 2 petabytes of data collected as part of SHRP2's naturalistic driving study. Volpe also conducts implementation analysis and planning activities, including organizing stakeholder workshops.

Saving Lives with Side Guards

Side guards are panels installed below trucks to prevent bicyclists, pedestrians, and motorcyclists from being swept underneath and killed. Passionate about safety, Volpe independently researched the impact of side guards in Europe. Its findings: After this technology became required on most heavy-duty vehicles in the United Kingdom, there was a 61 percent drop in fatalities for bicyclists and a 20 percent drop in fatalities for pedestrians who collided with the side of a truck. Volpe broadcast this research in an effort to make truck fleets safer. Communities responded with interest, including New York City, where collisions with trucks, which comprise less than 4 percent of vehicles, account for 12.3 percent of pedestrian fatalities and 32 percent of bicyclist fatalities. Working with Volpe, New York City became the largest municipal fleet in the nation to install truck side guards, and the City of Boston crafted the nation's first ordinance requiring side guards on trucks. The impact of this work continues as additional communities work with Volpe to make their vehicles—and their citizens—safer.

A Dynamic, World-Class Resource

Volpe enables sponsors to harness the collective power of hundreds of transportation experts with a shared vision of success.

We are powered by transportation thought leaders, driven by tough challenges, dedicated to making a better transportation system, and committed to the public good.

Volpe is a world-class transportation resource with broad technical and institutional expertise not replicated elsewhere. As dedicated public servants, we have devoted our careers to advancing a better transportation system. Whether we're providing new ideas or helping implement our sponsors' programs, we consistently deliver transformative transportation solutions.

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CAFE Analysis Helps Cut Fuel Consumption and Emissions

NHTSA turned to Volpe for critical analytical support to develop standards to regulate and increase the average fuel economy of cars and light trucks sold in the United States. The Corporate Average Fuel Economy (CAFE) standards help reduce the nation's energy consumption by requiring manufacturers to increase the average fuel economy of vehicles. Volpe's world-class experts in mechanical engineering, environmental science, physics, economics, computer science, and operations research have played a significant role in CAFE over the past 40 years, conducting detailed analyses and modeling to help determine the feasibility of such far-reaching standards.

First Carbon-Neutral Airport Reduces Environmental Impact

Volpe worked with the Massachusetts Department of Transportation, Nantucket Memorial Airport, and Honeywell Building Solutions to help create the United States' first carbon-neutral airport in Nantucket, Massachusetts. In this two-phased project, Volpe assessed the airport's baseline energy use and greenhouse gas emissions, examined human behaviors that could reduce energy waste, helped implement energy savings measures, and oversaw the installation of a large carbon-offsetting photovoltaic solar array. This project offers airports around the country a template for reducing energy use and approaching or achieving carbon neutrality.

Wake Turbulence Insights Boost Air Traffic Capacity

Planes cause disruptions in the air—known as wakes—that can be dangerous to trailing aircraft. Many of the foremost wake turbulence experts work at Volpe. Since Volpe's inception in 1970, our engineers have studied wake dynamics for FAA to understand the factors involved in their creation and dissipation. Volpe's work in characterizing wake behavior has enabled FAA to reduce the spacing between some heavy aircraft at a growing number of airports around the United States, which cuts the time an aircraft spends idling on the runway or making an airport approach, thereby increasing the capacity of the airspace and reducing aviation's energy footprint.

VOLPE AWARDS

Volpe Engineer Receives Prestigious SAE Award

Volpe engineer Kevin Green received SAE International's Barry D. McNutt Award for Excellence in Automotive Policy Analysis. This distinguished award recognizes individuals who have made outstanding contributions to the development of improved federal automotive policy.

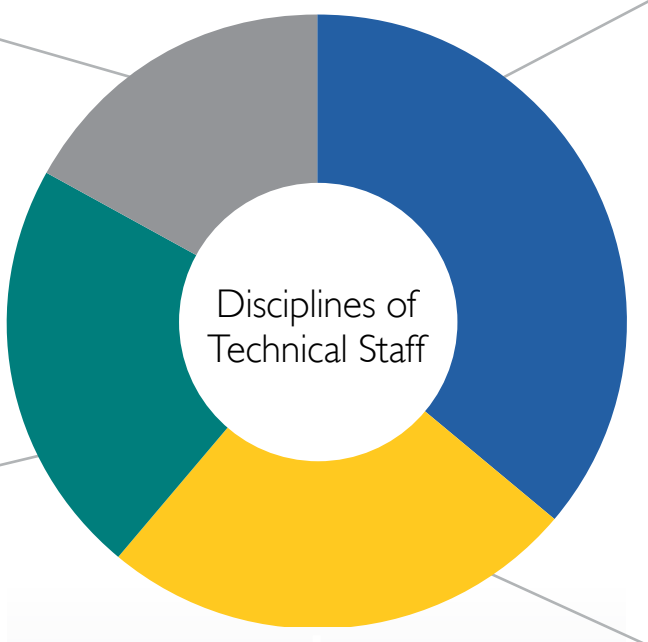
Safety Hazard Analysis Software Wins Technology Transfer Award

Volpe's Safety Hazard Analysis Tool received the Federal Lab Consortium's 2014 Excellence in Technology Transfer Award for the northeast region. This distinguished award recognizes individuals who have brought outstanding government-developed technology to the commercial marketplace.

Our Team

570+
Federal Employees

400+
On-Site Contractors



15%
IT Specialists

35%
Engineers

- Aerospace Engineers
- Chemical Engineers
- Civil Engineers
- Computer Engineers
- Electrical Engineers
- Electronics Engineers
- Environmental Engineers
- Fire Protection Engineers
- Industrial Engineers
- Marine Engineers
- Mechanical Engineers

25%
Planners/Scientists

- Economists
- Environmental Scientists
- Human Factors Specialists
- Psychologists
- Transportation and Urban Planners

25%
Analysts

- Geographic Information System Specialists
- Operations Research Analysts
- Organizational Development Specialists
- Program Analysts
- Security Specialists
- Transportation Analysts

Staff with Advanced Degrees

13%
Doctorates

36%
Masters

Fueled by Innovative Ideas

The Volpe Innovation Challenge:

Encouraging Unique Solutions to Emerging Transportation Issues

In 2012, Volpe initiated a staff competition to inspire the development of fresh ideas that address emerging transportation issues. The Innovation Challenge is an event that encourages multidisciplinary staff teams to develop and pitch creative ideas to improve some aspect of the transportation enterprise. Teams spend several weeks developing proposals that are pitched to a panel of judges composed of senior-level U.S. DOT leaders. The pitches include a description of the proposal, the potential impact, market size, and financial viability. Teams must also explain how to transition their concepts into solutions that can improve the state of transportation.

A winning team is selected to receive innovation funding to further its idea. While only one winner is selected, several of the ideas that are pitched often evolve into sponsor-funded projects.

Volpe teams compete for seed funding before a panel of senior-level U.S. DOT leaders (at center). Judges from Volpe's third Innovation Challenge included (front row, left to right) FRA Executive Director Stacy Cummings, FAA Deputy Assistant Administrator Carl Burleson, Assistant Secretary for Research and Technology Gregory Winfree, (back row, left to right) FAA NextGen Chief Scientist for Software Natesh Manikoth, SLSDC Deputy Administrator Craig Middlebrook, and PHMSA Chief Safety Officer and Assistant Administrator Stephen Domotor.

Our Sponsors

U.S. Department of Transportation

- Federal Aviation Administration
- Federal Highway Administration
- Federal Motor Carrier Safety Administration
- Federal Railroad Administration
- Federal Transit Administration
- Intelligent Transportation Systems Joint Program Office
- Maritime Administration
- National Highway Traffic Safety Administration
- Office of the Secretary of Transportation
- Pipeline and Hazardous Materials Safety Administration
- Saint Lawrence Seaway Development Corporation

Federal Agencies

- Department of Agriculture
  - U.S. Forest Service
- Department of Commerce
  - National Oceanic and Atmospheric Administration
- Department of Defense
  - Defense Threat Reduction Agency
  - Office of the Secretary of Defense
  - U.S. Africa Command
  - U.S. Air Force
  - U.S. Army
  - U.S. Naval Forces Europe
  - U.S. Navy
  - U.S. Transportation Command
- Department of Energy
- Department of Homeland Security
  - Federal Emergency Management Agency
  - Transportation Security Administration
  - U.S. Coast Guard
- Department of the Interior
  - Bureau of Land Management
  - National Park Service
  - U.S. Fish and Wildlife Service
- Environmental Protection Agency
- Millennium Challenge Corporation
- National Aeronautics and Space Administration
- U.S. Capitol Police

State and Local

- City of New York
- Florida DOT
- Massachusetts DOT
- Orange County Transportation Authority
- State of Arizona
- University of Florida
- University of Wisconsin
- Washington Metro Area Transit Authority

International

- International Civil Aviation Organization
- United Kingdom Ministry of Defence
- World Bank

Other

- BNSF Railway
- Columbia River Pilots
- General Motors
- Illingworth & Rodkin, Inc.
- National Academy of Sciences
- Wyle Laboratories, Inc.
- Zamurs and Associates

Our History

Volpe, The National Transportation Systems Center, was established in 1970 to provide analytical, scientific, and engineering support to the newly established U.S. Department of Transportation. From the beginning, Volpe was envisioned as a place where a broad range of skills could be focused on major issues that cut across the traditional modal structure of the transportation enterprise.

Housed on the campus of NASA's former Electronics Research Center, our organization opened as the "Transportation Systems Center." In 1990, our organization was renamed in honor of former Transportation Secretary John A. Volpe.

A distinguished civic leader, federal administrator, and public servant, John A. Volpe served as the first Federal Highway Administrator from 1956 to 1957 and was elected Governor of Massachusetts in 1960. In 1969, Volpe became the second U.S. Secretary of Transportation.

Thought Leadership

Engaging Thought Leaders,

Promoting Dialog to Address Global Issues

Volpe has a long history of bringing together thought leaders, decision makers, and stakeholders from across the global transportation enterprise to anticipate future transportation trends, generate fresh approaches to emerging issues, and inform decision making. As a part of this tradition, Volpe convenes experts to share their perspectives on emerging and future transportation issues. Recent thought leadership activities have addressed *Transportation System Resilience, Extreme Weather, and Climate Change; Transportation and the Economy; Automation and the Human;* and *Transportation Safety and Operator Performance.*

Our events, which are available to the public, have attracted more than 4,000 transportation professionals since 2011.

Committees and Conferences

- Transportation Research Board
  - Policy and Organization Group Executive Board: *Emeritus member*
  - Standing Committee on Intelligent Transportation Systems: *Chair*
  - Standing Committee on Rail: *Chair*
  - Subcommittee on Research: *Chair*
  - Standing Committee on Simulation and Measurement of Vehicle and Operator Performance: *Chair*
  - Standing Committee on Urban Freight Transportation: *Vice chair*
  - 54 committees: *Member*
  - 2015 Annual Meeting: *Chaired 12 sessions and delivered 18 presentations*
- National Transportation Safety Board: *Panelists*
  - Awake, Alert, Alive: Overcoming the Dangers of Drowsy Driving
  - Investigative Hearing: Railroad Accident Investigation Involving Two Freight Trains
  - Investigative Hearing: Two Metro-North Rail Accidents in Connecticut
  - Rail Safety Forum: Transportation of Crude Oil and Ethanol
- International Commission on Occupational Health, Shiftwork, and Working Time: *Secretary*
- United Nations
  - Economic Commission for Europe, Workshop on Intelligent Transport Systems: *Keynote speaker*
  - International Committee on Global Navigation Satellite System: *DOT lead*
- AARP National Older Driver Safety Expert Panel: *Member*
- Asia Pacific Economic Cooperation, Transportation Working Group: *Co-chair of the Global Navigation Satellite System Implementation Team*
- Marine Board: *Member of the Committee on Marine Safety and Human Factors*
- Institute for Navigation: *Council member*
- 21st World Congress on Intelligent Transportation Systems:
  - *DOT representative to the Connected Vehicle Safety Technology Demonstration*
  - *Program committee member and session organizer*
- International Civil Aviation Organization: *Co-chair of committee on Aviation Environmental Protection, Modeling, and Databases Group Meetings*
- Road Vehicle Automation Symposium 2014: *Co-chair*
- Fifth Symposium on Railroad Tank Cars: *Keynote presentation*
- International wake turbulence research groups: *Convener, organizer, presenter*
- International Conference on Human-Computer Interaction in Aerospace (HCI-Aero 2014): *Program committee members*
- Women's Transportation Seminar—Boston: *President*
- 2014 Energy Information Administration Energy Conference: *Presenter*
- 2014 Joint Rail Conference: *Track session organizer, sessions planner*
- American Society of Mechanical Engineers 2013 Rail Transportation Division Conference: *Session co-organizers*

Our Leaders

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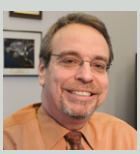

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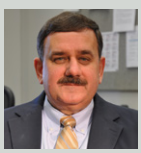

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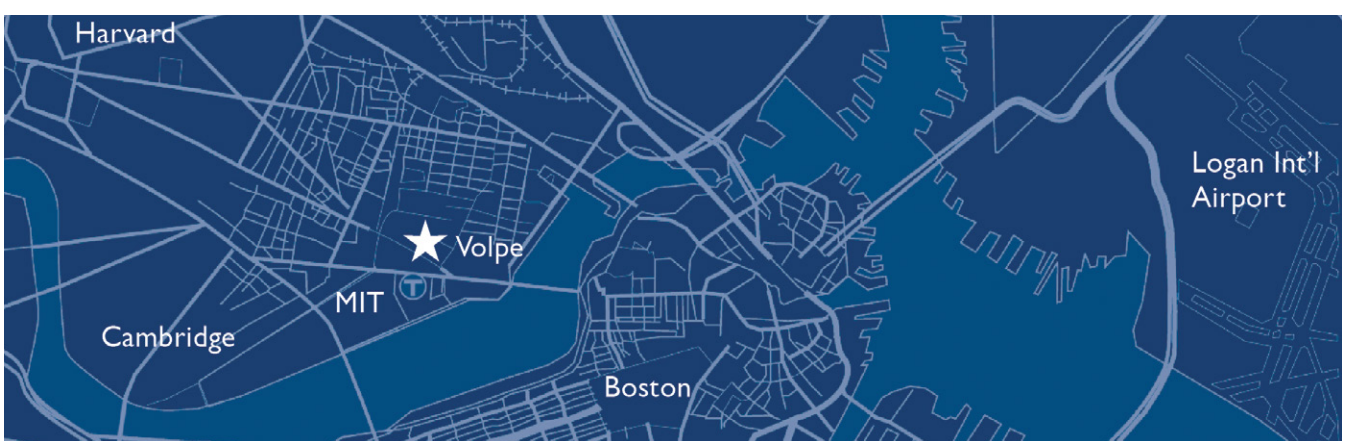

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