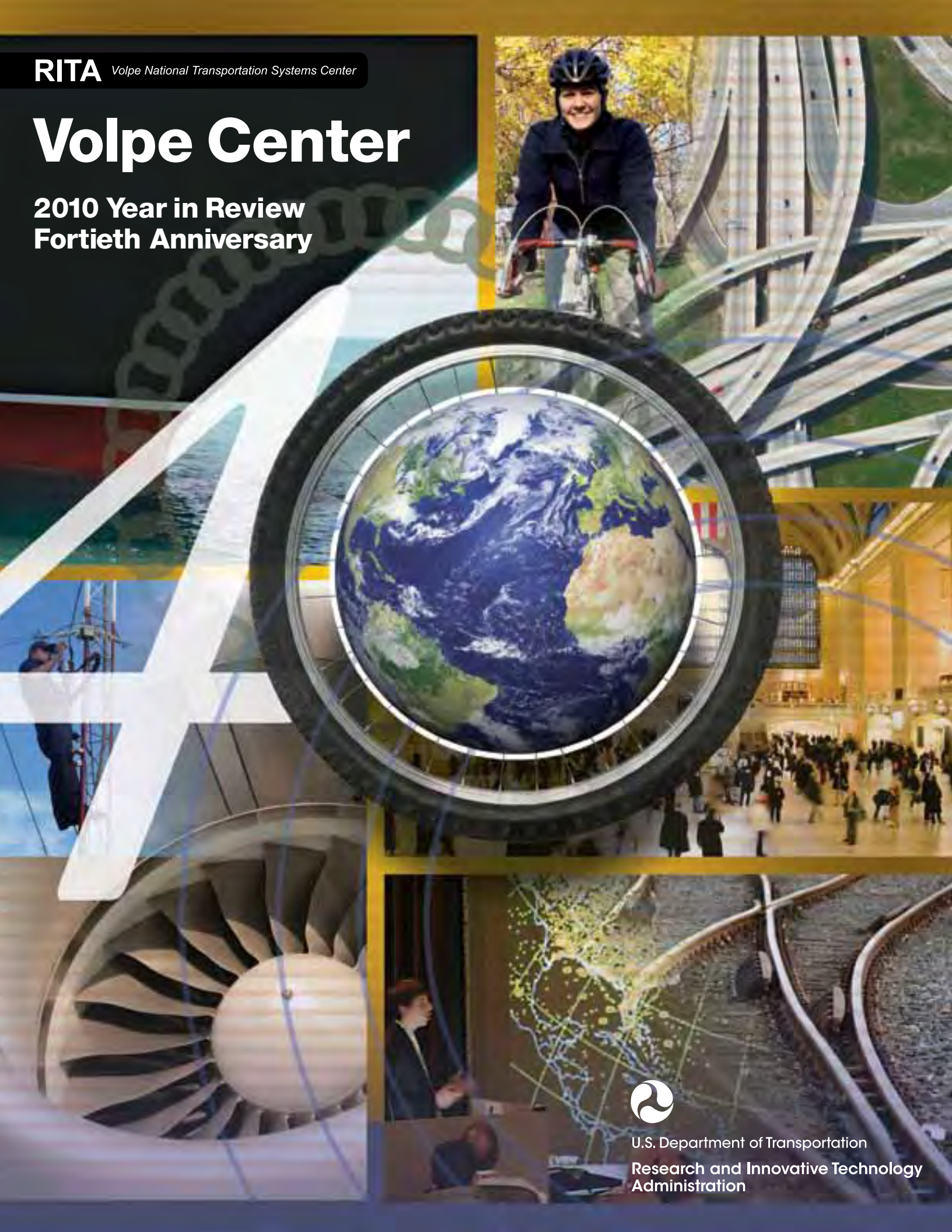


**RITA** *Volpe National Transportation Systems Center*

# Volpe Center

**2010 Year in Review  
Fortieth Anniversary**



U.S. Department of Transportation  
Research and Innovative Technology  
Administration





## A Note from the Director

This year provided a unique opportunity to reflect on the Volpe Center's 40 years of service to the nation as a global leader in multimodal transportation innovation. During our anniversary year, we celebrated our workforce, its capabilities, and its contributions. We celebrated our history of working collaboratively with our sponsors to respond to the nation's most pressing transportation challenges. We celebrated the Center's community spirit accentuated by our staff's extensive involvement in local educational outreach and environmental stewardship.

We also welcomed thousands of visitors from the U.S. and overseas and engaged our stakeholders in critical discussions addressing major transportation issues. These included topics such as innovation in traffic management and implementation of technologies across modes, the future of environmental measurement and modeling, leveraging safety data to drive safety decisions, cyber-security challenges facing transportation decisionmakers, and development of the next-generation workforce.

We continued to forge relationships with international colleagues, welcoming representatives from distant transportation organizations to Cambridge for information exchanges. Visitors included transportation officials from China, Korea, Malaysia, Pakistan, Singapore, Thailand, and the United Kingdom. Volpe staff worked internationally as well, supporting projects in Haiti, Mexico, the United Kingdom, India, and China.

Two new Deputy Associate Administrators took their posts at the Volpe Center this year, adding over 50 years of combined experience in transportation to our leadership team. At the beginning of the year, Anne Aylward was appointed as Deputy Associate Administrator for Research, Innovation and Technology. She transitioned from managing two Centers of Innovation here and now provides leadership to all of the Volpe Center's Centers of Innovation.

David Ishihara was named as the Deputy Associate Administrator for Operations. He joined the



Left to right: Deputy Associate Administrator for Operations David Ishihara; Deputy Associate Administrator for Research, Innovation and Technology Anne Aylward; RITA Administrator Peter H. Appel; Associate Administrator and Volpe Center Director Robert C. Johns. (Volpe Center photo)

management team from the Massachusetts Port Authority, where he served as the Director of Aviation Operations for Logan Airport.

During our 40th-anniversary events, we appreciated the participation of U.S. Department of Transportation Secretary Ray LaHood; U.S. Transportation Deputy Secretary John Porcari; U.S. Chief Technology Officer Aneesh Chopra; U.S. Congressman Michael Capuano; Research and Innovative Technology Administration (RITA) Administrator Peter H. Appel; and RITA Deputy Administrator Robert Bertini; as well as the broader transportation community and local stakeholders.

I would like to thank these leaders for their support and also thank our sponsors at the U.S. Department of Transportation and other Federal agencies, and our state, local, academic, and private-sector partners for the opportunity to collaborate on projects that contribute to enhancing the U.S. transportation system.

We look forward to working with you as we continue to address new challenges and pursue new opportunities for innovation across transportation modes and disciplines.

*Robert C. Johns, Associate Administrator and Director  
Volpe National Transportation Systems Center*



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# Celebrating 40 Years of Service to the Nation

**V**olpe Center Day at the U.S. Department of Transportation (U.S. DOT) headquarters in the spring, an employee celebration in the summer, and an Open House in the fall were the key events recognizing the Volpe National Transportation Systems Center's fortieth anniversary year and contributions to U.S. DOT and the nation.

*"Some 440 miles northeast of U.S. DOT headquarters lies one of our greatest success stories, and perhaps one of our best-kept secrets, the John A. Volpe National Transportation Systems Center. And today, we're celebrating the Volpe Center's 40 years of excellence... the work the Center's professionals do to advance that mission is state-of-the-art. From human factors research to global maritime tracking, the Volpe team is a world leader in finding innovative, research-based solutions to America's complex transportation challenges."*

Ray LaHood  
U.S. Transportation Secretary  
June 2, 2010

*"The Volpe Center is a great example of an experiment in government that's worked. Every day, you collaborate within every mode within the Department of Transportation, as well as with the larger industry to give form, shape,*



U.S. Transportation Secretary Ray LaHood and Volpe Center Associate Administrator and Director Robert Johns at Volpe Center Day on June 2, 2010 at U.S. DOT headquarters in Washington, DC. (Volpe Center photo)

*and direction to innovation. You are truly the laboratory of innovation."*

John D. Porcari  
U.S. Transportation Deputy Secretary  
October 15, 2010

*"Cars that don't crash... a truly interconnected transportation system... [and] innovations in non-motorized transportation... the Volpe Center is hard at work laying the seeds to ensure that we can capitalize on the opportunities and overcome these challenges, and achieve much greater successes over the next 40 years."*

Peter H. Appel  
U.S. DOT Research and Innovative  
Technology Administration Administrator  
October 15, 2010





Top: Crowds gather for Volpe Center Day. (Volpe Center photo)

Bottom: Secretary LaHood, Director Johns, and Caroline Donohoe of the Volpe Center's Human Factors Research and System Applications Center of Innovation (COI). (Volpe Center photo)

## Volpe Center Showcases Multimodal Collaboration

On June 2, 2010, the Research and Innovative Technology Administration (RITA) and the Volpe Center, in collaboration with its valued sponsors, welcomed guests from all transportation modes to a special event highlighting multimodal collaboration and commemorating the Volpe Center's 40th anniversary year.

Volpe Center Day at U.S. DOT headquarters in Washington, DC began with remarks by U.S. Transportation Secretary Ray LaHood, RITA Administrator Peter H. Appel, and Volpe Center Director Robert Johns. U.S. Transportation Deputy Secretary John Porcari also joined in the special event.

Volpe Center staff and colleagues led discussions and showcased projects focused on national transportation priorities. Participants represented the Federal Aviation Administration (FAA), the National Highway Traffic Safety Administration, the Federal Motor Carrier Safety Administration, the Federal Transit Administration, the Federal Highway Administration,



the Federal Railroad Administration, the St. Lawrence Seaway Development Corporation, and the Office of the Secretary of Transportation. Other Federal partners, including the Departments of Defense, Homeland Security, and Interior, participated in the panels and project demonstrations.

### **Workforce Celebrates the History of the Center**

An additional 40th anniversary celebration took place in June 2010, with employees gathering for a cookout on the Volpe Center's front lawn. Sunny weather provided an inviting backdrop to the event, attended by 400 Federal staff members as well as FAA Administrator J. Randolph Babbitt and RITA Administrator Peter H. Appel.

Top: Volpe employees enjoying the outdoor feast. (Volpe Center photo)

Center: Left to right, Jack Krumm, President, NAGE Local R1-195; Peter Appel, RITA Administrator; Robert Johns, Volpe Center Director; and J. Randolph Babbitt, FAA Administrator. (Volpe Center photo)

Bottom: Human Resources' Elaine Lyte, Effie Cho, and Physical Infrastructure Systems COI Director Robert Dorer, enjoying bocce with David Daley and Human Resources Chief Sue Connors. (Volpe Center photo)





The cooperative effort was planned by representatives from management, the local National Association of Government Employees, and the Transportation Employee Recreation Association.

## Volpe Welcomes Stakeholders to Open House

The Volpe Center hosted an open house on October 15, 2010, in commemoration of 40 years of service to U.S. DOT and the nation and of its key role as an economic engine and anchor tenant in Kendall Square's dynamic research and technology community. Colleagues and neighbors attended project demonstrations and simulations related to air traffic management, worldwide maritime vessel tracking, corporate average fuel economy modeling, rail crash energy management, and acoustics research on quiet cars.

*"President Obama has given me one clear instruction: in this Administration, entrepreneurs are welcome. Entrepreneurs at the Volpe Center, entrepreneurs in the community, entrepreneurs in Silicon Valley and Route 128, you are welcome. You are...going to design something incredible, that will improve our transportation experience not in ten years, but tomorrow... That's the entrepreneur in your heart, we want to tap into your mojo!"*

Aneesh Chopra, U.S. Chief Technology Officer  
October 15, 2010



Left: Aneesh Chopra, U.S. Chief Technology Officer, speaks on technology, data, and innovation at the Volpe Center's open house ceremony. (Photo courtesy of Linda Haas Photography)

Top: Patricia Llana, left, and Kari Jacobsen, pointing, describe the Volpe Center's work in crashworthiness to Karen Petho and other Volpe Center employees and visitors at the Open House project showcase. (Photo courtesy of Linda Haas Photography)

Center: From left, Volpe Center Director Robert Johns, U.S. Transportation Deputy Secretary John Porcari, RITA Administrator Peter Appel, and U.S. Congressman Michael E. Capuano. (Photo courtesy of Linda Haas Photography)

Bottom: RITA Chief Counsel Gregory D. Winfree and MARAD Deputy Chief Counsel Rand R. Pixa observe the interior of the Volpe Center's new Rail Cab Technology Integration Laboratory. (Volpe Center photo)



# The Volpe Center

1970–2010

A Retrospective

Since 1970, the Volpe Center has remained flexible, adaptable, and responsive to the needs of its stakeholders. Today, it has more than 75 sponsors, from the U.S. Department of Transportation (U.S. DOT), other Federal agencies, regional, state, and local government; other countries; nonprofit organizations; universities; and the private sector.

This chapter provides a retrospective look at the Volpe Center's remarkable history as a unique, world-class Federal transportation resource and offers a glimpse of the Volpe Center's landmark 40th anniversary year.

## Space Race Launched Transportation Systems Center

Today, the Volpe Center is a Federal Center of Excellence and home to world-renowned multidisciplinary expertise in all modes of transportation. Since 1970, its work on behalf of U.S. DOT, other Federal,



Apollo 17 night launch, 1972. (NASA/courtesy of nasaimages.org.)

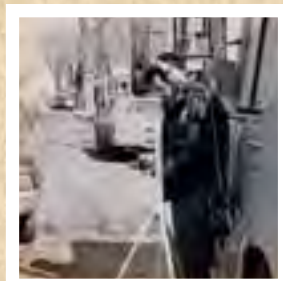
state, and local organizations, international entities, and the private sector has always reflected pressing national needs and priorities. The Volpe Center has responded to major transportation challenges, including the need to modernize air-traffic-flow-management systems, address critical multimodal safety issues, develop sophisticated logistics and communications systems for national initiatives overseas, meet energy crises, and strengthen global maritime domain awareness.



# 70

The Volpe Center pioneered the use of alcohol breath analysis as a transportation safety feature.

(Volpe Center photo)



# 70

One of the earliest Volpe Center environmental projects was measuring noise levels from aircraft and motor vehicles.

(Volpe Center photo)



The Cambridge, Massachusetts-based Federal organization has always been about transportation, but at the beginning it was all about space transportation. The National Aeronautics and Space Administration's (NASA) Electronics Research Center (ERC) was a major part of the plan to bolster America's space exploration program and support the Cold War struggle. In an effort to solidify NASA's in-house electronics expertise, ERC opened its doors in September 1964, five years before Apollo 11 lifted off and American astronaut Neil Armstrong set foot on the moon. Located in the midst of a leading United States technology hub, ERC was as important of a NASA field center as the Langley Research Center in Hampton, Virginia, or the George C. Marshall Space Flight Center in Huntsville, Alabama. By 1968, ERC had over 2,000 Federal employees.

ERC was thrust into the middle of political controversy in December 1969, when President Richard Nixon announced its closure as part of a major shift in the nation's space policy and also due to deep cuts in the Federal budget. By this time, however, appreciation had developed for the unique technical expertise and perspective that had been assembled in Cambridge. In an effort to preserve the intellectual foundation that had been established, then-Secretary of Transportation and former Governor of Massachusetts John A. Volpe and members of the New England Congressional delegation teamed with others in a bipartisan effort to preserve this national resource. The thinking at the time was that the nation was facing unprecedented transportation challenges and ERC's technical expertise could be applied to complex multimodal issues ranging from mass transit to air traffic flow and safety.



Early air-bag demonstration outside the Transportation Systems Center in Cambridge. (Volpe Center photo)

In a March 1970 memorandum, the science advisor to the president and the director of the Bureau of the Budget advised that the transfer of ERC to U.S. DOT would both strengthen transportation research and development and support the responsibilities of the Office of the Secretary of Transportation to ensure coordination and management for intermodal and crossmodal activities.

On July 1, 1970, the ERC facility was transferred to U.S. DOT for one dollar and became the nation's multimodal Transportation Systems Center, or TSC. Because the transfer occurred during a period of austere budgets, U.S. DOT's newest asset was established as a unique fee-for-service organization, reporting to the assistant secretary for Systems Development and Technology.

## The 1970s: TSC Emerges as a Transportation Leader

On July 1, 1970, U.S. DOT established the TSC in Cambridge, Massachusetts. The goal was to establish a top-notch, central research and development facility for



# 70

The Volpe Center developed several anti-hijacking airport security screening systems.

(Volpe Center photo)



# 70

Volpe Center research led to the development of the first Corporate Average Fuel Economy (CAFE) standards. The Center continues to be an active participant in the CAFE program. (Volpe Center photo)



the recently established cabinet agency and to support the Office of the Secretary of Transportation (OST) in ensuring coordination and management for intermodal and crossmodal activities. The Center reported to OST through the assistant secretary for Systems and Technology until 1977, when it was transferred to the newly formed Research and Special Programs Administration, a predecessor to today's Research and Innovative Technology Administration (RITA).

In the 1970s, a number of new transportation issues and challenges emerged, many of which remain important to the present day. These included the need to enhance rail, transit, and aviation safety; to increase mobility through high-speed rail, next-generation bus and rail, and personal rapid transit system concepts; to reduce highway

Railcar crashworthiness research support U.S. DOT, Amtrak, railroads and local transit authorities. (Volpe Center photo)



motor vehicle crashes associated with alcohol and drug abuse; to strengthen airport security; to address public criticism of transportation-related noise and air pollution; and to respond to mounting concern over the consequences of motor vehicle fuel consumption in light of oil embargoes and fuel shortages.

During its startup decade, TSC supported U.S. DOT's efforts to respond to these complex issues. It hosted significant leadership events involving participants from government, industry, and academia. Topics for these conferences and symposia included motor vehicle fuel economy standards, the environmental impacts of supersonic aircraft, the Chrysler Loan Guarantee, high-speed rail and highway-rail grade crossing safety, the design and development of the next generation of transit vehicles, satellite-based air traffic management, and wake vortex measurement to establish aircraft separation standards.

As the decade progressed, it became clear that successfully implementing advances in transportation technologies would require impacts on society and on the users and operators of a given system to be understood and integrated into transportation innovations. To meet this challenge, the Center's workforce, initially dominated by the engineering disciplines, shifted to a new, more equal mix of engineering and the social and behavioral sciences, including economics, human factors, and operations research.

TSC closed out the 1970s having fulfilled the initial vision for the Federal center. It emerged as a major contributor to the enhancement and stimulation of innovation across modes and sectors.



80

Volpe Center developed and deployed navigation aids (NavAids) along the St. Lawrence Seaway. (Volpe Center photo)



85

The Volpe Center developed the Enhanced Traffic Management System (ETMS) for the Federal Aviation Administration (FAA) and has continued to refine and manage this key air traffic control tool. (Volpe Center image)





The Volpe Center was a major contributor to such air traffic control concepts as the Advanced Automation System and Air Traffic Management System (ATMS). (Volpe Center photo)

## The 1980s: Shifting National Priorities Lead to Expanded Sponsor Base

The 1980s were a time of transition for the TSC, known today as the Volpe Center, as both its personnel skills and its project expertise shifted in response to changing government policies and priorities. During the 1970s, much of the Center's early work for U.S. DOT had focused on research, development, and demonstrations of advanced technologies in bus and rail transportation, and on new concepts in surface vehicles, such as people

movers. In the 1980s, the Center's work in these areas transitioned to a more comprehensive approach that incorporated requirements analysis and systems assessment of transportation options. This, in turn, led to an expansion of the Center's sponsor base: to non-U.S. DOT agencies with substantial transportation missions.

Faced with more complex logistics needs, the U.S. military turned to the Center for in-depth transportation expertise. Around mid-decade, the Department of Defense (DoD) called on the Center to help enhance its strategic mobility and logistics capability. A 1985 Memorandum of Understanding, signed by U.S. DOT and DoD, led to a significant expansion of the Center's work in this area. Also, during this period, devastating terrorist bombings against the U.S. Marine Corps barracks and the American Embassy in Beirut caused major loss of life and shifting national priorities. Building on its aviation security expertise, TSC responded rapidly, expanding its physical security support activities, including the application of anti-blast concepts to Federal facilities, such as the State Department's overseas embassies and other critical infrastructure.

DoD again sought TSC's technical expertise in December 1985, when a chartered plane carrying more than 240 American soldiers crashed in Gander, Newfoundland, killing everyone on board. A review of the crash concluded that the plane was overloaded and there was a lack of safety protocol. The Volpe Center created a valuable aviation assessment tool to evaluate the safety record of carriers used by the military. The tool was further developed by the Center on behalf of FAA.



# 85

The Volpe Center became a major support for both enhanced port security activities and the Defense Department's logistics modernization effort. (Volpe Center photo)



# 89

The Volpe Center was among the originators of the IVHS/ITS program. (Volpe Center image)

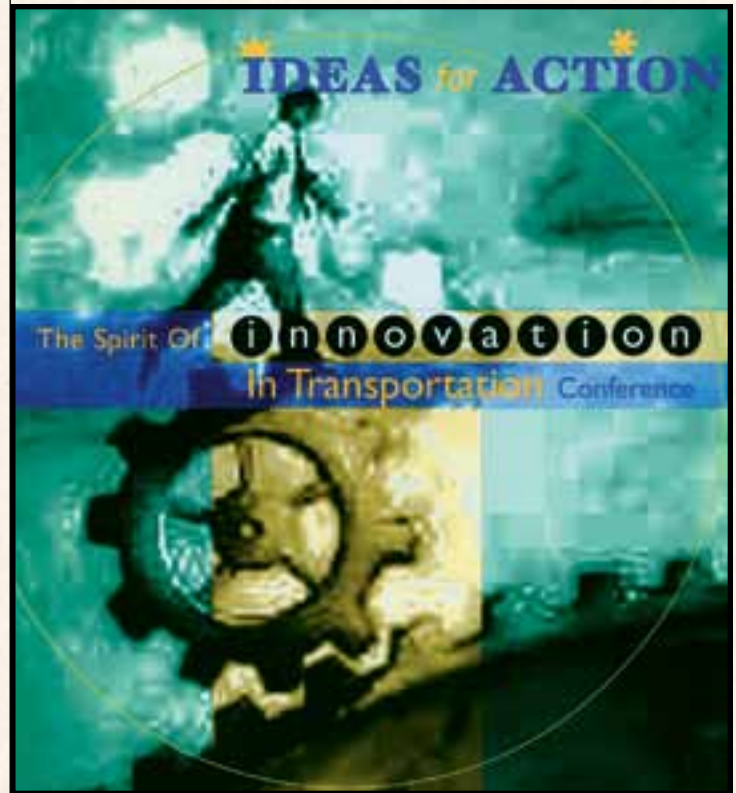


Aviation remained a significant part of the Center's activities throughout the decade, especially in relation to the development and deployment of future air traffic management and control concepts for FAA. Major initiatives, such as Advanced Automation Systems, Advanced Traffic Management Systems, and Enhanced Traffic Management Systems, all shared a common characteristic: the need for expertise in applying advanced information, communications, navigation, and surveillance technologies to complex air traffic management and control needs. In the wake of a mid-air Aloha Airlines incident in 1988, the Center lent critical support to FAA's National Aging Aircraft Research program, launched to investigate and prevent further accidents due to aircraft structural fatigue.

The 1980s ended with heightened TSC involvement in the formative years of what would become a key U.S. DOT surface transportation activity, Intelligent Vehicles/Highway Systems (IVHS), which evolved into today's Intelligent Transportation Systems (ITS) program. This new concept, which focused on the application of advanced technologies to surface transportation, was an excellent fit with the Center's existing skills and capabilities and closely paralleled the advanced aviation work that TSC had performed successfully for many years.

### The 1990s: Seeking Common Ground on Major Transportation Issues

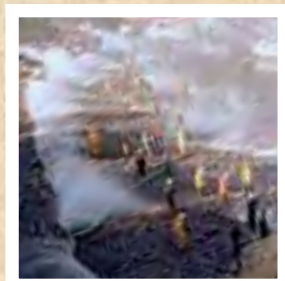
The 1990s were marked by the end of the Cold War, the beginning of long-term U.S. military engagement in the Middle East, the dawn of the Internet age,



Volpe Center graphic

#### Landmark Thought Leadership Events

- Charting a New Course in Transportation (8 sessions, 1991)
- First International Congress on New Information Technologies and Operations Research Methods in Transportation and Telecommunications (co-sponsored with MIT, 1992)
- Working Together: Transportation Opportunities for Technology Reinvestment (1993)
- Challenges and Opportunities for Global Transportation in the 21st Century (1995)
- Symposium on Enabling Technologies for Advanced Transportation Systems (1997)
- The Spirit of Innovation in Transportation (1999)



# 89

Environmental remediation became a major project cluster with cleanups of U.S. DOT sites and assistance to other agencies.

(Volpe Center photo)



# 93

The Volpe Center has investigated alternative transportation fuels — including hydrogen, electric, ethanol, biofuel and hybrids — for every major mode. (Volpe Center photo)



unprecedented global economic growth, and rejuvenation of the environmental movement. The Volpe Center adeptly shifted to meet new national priorities and to develop innovative solutions to the nation's transportation problems. Reinforcing its critical role as a thought leader in transportation, the Volpe Center convened international experts to generate fresh approaches to emerging issues. To support Federal decision-making and prepare for the new century, the Volpe Center hosted a series of high-profile outreach events and explored major transportation challenges (see sidebox).

In 1990, TSC was renamed the John A. Volpe National Transportation Systems Center, in honor of the second U.S. Transportation Secretary, who, together with Tip O'Neill, Ted Kennedy, and other members of the New England Congressional delegation, had been instrumental in launching TSC.

The Volpe Center's primary activities during this decade reflected the major themes of national transportation policy: safety and security, energy and the environment, and mobility and the economy. Major new safety initiatives included rail-car crashworthiness, motor carrier safety-data collection and analysis, risk analysis for transporting hazardous materials, vehicle crash-avoidance research, runway incursion reduction, and ITS activities for the surface modes.

The Volpe Center's extensive physical security expertise was instrumental for such diverse sponsors as the Bureau of Printing and Engraving, the U.S. Capitol Police, and the Immigration and Naturalization Service (INS). Border security systems for passengers and cargo were developed and applied in the Center's work for the INS.



The Volpe Center is a nationally recognized center of expertise on the Global Positioning System (GPS), its uses in transportation, and its vulnerabilities. (Volpe Center illustration)

Environmental sustainability, remediation, and cleanup efforts took on new importance as landmark clean-air and transportation legislation and conferences in Rio de Janeiro (1992) and Kyoto (1997) increased global awareness of these issues. Volpe Center staff worked on enhancing the capacity of developing countries to mitigate transportation-related greenhouse gas emissions and to address climate change. The Environmental Protection Agency, U.S. Postal Service, and National Park Service sought help from the Volpe Center on environmental issues. In support of the Federal Transit Administration, the Volpe Center began studying



94

The Volpe Center's *Boston-New York Rail Improvement Study* laid the foundation for Amtrak's all-electric Acela high-speed service in the North East Corridor.

(Volpe Center photo)



99

The Volpe Center developed the System for Assessing Aviation's Global Emissions (SAGE) and Aviation Environment Design Tool (AEDT) to calculate aviation's contribution to climate change.

(Volpe Center image)



alternative fuel buses. A growing number of Federal agencies, challenged by issues related to transportation and the environment, looked to the Volpe Center for assistance.

As part of an effort to reduce trip times and expand passenger capacity on the Northeast Corridor, a major study of Boston–New York City rail improvements in the mid-1990s led to infrastructure upgrades, electrification, and the start of Amtrak’s Acela service. Around this time, the Center also developed internationally renowned expertise in the application of GPS satellites to support transport and logistics needs of military and civilian users. The Center also created the Federal government’s radio navigation plans and was instrumental in the development and deployment of a new generation of air traffic control systems, such as Automatic Dependence Surveillance-Broadcast and Enhanced Traffic Management.

### The 2000s: Emphasis on Safety, Security, and the Environment

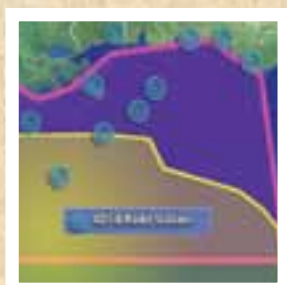
During the 2000s, the Volpe Center has continued to provide leadership on emerging issues and to support national transportation priorities. In the wake of September 11th, 2001, the technical strengths that the Center had previously developed both in physical and cyber security found increasing application to the needs of our sponsors. In support of the Department’s safety objectives, the Volpe Center helped to promote the Federal Motor Carrier Safety Administration’s major nationwide commercial vehicle safety effort and broadened its multimodal understanding of the



The Center has a distinguished heritage of supporting activities that promote “livable communities.” (© iStockPhoto.com/Jeffrey Shanes)

unintended consequences of human-automation interaction. Research emphasis shifted from responding to and analyzing accidents to anticipating and avoiding them. This year, the Volpe Center participated in the formation of the U.S. DOT Safety Council, a multimodal, action-oriented, data-driven forum for fresh ideas and new perspectives on common issues.

The Volpe Center’s 40 years of technical experience in the assessment, development, and deployment of multimodal positioning, navigation, and timing systems and



# 01

The Volpe Center provides critical support to the implementation of Automatic Dependent Surveillance-Broadcast (ADS-B), a real-time data flow system that significantly increases airspace capacity. (Volpe Center image)



# 03

Volpe Center supports motor carrier safety programs such as Compass and CSA 2010. (Volpe Center photo)



their vulnerabilities was, and continues to be, applied in a number of programs, including Next Generation Air Traffic Control, Positive Train Control, ITS, and the Maritime Safety and Security Information System (MSSIS). On September 10, 2001, the Volpe Center released a landmark report on the vulnerabilities of GPS to intentional or unintentional interference. The very next day, concern about the vulnerability of our nation's critical transportation infrastructure became the driving force for national transportation policy.

In the area of environmental sustainability, extensive noise and emissions modeling progressed in support of FAA's goals for carbon-neutral growth and greenhouse gas emissions reductions. For FAA and the National Park Service (NPS), Air Tour Management Plans were initiated to reduce the intrusion of aviation activities, mainly noise, into national parks. Vital work continued

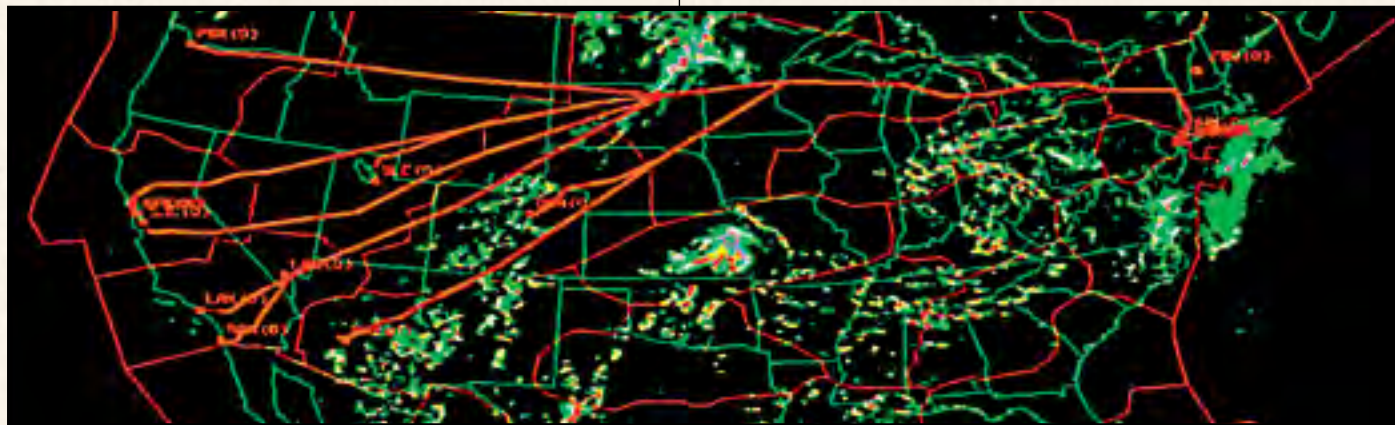
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The Volpe Center also supports developing and implementing other FAA NextGen-related tools such as System Wide Information Management (SWIM), Terminal Data Distribution System (TDDS), Integrated Terminal Weather System (ITWS), and Re-Route Impact Assessment (RRIA).  
(Volpe Center image)

on light-duty motor vehicle fuel economy standards for the National Highway Traffic Safety Administration, potential applications of fuel cells and electric batteries for the Federal Transit Administration (FTA), assessment of alternative transportation modes for NPS, and the benefits and costs of transportation biofuels for RITA.

Toward the end of the decade, the Volpe Center, in collaboration with the Federal Highway Administration and FTA, began supporting the President Obama's new Livable Communities Initiative in coordination with the Department of Housing and Urban Development and the Environmental Protection Agency. The Volpe Center played a key role in the development of transportation conferences, webinars, and training sessions on program implementation and professional capacity building for the local, state, and national transportation community.

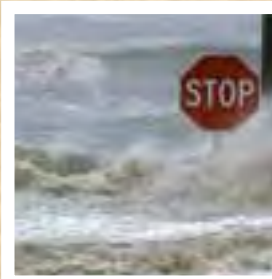
By the decade's end, the Volpe Center was well-positioned to continue and expand its collaborative efforts with its sponsors and the broader transportation community.



09

MSSIS won the prestigious "Excellence in Government" award from Harvard's Kennedy School of Government in 2009.

(Volpe Center photo)



09

Volpe Center staff are key respondents to natural disasters through the U.S. DOT and FEMA emergency action programs.

(Volpe Center photo)

# Multimodal Systems Research and Analysis

The Multimodal Systems Research and Analysis Center of Innovation (COI) contributes to the realization of an integrated multimodal national transportation system. We support the planning, development, management, operations, and financing of multimodal infrastructure. Our work enables decision-makers in government to understand tradeoffs among competing goals in order to deliver a world-class transportation system that ensures that people and goods will reach their destinations safely, on time, and with minimal environmental impact.

## Assisting Interagency Working Group on Affordable Housing and Transit

The average American family spends 60 percent of its income on housing and transportation. In some vehicle-dependent neighborhoods, households spend nearly as much on transportation as on housing. One solution to this challenge is to increase housing opportunities adjacent to transit. Although the concept of transit-oriented development is not new, U.S. Secretary of Transportation Ray LaHood's focus on livable communities has translated into support for a broad

range of new livability initiatives. Besides the goal of improving access to affordable housing, the Partnership for Sustainable Communities was created by Secretary LaHood, Department of Housing and Urban Development (HUD) Secretary Shaun Donovan, and Environmental Protection Agency (EPA) Administrator Lisa Jackson to support interagency collaboration on policies, plans, and projects.

Volpe Center staff, in support of the partnership and its subgroup, the Interagency Working Group on Affordable Housing and Transit, worked with Federal Transit Administration (FTA) and HUD staff to conduct a series of webinars. The national webinars facilitated information exchange and improved the coordination and delivery of joint projects and services. They brought together over 175 regional and headquarters staff from FTA, the Federal Highway Administration (FHWA), HUD, and EPA.

As part of ongoing support to FTA and the partnership, the Volpe Center is developing a series of urban and rural case studies of livable communities that combine transportation with local housing and environmental programs. The case studies offer insights into best practices for collaboration both among the Federal partners and with local transportation, housing, land-use and environmental agencies, and other critical partners, such as nongovernmental organizations and community development associations. Boston's





Fairmount/Indigo urban rail line is showcased in one case study. The project involves innovative collaboration between FTA and HUD regional offices on transit-oriented development, the EPA regional office on brownfield reclamation, the Massachusetts Bay Transportation Authority (MBTA), the City of Boston, and local development and advocacy organizations. *(Sponsored by FTA)*

Top: Volpe Center staff members accompanied FTA Deputy Administrator Therese McMillan, MBTA Director of Planning and Development Joseph Cosgrove, Massachusetts Department of Transportation (DOT) CEO Jeff Mullan, and Katherine Mattice, of FTA's Budget and Policy Office on a tour of Boston's Fairmount/Indigo urban rail line and transit-oriented developments. (Photo courtesy of FTA)

## Volpe Center Promotes Walking and Bicycling Options

Under the provisions of the last reauthorization of the Highway Trust Fund, \$100 million was authorized for four communities in the United States to develop an infrastructure for expanding local pedestrian and bicycle travel in order to decrease highway congestion and energy use and to promote a healthier and cleaner environment. This initiative, the Nonmotorized Transportation Pilot Program (NTPP), is currently funding projects in Columbia, Missouri; Marin County, California; Minneapolis, Minnesota; and Sheboygan County, Wisconsin.

The Volpe Center is supporting FHWA's Office of Human Environment and these communities in developing and implementing the program to expand

Bottom: Participants in the Twin Cities bike tour, including Volpe staff members and (second from left) FHWA sponsor and Livability and Nonmotorized Team Leader Gabe Rousseau. (Volpe Center photo)



travel options, evaluate the program's results, and report them to Congress. Volpe Center staff members from the Multimodal Systems Research and Analysis COI attended last month's annual NTPP meeting in Minneapolis, where they led discussions of the project working group on program evaluation and the final report to Congress. They met with local officials and took part in an eight-mile tour of the NTPP-funded Twin Cities projects on bicycles provided through the new Nice Ride Bike Sharing project, also funded through NTPP. NTPP's goals are compatible with those of the Interagency Partnership for Sustainable Communities, recently announced by Transportation Secretary LaHood, HUD Secretary Donovan, and EPA Administrator Jackson. Goals include providing more transportation choices and enhancing the unique characteristics of each community. *(Sponsored by FHWA)*

## New Report on Groundbreaking Pilot Program Points to Carbon Sequestration Potential

FHWA established the Carbon Sequestration Pilot Program in 2008 to assess how much carbon could be sequestered by native vegetation in National Highway System (NHS) rights-of-way (ROW). FHWA asked the Volpe Center's Multimodal Systems Research and Analysis COI to assist with this effort.

As a result of this collaboration, FHWA and the Volpe Center released a report, *Estimated Land Available for Carbon Sequestration in the National Highway System*. Using geographic information systems (GIS), the project team analyzed aerial images, detailed state DOT maps, and ROW plans. This information enabled the team to estimate that the NHS comprises approximately five million acres of land, representing the first known data-based approximation of highway ROW acreage for both individual states and the nation.

The project team also estimated that vegetation in the NHS ROW has already sequestered 91 million metric tons (MMT) of carbon and that it continues to sequester approximately 3.6 MMT per year nationwide, the equivalent of carbon dioxide emissions from about 2.6 million passenger cars. On the basis of a hypothetical



Example of a ROW property map overlaid on an aerial photograph to determine and measure distances between boundaries. (Volpe Center image)

price of \$20 per metric ton of carbon, the total potential sequestration value of the nation's highway ROW is approximately \$8.5 to \$14 billion. As part of the overall project, the Volpe Center and FHWA developed a Highway Carbon Sequestration Estimator as a decision-support tool to help state DOTs assess return on investment for various carbon sequestration scenarios. The report is available online at [www.fhwa.dot.gov/hep/climate/carbon\\_sequestration/index.htm](http://www.fhwa.dot.gov/hep/climate/carbon_sequestration/index.htm), and the decision-support tool is available upon request.

*(Sponsored by FHWA)*

## Collaborating on the Social Cost of Carbon for Rulemaking Activities

This year, a Federal Interagency Working Group issued a final report, *The Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866*. The Executive Order requires U.S. government agencies, to the extent permitted by law, "to assess both the costs and the benefits of the intended regulation and, recognizing that some costs and benefits are difficult to quantify, propose or adopt a regulation only upon a reasoned determination that the benefits of the intended regulation justify its costs." As the report's Executive Summary states: "The purpose of the 'social



cost of carbon' estimates presented here is to allow agencies to incorporate the social benefits of reducing carbon dioxide emissions into cost-benefit analyses of regulatory actions that have small, or 'marginal,' impacts on cumulative global emissions. The estimates are presented with an acknowledgement of the many uncertainties involved and with a clear understanding that they should be updated over time to reflect increasing knowledge of the science and economics of climate impacts."

On behalf of the U.S. Department of Transportation (U.S. DOT), Dr. Don Pickrell, chief economist at the Volpe Center, served with technical experts from numerous agencies to consider public comments, explore the technical literature in relevant fields, and discuss key model inputs and assumptions. Other participating agencies included the Council of Economic Advisers; the National Economic Council; the Council on Environmental Quality; the Departments of Agriculture, Commerce, Energy, and Treasury; the EPA; and the Offices of Energy and Climate Change, Management and Budget, and Science and Technology Policy.  
*(Sponsored by U.S. DOT)*

## Developing Cost Allocation Methodology for Amtrak Routes

The profitability of passenger rail service in the United States has been a controversial subject since Congress created Amtrak in 1970. A major problem has been the perception that Amtrak's accounting systems are inaccurate and insufficiently able to track and allocate the costs of each of its more than 40 passenger rail routes. To help resolve this issue, Congress authorized the Secretary of Transportation to develop a methodology for determining the avoidable and fully allocated costs of each Amtrak route. Avoidable costs are defined as estimated cost savings that would occur if a single route were eliminated, while fully allocated costs are the portion of the total cost that best represents an equitable share for a single route. To undertake this effort, the Federal Railroad Administration (FRA) turned to the Volpe Center.

FRA and the Volpe Center issued a joint report entitled *Methodology for Determining the Avoidable and Fully Allocated Costs of Amtrak Routes*.

The Volpe Center's Multimodal Research and Analysis COI assembled a team to work closely with Amtrak staff to review Amtrak's cost accounting system and determine how to develop and implement a revised method for outlining both avoidable and fully allocated costs for each route.

As part of the methodology development process, several major issues needed to be resolved. For example, certain shared operational and corporate costs, such as maintenance-of-way, capital costs, and general and administrative costs, cannot be easily apportioned to individual trains or routes. Amtrak also has several major ancillary businesses, such as commuter rail services and real-estate ventures, the costs of which need to be properly allocated.

The methodology that the Volpe Center developed for FRA is being integrated into a new Amtrak performance-tracking cost accounting system, which will enable the costs of individual routes to be assessed more accurately than in the past. *(Sponsored by FRA)*

Amtrak's high-speed Boston-New York Acela service. (Volpe Center photo)





## Designing a New Feature to Enhance the Highway Investment Model

One of U.S. DOT's strategic goals is to ensure that transportation assets are maintained in a state of good repair. FHWA uses a formal highway investment model, the Highway Economic Requirements System (HERS), to estimate the benefits and costs of alternative levels of investment in capacity, pavement rehabilitation, and other physical improvements. HERS is a primary contributor to the information and recommendations in the biennial U.S. DOT Conditions and Performance (C&P) Report to Congress on the nation's surface transportation system.

The Volpe Center has been a key partner in the creation and evolution of the HERS model since the 1980s, and today it hosts, maintains, and operates the system for FHWA. The Volpe Center works closely with FHWA to add new features and continually improve the effectiveness of HERS as a decision-support tool. In an effort to ensure the scientific integrity of the model,

The Volpe Center has been a key player in the creation and evolution of the HERS model. (Photo courtesy of Texas Transportation Institute)

enhancements to HERS are regularly subjected to peer review by academic experts.

Recently, the Volpe Center designed a new feature that allows congestion pricing to be analyzed in relation to road usage and investment needs as a policy alternative. Instead of providing a single daily traffic volume for a road segment, this feature permits analysis of three diurnal traffic categories: peak, offpeak, and counterpeak (reverse commuting). *(Sponsored by FHWA)*

## Promoting Best Practices in Emergency Management

This year, the Volpe Center supported a workshop and webinar learning opportunity, "Fort Hood, Texas Army Base Shooting Incident: A Multiagency Emergency," offered by the Transportation Safety Advancement



Group (TSAG) and the U.S. DOT Research and Innovative Technology Administration (RITA) Joint Program Office's (JPO) Talking Technology and Transportation (T3) program. In collaboration with webinar moderator and presenter Jim Reed, who is executive director of the Central Texas Council of Governments, and Linda Dodge of RITA's Intelligent Transportation Systems (ITS) JPO, the Volpe Center delivered a webinar describing how ITS is being used in real-world emergency and incident management. The Volpe Center also coordinated all webinar logistics, including outreach, registration, and onsite technical support, and provided an online webinar summary.

Through its Case Studies Workshops series, TSAG promotes public safety and conducts post-reviews of recent events and incidents and associated emergency-responder experiences. The workshops facilitate discussions among multidisciplinary and multiagency professionals, enabling them to identify technological, institutional, and policy-based successes, failures, and lessons learned. *(Sponsored by RITA JPO)*

## Conducting Alternative Transportation Awareness Surveys in Our National Parks

Volpe Center teams from the Economic and Industry Analysis and the Transportation Policy, Planning, and Organizational Excellence Divisions have conducted surveys for the National Park Service (NPS) in Virginia's Colonial National Historical Park. The park offers visitors a look into the history of colonial America. The Historic Triangle Shuttle services run between Colonial Williamsburg and area highlights, such as the Yorktown Battlefield and the Jamestown Settlement. Lydia Rainville and Paul Minnice of the Economic and Industry Analysis Division and Gabriel López-Bernal of the Transportation Policy, Planning, and Organizational Excellence Division administered a survey to over 500 visitors who arrived by personal



The Historic Triangle Shuttle travels among various park sites, including the Jamestown Settlement and the Yorktown Battlefield. Inset: Lydia Rainville of the Volpe Center's Economic and Industry Analysis Division reviews collected data. (Volpe Center photo)

vehicle, asking about their awareness of the shuttle services. The survey was a continuation of a Volpe Center analysis of transportation at the park and also a follow-up to a survey of shuttle users conducted last year.

On the basis of the data collected, Volpe Center staff will draft a report on the public's awareness of alternative transportation options in the park and will provide recommendations to NPS on how the shuttle might be better utilized in the future.

*(Sponsored by NPS)*

# Safety Management Systems

The Safety Management Systems Center of Innovation (COI) is a national resource for safety management expertise, addressing challenging and complex transportation safety issues in all modes of transportation. The information technology systems that we develop and the data analysis that we perform enable key transportation stakeholders in the public, private, and nongovernmental sectors to take informed and effective actions to reduce the number and severity of transportation-related deaths, injuries, and property-damage incidents.

## Preparing for National Rollout of FMCSA's Highest-Priority Enforcement Program, CSA 2010

This year, the Federal Motor Carrier Safety Administration's (FMCSA) Comprehensive Safety Analysis 2010 (CSA 2010) program, developed with significant support from the Volpe Center, began its national rollout. CSA 2010 is designed to increase the efficiency and effectiveness of FMCSA's motor carrier compliance and enforcement program. FMCSA expects CSA

2010 to improve large-truck and bus safety and thereby achieve major reductions in crashes, injuries, and fatalities. While nationwide implementation is planned to begin in December of 2010, nine states that participated in a 30-month field test of the CSA 2010 operational model are already employing CSA 2010 processes.

The Volpe Center Safety Management Systems COI has made significant contributions to the CSA 2010 effort. Volpe Center staff developed the Carrier Safety Measurement System (CSMS), which assesses individual motor carrier safety performance on the basis of violations found in roadside inspections and crashes. The Volpe Center has also substantially contributed to the development and deployment of a new toolbox of interventions to enable FMCSA and state partners to identify and correct unsafe behaviors identified by CSMS. Throughout the field test of CSA 2010 and leading up to the national rollout, FMCSA and state partners in the field-test states have used the web-based Comprehensive Safety Information System (CSI), developed by the Volpe Center, to help conduct CSA 2010 interventions.

In preparation for the rollout, the Volpe Center engineered time-critical enhancements to CSMS, incorporating lessons learned from the CSA 2010 field test. These enhancements enabled FMCSA to





demonstrate its responsiveness to feedback from field staff and industry. Using CSMS results, the Volpe Center also developed a new congressionally mandated “high-risk” carrier list that identifies companies with higher crash rates and more total crashes than the list currently used by FMCSA. The Volpe Center also developed information resources to display CSMS results to motor carriers on the website in advance of public display. This “preview” fulfilled FMCSA’s objectives of fairness and transparency and so far has allowed more than 16,000 motor carriers to take immediate steps toward self-improvement.

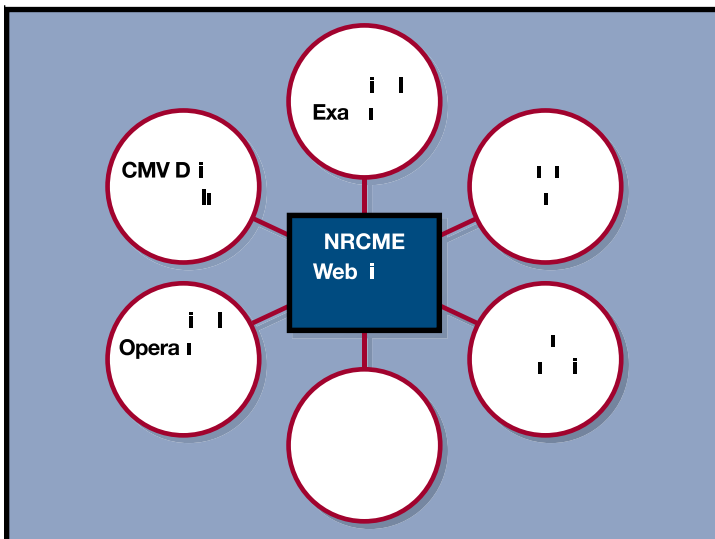
The Volpe Center also developed and continues to maintain a website that has become the outreach centerpiece for CSA 2010. The website has made it possible for internal and external stakeholders to easily obtain the latest information about the CSA 2010 program, including results of the CSMS preview mentioned above, and for FMCSA to enhance understanding and dispel myths. In advance of major milestones, the Volpe Center has prepared public statements and supporting guidance that major trucking-industry trade publications have drawn on to explain CSA 2010 to their readers.

FMCSA truck inspection. (Volpe Center photo)

Finally, in preparation for rollout, the Volpe Center is working, in conjunction with FMCSA’s National Training Center, to develop training materials. These materials will prepare FMCSA safety investigators, their managers, and state partners across the country to begin implementing CSA 2010 interventions. The Volpe Center has also developed a new crash analysis tool that investigators in the nine test states are using to identify underlying causes of crashes. *(Sponsored by FMCSA)*

### **Developing a New National Medical Examiner Database for Truckers**

More than nine million commercial motor vehicle (CMV) operators drive our nation’s buses and heavy trucks. Each of these operators must meet a set of physical qualifications in order to receive or renew a commercial driver’s license. In 1996 and 1997, the Federal Highway Administration (FHWA) convened a negotiated rulemaking committee, which submitted several proposals addressing ways to ensure that



Stakeholders and interactions of the NRCME Website and Roster. (Volpe Center illustration)

medical examiners (MEs) understand the agency’s medical requirements for drivers. One of the committee’s recommendations was to develop models for a national registry and education programs for MEs. In 1999, the national registry idea reemerged with the introduction of the Motor Carrier Safety Improvement Act, which also established FMCSA.

FMCSA has asked the Volpe Center’s Safety Management Systems COI to develop a new National Registry of Certified Medical Examiners (NRCME). The four-year project will enable CMV operators to access, via the Internet, a national database of approximately 40,000 MEs who are certified to determine drivers’ physical qualifications. The Volpe Center will develop, install, deploy, operate, and maintain the NRCME software application; select and purchase system hardware and software; operate a help desk; provide analysis and technical support to FMCSA’s medical program and performance measurement system; and ensure that the system meets all applicable security, accessibility, and continuity-of-operations requirements.

The NRCME will ensure that MEs are certified to perform their essential function and that CMV operators can easily find an ME to examine them. The result will be safer streets, not only for truck and bus drivers but for everyone. *(Sponsored by FMCSA)*

## Supporting Maritime Information Security Initiatives

The Volpe Center’s Safety Management Systems COI has been a key supporter of several Maritime Administration (MARAD) security initiatives. These initiatives include the Information Security Program, which has become increasingly visible as emphasis on protecting personally identifiable information (PII) and securing U.S. DOT’s information technology (IT) assets, such as Internet gateways to the public, has intensified. The Volpe Center has conducted security reviews and prepared certification and accreditation documentation for numerous MARAD IT systems to ensure compliance with U.S. DOT and Office of Management and Budget requirements. The Volpe Center team has also acted as the MARAD information system security officer on an interim basis and is supporting the agency’s effort to create a permanent in-house capability.

For the U.S. Merchant Marine Academy in Kings Point, New York, the Volpe Center reviewed systems supporting vital functions of the academic and administrative communities as well as midshipmen. During initial reviews, the team proposed a separate review of controls and procedures for protecting PII. This review, which the team completed in conjunction with MARAD IT staff, resulted in the successful pilot of a document control system. *(Sponsored by MARAD)*

## Developing a Knowledge Management System for U.S. DOT RD&T Projects

The Research and Innovative Technology Administration’s (RITA) Office of Research, Development, and Technology (RD&T), with the support of the RD&T Planning Team, will be rolling out the new beta version of the web-based Knowledge Management System (KMS) for U.S. DOT’s RD&T projects this fall. This new resource, which the Volpe Center’s Safety Management Systems COI helped to develop, will



enable users to access information on most of U.S. DOT's RD&T activities, including project goals, objectives, and intended outcomes; personnel and funding; award type (grant, contract, or cooperative agreement); and status. Once the system is fully operational, regular data inputs from each U.S. DOT agency will keep the KMS up-to-date.

Development of the KMS began in response to an August 2006 Government Accounting Office report of the department's RD&T activities, which recommended that it develop "a U.S. DOT-wide database of all of the U.S. DOT's RD&T projects that will support RITA's coordination, facilitation, and review efforts."

The consolidation of these data into one system will enable enhanced sharing of RD&T information among users within U.S. DOT and with other agencies, more effective analysis and development of reports, and identification of gaps and areas where cooperation and sharing can bring the greatest benefits. The final KMS version will include a search engine for querying the database from multiple perspectives. The current beta version of KMS will be reviewed by RITA RD&T staff for functionality and screen content. *(Sponsored by RITA/RD&T)*

Screenshot of the Knowledge Management System (KMS), showing search capabilities. (Screen capture of [rita.dot.gov](http://rita.dot.gov))



## Assisting FAA in Safety Management System Pilot Project

The Federal Aviation Administration's (FAA) Office of Aviation Safety (AVS) regulates and oversees safety aspects of the civil aviation industry by establishing safety and certification standards, monitoring safety performance, issuing certificates and licenses, and managing the FAA rulemaking program. Within AVS, the Aircraft Certification Service (AIR) is responsible for industry compliance with safety standards governing the design, production, airworthiness, and continued operational safety of civil aircraft and related components. AIR has requested the Volpe Center's collaboration on its Safety Management System (SMS), given the Center's expertise in safety programs.

Recently, AIR has been investigating ways to implement a more proactive approach to aviation safety that can identify and resolve problems before they emerge and create real safety concerns. In a 2009 advance Notice of Proposed Rulemaking (NPRM), FAA announced that it may require certain aviation companies to establish manufacturers' SMSs within their firms to enhance overall safety. As defined in the NPRM, SMS is "a comprehensive, process-oriented approach to managing safety" that includes "an organization-wide safety policy, formal methods of identifying hazards, mitigating and continually assessing risk, and promotion of a safety culture." A growing number of private-sector companies in a wide variety of fields are creating and upgrading their own SMSs.

AIR has called on the Volpe Center's technical and management experience in safety programs to assist in developing the initial requirements and the evaluation and assessment criteria that an aviation firm would have to meet in order to obtain FAA acceptance for its SMS. These criteria will then be tested against existing aviation SMSs. This effort is expected to last into early 2011, at which point FAA will decide how to proceed. *(Sponsored by FAA)*

# Environmental and Energy Systems

**T**he Environmental and Energy Systems Center of Innovation (COI) provides critical data and analyses to support energy independence, innovations in the movement of people and goods, and transportation-related climate-change mitigation and adaptation. We specialize in the analysis and measurement of climate variability, air quality, and noise. We also maintain substantial expertise in environmental compliance, engineering and remediation, and hazardous materials. The results of our work equip transportation decision-makers at all levels of government and industry with the information necessary to design energy and environmental policy that drives reductions in carbon and other greenhouse gas emissions, promotes energy independence, and prepares our nation and the world for the potential impacts of climate change.

## Setting Aggressive New Fuel Economy and Greenhouse Gas Emissions Standards

The National Highway Traffic Safety Administration (NHTSA), working with the Environmental Protection Agency (EPA), has finalized Corporate Average Fuel Economy (CAFE) standards as part of a new harmonized national program designed to reduce fuel consumption and greenhouse gas emissions. The standards will apply to the new light-vehicle fleet from 2012 through 2016.

NHTSA estimates that the new CAFE standards will result in benefits totaling more than \$180 billion over the lifetime of the more fuel-efficient fleet, including:

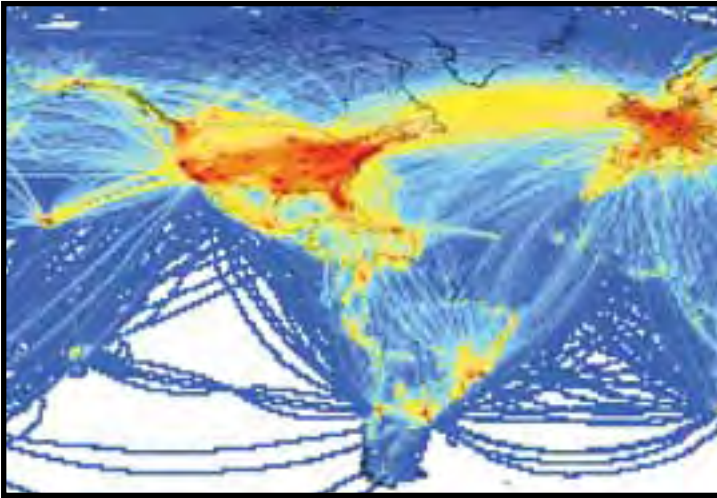
- Cost savings to consumers, from reducing future fuel needs by 61 billion gallons;
- Prevention of 654.7 MMT of CO<sub>2</sub> emissions.

NHTSA expects that, by any measure, total benefits of the new standards will far outweigh total costs.

The Volpe Center supports NHTSA in CAFE rulemaking, in part through managing the CAFE Compliance and Effects model, also known as the Volpe model. For more information, visit:

- Standards for Model Years 2012-2016: EPA-NHTSA Joint Final Rule; <http://www.epa>.





AEDT Global Fuel Burn Data for One Year. (Volpe Center image)

gov/otaq/climate/regulations/420f10014.pdf

- Related December 2009 Volpe Highlights article, Joint Rule Proposed for New Fuel Economy Standards; <http://www.volpe.dot.gov/infosrc/highlts/09/dec/fuel.html>.  
(Sponsored by NHTSA)

## Beta Versions of New Aviation Environmental Tool Released

The Federal Aviation Administration (FAA) Office of Environment and Energy (AEE), with support from the Volpe Center, is developing a new suite of tools that will enable the analysis of interdependencies of aviation fuel burn, noise, and emissions. In 2010, the Volpe Center led the development, integration, and testing of three beta versions of the Aviation Environmental Design Tool (AEDT), which were released to a Design Review Group (DRG) made up of consultants, industry, and academia stakeholders. (Sponsored by FAA)

## Volpe Center Is Federal Leader in Environmental, Energy, and Economic Performance

The Volpe Center has continued to encourage a culture of recycling and energy efficiency with great success. This year, the White House Council on Environmental Quality (CEQ) identified the Volpe Center as a Federal

leader in undertaking model efforts to improve environmental, energy, and economic performance. The summary of Federal contributors (<http://www.whitehouse.gov/sites/default/files/microsites/20100128-ceq-agency-stories.pdf>) is a supplement to an Executive Order (<http://www.whitehouse.gov/administration/eop/ceq/initiatives/sustainability>) that raises the bar for Federal agencies to lead the development of best practices in several categories, including greenhouse gas emissions management and efficient use of water resources.

The Volpe Center Green Team and Real Property and Facility Services have been working closely together since 2007 to improve the environmental and energy performance of the Cambridge, Massachusetts campus, with significant results. Initiatives such as bringing in utilities to conduct energy audits and diverting waste through recycling efforts have saved the Center 185 metric tons of carbon dioxide. The Center is proud to continue short- and long-term improvements, promoting awareness among U.S. DOT employees and working toward a more sustainable future.

## White House Designates Volpe Commuter Choice Survey as Best Practice for Federal Agencies

The White House CEQ distributed the Volpe Center's Commuter Choice Survey in the fall of 2010. CEQ provided all Federal agencies with this survey as the best resource currently available to estimate greenhouse gas emissions attributable to the commuter travel of Federal employees. The Volpe Center's Green Team developed the survey. The team works to integrate environmental sustainability considerations in the facility planning process at the Volpe campus.

The survey originated out of the need for data on the Center's commuting population to support an application for LEED certification from the U.S. Green Building Council. The Green Team designed and implemented the innovative survey for the nearly 600 Volpe Center Federal employees. Results from the

survey revealed that respondents opt for alternative commuting for the majority of their trips and that commuting flexibility (flexible arrival/departure times, telework, and compressed-work-week options) strongly contributes to worker satisfaction.

The survey gathers information on an entire week of commuting activity from each respondent and includes questions regarding demographics, sustainability, and the psychological aspects of commuting. The survey supports the requirements of an Executive Order (<http://www.whitehouse.gov/administration/eop/ceq/initiatives/sustainability>) mandating that Federal facilities evaluate opportunities to reduce greenhouse gas emissions from employee commuting. Following a high-level Federal review process, a revised version of the survey was released to Federal agencies as a model practice.

## Preserving Natural and Cultural Resources in U.S. National Parks

While they are enjoying the sounds of rustling leaves, rushing winds, or falling rains, visitors to some national parks may intermittently see and hear aircraft from sightseeing flights overhead. In recognition of the potential negative impacts from aircraft noise, FAA and the National Park Service (NPS) are developing Air Tour Management Plans (ATMPs) for approximately 80 national parks where commercial air tours operate.

The objective of ATMPs is to provide acceptable and effective measures to mitigate or prevent significant adverse impacts of commercial air-tour operations upon natural and cultural resources, visitor experiences, and tribal lands. The Volpe Center's Environmental and Energy Systems COI supports ATMP implementation, including the monitoring of ambient sound levels in the parks to establish a baseline for use in impact assessment.

Over the course of the year, acoustic specialists have gathered data in 21 parks across five states. These experts characterized the soundscape of even the most



The team adjusts acoustic monitoring equipment at Agate Bridge in Arizona's Petrified Forest National Park. (Volpe Center photo)

remote areas of the parks, even if they are carrying 50-lb backpacks and are hiking for miles on snow-covered or muddy trails. (*Sponsored by FAA*)

## Earning Departmental Sustainability Achievement Award for Alternative Fuels Initiative

In 2010, the first Sustainability Achievement Awards ceremony within U.S. DOT took place in Washington, DC. Kathryn Thomson, counselor to the Secretary and newly named senior sustainability officer, presented awards in five categories. A team comprising FAA and Volpe Center contributors earned an award in the category of Alternative Fuels/Fuels Conservation. The award recognized the team's support in advancing research and evaluating alternative aviation fuels through the Commercial Aviation Alternative Fuels Initiative (CAAIFI), a multisector coalition that FAA cosponsors with the Air Transport Association, the Airports Council International-North America, and the Aerospace Industries Association. (*Sponsored by FAA*)

## Providing Traffic Noise Modeling Support to FHWA

In September, Dr. Judy Rochat and Michael Lau of the Volpe Center's Environmental Measurement and Modeling Division participated in an On-Board Sound



Intensity comparison study on North Carolina highways near Charlotte. The tire/pavement noise-measurement data that were collected will assist in implementing the effects of various pavement types in the Traffic Noise Model (TNM), which the Volpe Center developed and currently maintains for the Federal Highway Administration's (FHWA) Office of Natural and Human Environment. FHWA's Office of Pavement Technology has joined with that office to support the study. The Volpe Center is assisting FHWA and other government agencies in developing measurement and modeling techniques pertaining to the mitigation of transportation-related noise and exhaust emissions. *(Sponsored by FHWA)*



Vehicle equipped to gather Traffic Noise Model data. *(Volpe Center photo)*

## Developing International Standards for Alcohol Countermeasures Program

The Volpe Center's long and distinguished list of accomplishments in alcohol countermeasures and transportation has given it a nationally recognized leadership position in the field. Since its founding in 1970, the Volpe Center's Alcohol Countermeasures Program has continually assisted NHTSA as well as other sponsors, such as the Office of the Secretary of Transportation and the Federal Transit Administration, in designing



Dr. Art Flores and Ed Conde with a breath-alcohol testing device in the Volpe Center's Alcohol Countermeasures Lab. *(Volpe Center photo)*

and developing devices and programs that can accurately detect the presence of alcohol in transportation drivers and operators.

One of the program's major current activities is its participation in the International Organization of Legal Metrology (OIML). Volpe Center staff are part of the OIML working group that is drafting recommended international standardized procedures for evaluating breath-alcohol testing and screening devices, or evidential breath testers (EBTs). Other activities, many of which take place in the Alcohol Countermeasures Lab at the Volpe Center, include developing specifications for and testing EBTs and calibration units and testing submitted breath-test samples. The Volpe Center helped to develop, validate, and calibrate these technologies through scientific testing.

In addition to its 40-year history at the Volpe Center, the Alcohol Countermeasures Program is remarkable for having had only two technical program managers: Dr. Art Flores, from 1970 until 2005, and Ed Conde, the current manager. At NHTSA's request, the Volpe Center frequently provides expert testimony on the validity of breath-alcohol tests and testing devices for pretrial hearings, court appearances, telephone testimony, depositions, and affidavits. *(Sponsored by NHTSA)*

# Freight Logistics and Transportation Systems

The Freight Logistics and Transportation Systems Center of Innovation (COI) maintains expertise in all aspects of local, regional, national, and global freight logistics and transportation infrastructure. Issues addressed include physical and cyber security, logistics management systems, and maritime domain awareness. With increasing international trade and demand for freight transportation, our expertise enables the rapid development of technologies that increase the capacity of these systems while also improving security, safety, and environmental stewardship.

## Tracking Maritime Vessel Traffic Along the Mexican Gulf Coast

In support of the U.S. Northern Command (NORTHCOM) and the U.S. Department of Defense Counter-Narcoterrorism Technology Program Office, and in collaboration with the U.S. Embassy in Mexico and SEMAR (the Mexican Navy), Volpe Center engineers are providing technical expertise and systems deployment support to enhance Mexico's maritime vessel tracking capabilities.

This summer, Volpe Center engineers along with a SEMAR technical team successfully deployed Automatic Identification System (AIS) sensors at ten facilities along the Gulf Coast of Mexico. The Volpe Center also provided technical support and systems training to the Mexican Navy, building on expert knowledge gained from previous deployments of vessel tracking systems for the Panama Canal Commission, the St. Lawrence Seaway, the U.S. Coast Guard, and the U.S. Navy. Site surveys, site design, and on-site installation support were provided by the Volpe team. During site installations, the Volpe team also recommended best practices for safety, site-equipment configuration, installation, and long-term systems sustainment.

The newly deployed sensor network has made vast improvements in maritime domain awareness by providing Mexican authorities with the location and identity of commercial vessels operating off their East Coast. The launch of the sites centralizes previously fragmented tracking of coastal commercial ship traffic.

During the next phase of enhancing Mexican and global maritime domain awareness, NORTHCOM and the Volpe Center will continue to provide technical support in the installation of AIS systems at 13 sites along Mexico's Pacific Coast. Each of those sites will contribute local ship traffic information to the Volpe





Screenshot displaying details for a commercial ship inbound to Haiti. (Google Earth overlay of MSSIS data)

### Center-developed Maritime Safety and Security Information System (MSSIS).

Ultimately, data from all 23 Mexican sites will be consolidated as part of the country’s maritime information network, prior to streaming the data to the Volpe Center. As Mexico further develops its maritime domain awareness capabilities, it joins over 60 nations freely contributing their data to MSSIS, enhancing situational awareness and increasing safety and security worldwide. *(Sponsored by U.S. Navy)*

### Assisting DoD in Haitian Relief Efforts

In the aftermath of Haiti’s devastating earthquake in January of 2010, the arrival details of ships delivering supplies have been critical to relief organizations. With support from the Volpe Center’s MSSIS team, the U.S. Department of Defense (DoD) has ensured that deployed Naval Co-operation and Guidance for Shipping (NCAGS) personnel have continuous access to real-time data for commercial ships arriving in Haiti. NCAGS passes on this information to other

organizations engaged in the relief effort, enabling them to accelerate the distribution of supplies.

*(Sponsored by U.S. Navy)*

### Bright Idea in Government Award: A Logistics Solution for the UK Ministry of Defence

The United Kingdom’s Ministry of Defence (UK MOD) approached the Volpe Center’s logistics experts with a challenge: design an interim solution for real-time active management of MOD cargo operations worldwide to bridge the gap between the shutdown of its old tracking system and the implementation of a new system. The intended replacement system was inadequate and behind schedule.

The Volpe Center designed a functional Interim Cargo Solution (ICS) system for UK MOD within seven months. The system has been operating so well that UK MOD is planning to use ICS as its main cargo solution until at least mid-2012. In addition to meeting performance goals, the Volpe Center team developed the solution for under 375 thousand in U.S.

dollars, a fraction of what had been already spent on the originally intended replacement system.

The Volpe Center's solution was recently recognized by Harvard University's Kennedy School of Government as a "Bright Idea in Government." UK MOD sponsors are delighted by this honor and have expressed that it "directly reflects the value we place upon the Volpe Center's contributions to the UK MOD." (*Sponsored by UK Ministry of Defence*)

### **Assessing Challenges to Nation's Marine Transportation System**

Waterborne international freight is extremely important to the U.S. economy, with imports and exports accounting for 20 to 25 percent of the nation's gross domestic product. The U.S. Committee on the Marine

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Active port in New Jersey. (© iStockPhoto.com/jlm5571)

Transportation System (CMTS) is an interagency group, chaired by the Secretary of Transportation and representing over a dozen U.S. government departments and agencies with maritime responsibilities. CMTS was created to investigate ways of maintaining and improving the operations of the nation's Marine Transportation System (MTS). One of the five priority areas for CMTS is an assessment of the resilience and reliability of MTS when faced with natural or manmade events that may impede its effectiveness.

With sponsorship from the U.S. Army Corps of Engineers, Dr. Bahar Barami of the Volpe Center's Freight Logistics and Transportation Systems COI delivered a 2010 report entitled "Assessment of MTS Challenges to CTMS." The report evaluates MTS risks arising from infrastructure and capacity constraints; trade and economic challenges; and safety, security, environmental, and institutional limitations. It applies a risk-and-resiliency analysis framework,





developed specifically for the assessment; evaluates inherent elements within the system that can mitigate the consequences of MTS risk factors; and identifies technology-deployment and policy solutions that would enhance MTS sustainability and resiliency. Two additional Volpe Center reports, included in the final “Assessment of MTS Challenges,” are “A Study on Short Sea Shipping,” conducted for the Office of Naval Research, and “Benefit Cost Analysis of Electronic Navigation Charts,” prepared for the National Oceanic and Atmospheric Administration. *(Sponsored by U.S. Army Corps of Engineers)*

### Aviation Security Workshop Brings Together Key Stakeholders

New “E-enabled” aircraft are incorporating increasing amounts of nonclassified technologies such as open standard internet communication protocols and commercial-off-the-shelf equipment, that can add significant benefits in terms of aircraft efficiency and capabilities. The open nature of these systems raises concerns about the corresponding increase in cyber-security vulnerabilities and threats to aircraft safety.

To assist in managing these concerns, the Volpe Center developed the Airborne Network Security Simulator (ANSS) at Wichita State University (WSU) in Kansas for the Federal Aviation Administration (FAA) and DoD. ANSS integrates commercial and military aeronautical simulators providing a controlled test bed to identify security threats in airborne network environments. It can be used to test, evaluate, and calibrate aviation systems and equipment; assess their potential weaknesses and vulnerabilities in a safe environment; and develop new and upgraded industry and regulatory policies and standards to address aviation security issues.

In 2010, the Volpe Center’s Freight Logistics and Transportation Systems COI organized the first ANSS Demonstration and Technical Workshop at WSU. The meeting attracted over 70 international participants from both the military and commercial

aviation communities, including: the FAA; the DoD; the Defense Information Systems Agency; the Department of Homeland Security (DHS); the United Kingdom Communications Electronic Security Group (CESG); American, Delta, Lufthansa, and United airlines; aircraft, engine, and avionics manufacturers such as Airbus, Boeing, Cessna, Honeywell, Pratt and Whitney, Rockwell Collins, and Thales; IT companies; and several universities. The Volpe Center/WSU demonstration included a security test of a Class 3 Electronic Flight Bag and the wireless connection used to distribute flight plan and performance information from an airline. *(Sponsored by FAA)*

### Assisting the DHS in Strengthening Cyber Security Across Modes

U.S. Presidential Decision Directive 63 (1998) established Critical Infrastructure Protection as a national goal that requires the government and private-sector cooperation in order to “protect the physical and cyber-based systems essential to the minimum operations of the economy and the government.” The DHS has been assigned Federal “sector-specific agency” responsibility for coordinating cyber-security activities with the private sector and other levels of government for transportation and ten additional

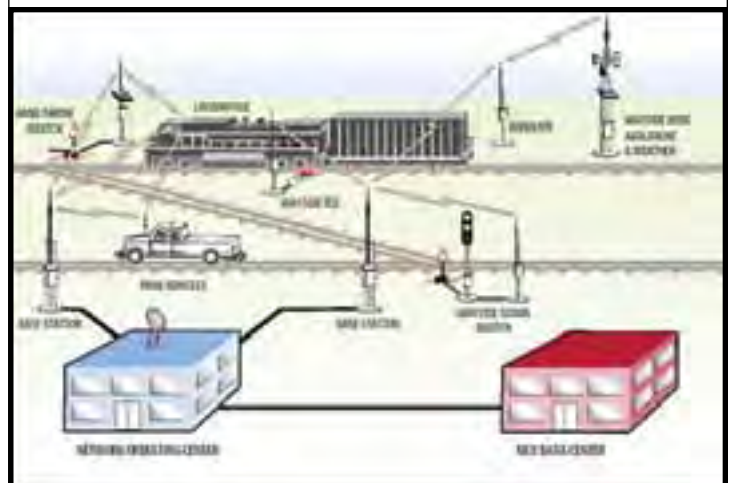


Diagram of a typical Positive Train Control communications network, showing reliance on wireless service. (Image courtesy of MeteorComm, LLC)

critical infrastructure sectors. To assist in carrying out this responsibility, the DHS National Cyber Security Division's Control Systems Security Program (CSSP) office has initiated a support agreement with the Volpe Center's Freight Logistics and Transportation Systems COI. DHS selected the Center because of its extensive knowledge base, expertise in transportation and information systems, and 40 years of experience in the development and implementation of complex technology-based systems within transportation.

Under this new agreement, the Volpe Center will support CSSP over a comprehensive range of specific transportation cyber-security tasks that cover every mode. Anticipated activities include identifying and assessing the vulnerabilities of major U.S. transportation control systems (TCS); preparing a cyber-security roadmap with information on how to enhance the security of these systems; creating a prototype cyber laboratory for testing and validating TCS cyber-security measures; developing transportation-based scenarios for use in national-level cyber exercises; providing outreach, awareness, and educational support and enhanced professional capacity building; and expanding collaborative cyber-security efforts with other U.S. and international members of the transportation community. *(Sponsored by DHS)*

## Testing of Surface Transportation Security Technologies

In January 2010, the Volpe Center completed a three-year program to support the Transportation Security Administration (TSA), Office of Surface Transportation Security Technology. The effort comprised four distinct projects:

- Analysis of Alternatives for Detection of Chemical/Biological Threats
- Analysis of Automatic Equipment Identification (AEI) Network Technology
- Analysis of Remote Bus Communication and Control Technologies
- Assessment of Bus OEM Security Technology

The project that yielded the most visibility to TSA and the Volpe Center was the Analysis of Remote Bus Communication and Control Technologies. Testing of these technologies was conducted on San Diego Metropolitan Transit System (MTS) buses and included participation by El Cajon and La Mesa Police Special Weapons and Tactics (SWAT) teams. Two tests were performed; one involving a satellite-based remote bus-disabling system and the other, a cellular-based system. In both cases, a realistic bus-hijacking scenario was staged and the effectiveness of both bus-disabling systems was assessed. The project led to a recommendation for inclusion of one of the systems as an approved product for TSA grant funding. *(Sponsored by TSA)*

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Scenario tests of bus communication and control technologies that included participation by TSA, the Volpe Center, San Diego MTS, and the La Mesa and El Cajon police departments. (Volpe Center photo)





## Field Operational Testing of Blast-Resistant Cameras

In September 2010, the Volpe Center, in support of the DHS, Science and Technology Directorate (S&T), conducted a field test of Blast-Resistant Autonomous Video Equipment (BRAVE). S&T had previously conducted functional and explosive testing on these cameras and had determined that they are capable of recording video and storing the recorded data internally in a blast-resistant manner. The Volpe Center tested the cameras on platforms, inside facilities, and onboard vehicles at four transit agencies:

- North County Transit District, Oceanside, California
- Niagra Frontier Transportation Authority, Buffalo, New York
- New Orleans Regional Transit Authority, New Orleans, Louisiana
- Spokane Transit Authority, Spokane, Washington

The Volpe Center conducted periodic inspections of the equipment and compiled findings for S&T regarding the functionality of the cameras, including feedback from the host transit agencies. *(Sponsored by DHS)*

## Developing a Security Strategic Plan for the MBTA

The Volpe Center is supporting the Massachusetts Bay Transportation Authority (MBTA) by developing a strategic plan that will provide a roadmap toward an integrated, cohesive security and surveillance network. Historically, improvements to the MBTA's security infrastructure have been accomplished incrementally, incorporating a variety of equipment.

The Volpe Center's efforts have been twofold. First, it conducted an assessment of current and planned videosurveillance projects and recommended actions to ensure that the equipment is compatible, cutting-edge, and able to be supported by current and planned network capacities. Second, it performed a systemwide security assessment and developed a gap analysis intended to highlight deficiencies that will exist in spite of current and planned security upgrades.

*(Sponsored by MBTA)*

## Next Generation Explosive Detection for Surface Transportation

In 2010, the Volpe Center launched a two-year program in support of the DHS/S&T. The Volpe Center's Freight Logistics and Transportation Systems COI is conducting site assessments across the country to frame the explosive detection technology solution space for the surface transportation environment. The information will identify common, as well as unique environmental and operational characteristics of mass transit systems, allowing development of explosive detection equipment specifically designed for mass-transit heavy- and light-rail operations.

The aviation sector has spent billions of dollars on research, development, test, and evaluation, (RDT&E) deployment and training associated with explosive detection technology. Multiple studies and pilot projects have demonstrated that these solutions are inadequate to meet the environmental and operational environment of the surface transportation sector. DHS/S&T is leveraging the Volpe Center's skills and expertise in multimodal transportation, physical security, counter-terrorism RDT&E, and security technologies to characterize mass-transit systems. *(Sponsored by DHS)*

# Physical Infrastructure Systems

As the nation places increasing demands on an aging transportation system, the Physical Infrastructure Systems Center of Innovation (COI) seeks new approaches to maintain, renew, and expand this infrastructure. Volpe Center engineers provide technical support in the inspection, maintenance, and rehabilitation of existing and future vehicles, guideways, and intermodal facilities. Our group's internationally recognized expertise in the utilization of new materials and in the creation of novel engineering concepts and robust institutional approaches ensures the safety and resilience of the nation's transportation infrastructure.

## Improving Safety for Hazmat Rail Tank Cars

Rail transport has proved to be the safest method for moving large quantities of hazardous chemicals around the nation. In support of the rail tank-car safety program of the Federal Railroad Administration's (FRA) Office of Research and Development, the Volpe Center's Physical Infrastructure Systems COI conducts detailed

research into the design, structural behavior, and causes of metal fatigue and fractures in rail tank cars that carry hazardous freight.

The Volpe Center has provided FRA with technical support over the past three decades. Activities have included developing head-shield protection and shelf-coupler design options to protect tanks during derailments, reducing derailment likelihood, undertaking damage-tolerance analyses to determine the point at which detectable flaws in a tank car require repair or replacement, understanding the contribution of residual cracks caused by welding processes to the growth of these flaws, and studying the behavior of tank-car shells under extreme conditions such as impacts, derailments, and collisions.

This year, the Volpe Center utilized the unique resources of Lehigh University in Bethlehem, Pennsylvania, to assist in studying tank-car shell protection. Lehigh's Center for Advanced Technology for Large Structural Systems operates a Baldwin universal test machine that can exert up to five million lbs of force on a test panel. An FRA contractor manufactured 16 test options for panel reinforcement. The Baldwin machine deformed these panels and measured their structural characteristics. Results were compared to determine which options would best help to protect tank cars against impacts and collisions.





Volpe Center mechanical engineer Michael Carolan inspects a prototype panel after a structural bend test at the Lehigh Center for Advanced Technology for Large Structural Systems. (Volpe Center photo)

Volpe Center staff are using the test results to develop new design concepts for protecting tank cars. The draft report on this project, “Deformation Behavior of Welded Steel Sandwich Panels under Quasi-Static Loading,” is currently under review by FRA for publication. *(Sponsored by FRA)*

## Reviewing Rail Trespass in South Florida

Rail trespass is becoming an increasing problem around the United States. In the past few years, a number of deaths have occurred along a seven-mile stretch of rail in Florida’s West Palm Beach. Hoping to identify solutions that can prevent rail-trespass deaths, FRA approached the Volpe Center to initiate a Trespass Prevention Guidance Demonstration project.

Volpe Center experts from the Physical Infrastructure Systems COI are working closely with the South Florida Regional Transportation Authority and

stakeholders in West Palm Beach. They will review pedestrian safety at or near rail passenger stations; local, state, and Federal laws regarding trespass on railroad property; vandalism affecting railroad safety; and violations of highway-rail grade crossing warning devices.

The research will be conducted in an ongoing two-year program, which will entail development and periodic revisions of model prevention strategies. The Volpe Center anticipates that the results and lessons learned will provide nationwide guidance on the topic of railroad trespass prevention that will enhance safety by reducing injuries and deaths. *(Sponsored by FRA)*

## Assisting Fuel Cell Bus Technology Development

The Federal Transit Administration (FTA) administers the National Fuel Cell Bus Program (NFCBP), authorized through the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) to facilitate the development of commercially viable fuel cell bus technologies and



NFCBP battery-dominant hybrid hydrogen fuel cell transit bus outside U.S. DOT headquarters in Washington, DC. (Photo courtesy of the National Fuel Cell Bus Program)

related infrastructure. The goals of NFCBP are to advance technology, reduce production costs, and increase public acceptance of fuel cell vehicles.

The Volpe Center provides technical assistance and management support to FTA with an emphasis on system safety, energy storage, bus systems integration, and fueling infrastructure. In addition, the Volpe Center is tracking fuel cell bus technology demonstrations across the country and around the world, including in California, Connecticut, Brazil, Canada, China, Japan, and several European cities.

Also in support of FTA, Barry Mickela of the Volpe Center's Physical Infrastructure Systems COI coordinated a two-day NFCBP meeting on April 8th and 9th in Washington, DC. Three consortia — the Center for Transportation and the Environment, the

Northeast Advanced Vehicle Consortia, and Calstart (Clean Transportation Technologies and Solutions) — presented and discussed successes, drawbacks, and best practices related to recent advancements in fuel cell technology.

As part of the Volpe Center's support of NFCBP, Karen Shilo of the Environmental and Energy Systems COI represented FTA at Fuel Cell Exposition 2010 in Tokyo. The exposition addressed strategies related to fuel cells, connections between clean and energy-secure systems, the creation of sustainable communities, and improved livability through the reduction of particulates and other urban emissions in transportation.

*(Sponsored by FTA)*

### **Supporting Air Traffic Control Upgrades at Military Bases in the Pacific Region**

The Volpe Center's Physical Infrastructure Systems COI is assisting the U.S. Air Force's (USAF) Pacific



Air Forces Major Command and the 853rd Electronic Systems Group at Hanscom Air Force Base in Bedford, Massachusetts in a series of upgrades and relocations of air traffic control facilities and landing systems at military air bases in the Pacific region. The Volpe Center conducts preparations and relocations of current sites to new, more modern air traffic control tower and radar approach control facilities at these bases. A Volpe Center team provides onsite technical assistance to manage site and cutover preparations, testing from old to new facilities, and system inspection and acceptance.

Upgrades at these air bases also include testing Enhanced Terminal Voice Switch Systems and installing Standard Terminal Automation Replacement Systems, which fuse multiple radar inputs and track and display both aircraft and weather conditions to air traffic controllers. Upgrades have been completed for Kadena and Yokota Air Bases in Japan and Kunsan Air Base in Korea. *(Sponsored by U.S. Air Force)*



Volpe Center engineer Ted Papadopoulos at Yokota Air Base in Japan.  
(Volpe Center photo)

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# Communication, Navigation, and Surveillance (CNS) and Traffic Management Systems

The Communication, Navigation, and Surveillance and Traffic Management Systems Center of Innovation (COI) supports systems that alleviate air traffic congestion, thereby improving safety as well as environmental and on-time performance. We specialize in research and systems development, focusing critical expertise on the Next Generation Air Transportation System (NextGen). Our work develops and supports internationally recognized real-time, operational communication, navigation, surveillance, and decision support, resulting in an improved flow of air traffic around the world.

## Tackling Traffic and Reducing Delays at JFK International Airport

At one of America's busiest airports, John F. Kennedy International (JFK), one might wonder what behind-the-scenes measures air traffic controllers and managers are taking to address congestion and reduce delays. Currently, the Volpe Center is assisting the Federal Aviation Administration (FAA) in designing and deploying cutting-edge technology to enable air traffic

personnel to provide increasingly safer and more efficient service to airlines and passengers. At JFK, the Volpe Center has supported the implementation of two enhancements of the Airport Surface Detection Equipment, Model X (ASDE-X) aircraft tracking system.

ASDE-X is an Internet-age version of radar that enables air traffic controllers and managers to "see" aircraft on taxiways and runways even when they are not visible from the tower cab, potentially due to fog, haze, or other obstructions, by viewing a real-time display.

The Volpe Center and Sensis Corporation, on behalf of FAA, implemented a unique extension of ASDE-X to provide aircraft position data for the entire JFK airport surface right up to the parking gate. With real-time monitoring of queues in these previously "invisible" areas, decision-makers can better anticipate backups and balance departures and arrivals.

The second ASDE-X enhancement distributes aircraft tracking data to FAA personnel and other key airport management participants: the Port Authority of New York and New Jersey, the Transportation Security Agency, and the airlines. A commercial product developed to support operational use of ASDE-X data organizes this information for rapid, accurate interpretation and prediction of congestion trouble





With ASDE-X enhancements, air traffic controllers and managers can track aircraft on the entire airport surface right up to the parking gate. (Photo courtesy of Ad Meskens)

spots. With this common “airport picture” available to decision-makers, adjustments that impact operations can be made sooner.

These operational improvements are especially valuable, given that JFK temporarily closed its longest runway for upgrades during the spring of 2010. With the Volpe Center’s assistance, FAA was able to ensure that ASDE-X provided the best possible information to air traffic controllers and managers under any scenario. *(Sponsored by FAA)*

### **Award-Winning Expansion of Air Traffic Control in the Gulf of Mexico**

FAA’s Automatic Dependent Surveillance-Broadcast (ADS-B) team, which includes Volpe Center staff, was recognized by FAA Administrator J. Randolph Babbitt and the Helicopter Association International for successfully expanding air traffic control (ATC) services in the Gulf of Mexico. ADS-B is one of the major programs that will enable NextGen, the ongoing,

wide-ranging transformation of the National Airspace System.

The team has been working to ensure that aircraft over the Gulf can take advantage of the full array of ATC services available from Houston Control. The Volpe Center was instrumental in the selection of and negotiation for deployment sites on petroleum exploration and production platforms. With ADS-B radio stations located on these platforms, significantly reduced aircraft separations will be achieved.

Early in 2010, Administrator Babbitt traveled to Texas to announce that Houston air traffic controllers are beginning to use ADS-B in the Gulf of Mexico and to recognize FAA and Volpe Center staff for successfully attaining the initial operating capability target date for ADS-B service in the area. Matthew Maki of the Volpe Center’s Communication, Navigation, and Surveillance (CNS) and Traffic Management Systems COI participated in the awards ceremony.

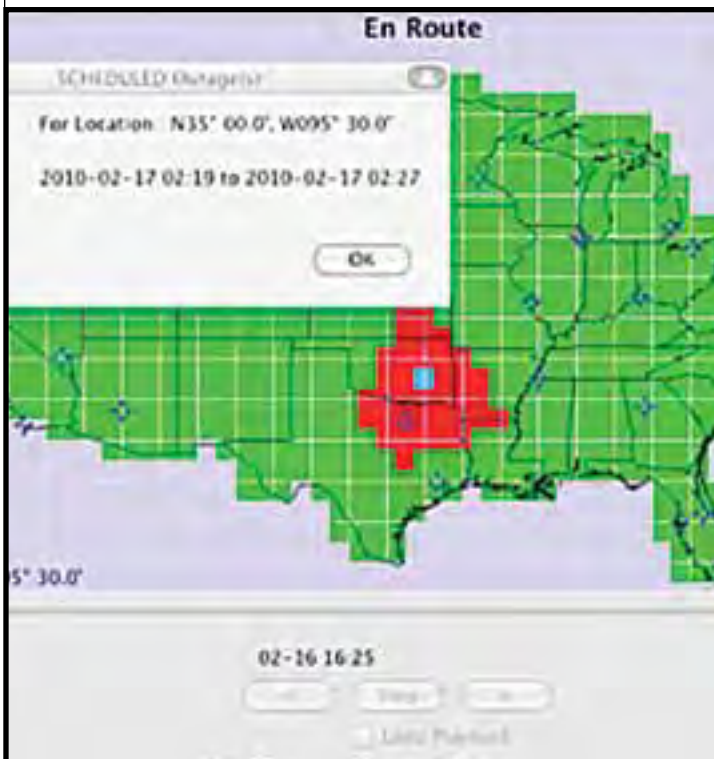
At HAI’s annual conference, Mr. Maki accepted the Salute to Excellence group award, which recognized Volpe Center support for this effort, and the individual award for Meritorious Service in recognition and appreciation of his own outstanding service to the international helicopter community. *(Sponsored by FAA)*

## Predicting GPS RAIM Outages to Support NextGen Flight Planning

When pilots rely solely on global positioning system (GPS) satellites for Area Navigation (RNAV), flight planners need to confirm ahead of time that the pilots will have adequate GPS signal integrity, or Receiver Autonomous Integrity Monitoring (RAIM) availability, from takeoff until landing. FAA issued Advisory Circular 90-100A to formally establish the practice of performing predeparture integrity checks. FAA approached the Volpe Center to build a compliance tool so that carriers, in particular smaller airlines, would not be burdened with costly upgrades.

In July 2009, the Volpe Center project team successfully launched the GPS RAIM Prediction website, a set of web-based tools that FAA provides free of charge to enable compliance with the standard. On any given day, flight managers submit about 25,000 flight plans through the site's Extensible Markup Language (XML) interface to check predicted RAIM availability along planned routes. The site also provides a map display

Screenshot from the GPS RAIM Prediction website, indicating that a flight will encounter a RAIM outage along its intended path. (Volpe Center image)



and a flight planning form for users who lack the means to develop an XML client, and it includes warnings to indicate predicted outages so that flight managers can adjust flight plans as necessary.

In just eight months, the GPS RAIM Prediction website received over five million queries. The Volpe Center team has monitored and modified the site to handle the high volume and is assisting in transferring operations from the Communication, Navigation, and Surveillance (CNS) and Traffic Management Systems COI to a 24-hour monitoring team at FAA's William J. Hughes Technical Center in Atlantic City. The cost-effective, rapid development of this tool supports the near-term implementation of RNAV, a key component of NextGen that reduces fuel use, shortens flight times, and mitigates airspace congestion. *(Sponsored by FAA)*

## Assisting FAA in Enhancing Alaskan Air Safety

Navigating an aircraft through the rugged mountains of Juneau is always a challenge for both pilots and air traffic controllers because of the lack of precise radar coverage. This has meant that aircraft have had to be separated by greater distances than are normally required. Now, thanks to FAA and the Volpe Center's Communication, Navigation, and Surveillance (CNS) and Traffic Management Systems COI, the job has become much easier.

The Juneau Wide Area Multilateration (WAM) system, developed by FAA with Volpe Center assistance, achieved initial operational capability in late January of 2010. WAM consists of a series of small sensors, distributed around Juneau airspace, that send and receive signals to and from aircraft in the region via onboard transponders. WAM then multilaterates the return signals to provide air traffic controllers with the precise location of each aircraft. As a result, the capacity of Juneau's airspace can be significantly increased with the added benefit of increased safety. WAM surveillance complements ADS-B services that were added to the airspace in April 2010. *(Sponsored by FAA)*



# Human Factors Research and System Applications

**A**s an internationally recognized research and development team, the Human Factors Research and System Applications Center of Innovation (COI) improves transportation safety, security, and productivity. The Volpe Center team performs pioneering research and evaluation of the increasingly complex relationships between humans and transportation systems, including current and future automation technologies. In addition, this COI is involved in designing and testing technology and procedures for human use, and supports other projects at the Center and across all modes of transportation. We seek to minimize operator errors, and provide a means to easily recover, which often entails improving related policy and refining the underlying engineering.

## Investigating the Auditory Detectability of Hybrid Electric Vehicles in Low-Speed Operation

Preliminary analysis by the National Highway Traffic Safety Administration (NHTSA) shows that hybrid

electric vehicles are two times more likely than internal combustion engine vehicles to be in a pedestrian crash when the vehicle is backing out, slowing/stopping, starting in traffic, or entering or leaving a parking space/driveway. There was a concern that a reduction in the auditory cues emitted by vehicles operating in electric mode could be a potential contributing factor. A perceivable reduction in the sounds emitted by vehicles presents a safety concern for pedestrians as these sounds are often the first or only cues that they use to avoid a conflict. The issue is relevant for all pedestrians but is a critical concern for individuals who are visually impaired.



The Volpe Center recorded the sounds of hybrid-electric and internal combustion engine vehicles in various speed and operating modes and used the recordings to examine the auditory detectability of vehicles by vision-impaired pedestrians. (Volpe Center photo)

The Volpe Center has been assisting NHTSA in investigating this issue through the Quieter Cars and the Safety of Blind Pedestrians research program. Staff from the Volpe Center's Human Factors Research and Systems Applications COI and the Environmental and Energy Systems COI worked with NHTSA to develop and implement the program's research plans. In the first phase of this research, completed in 2010, the Volpe Center documented the acoustic characteristics of several vehicles and examined the auditory detectability of these vehicles in a variety of low-speed operations. The second phase of the research is underway as the Volpe Center explores the feasibility of developing specifications requirements for synthetic vehicle sounds (i.e., audible countermeasures) to be used in electric vehicles, plug-in hybrid electric vehicles, or hybrid electric vehicles operating in electric mode.

The Volpe Center and NHTSA have taken an active role in connecting with various public and private entities and seeking their input concerning this research. These entities include the Alliance of Automobile Manufacturers, the American Council of the Blind, the American Foundation for the Blind, the Association of International Automobile Manufacturers, the Environmental Protection Agency, the Carroll Center for the Blind, the International Organization for Standardization, the Japan Automobile Manufacturers Association, the Massachusetts Commission for the Blind; National Federation of the Blind, Perkins School for the Blind, the Society of Automotive Engineers, and the United Nations Economic Commission for Europe, World Forum for Harmonization of Vehicle Regulation.  
*(Sponsored by NHTSA)*

## **New Locomotive Simulator Serves as Human Factors Laboratory**

The Volpe Center provides human factors services to support safe and productive railroad operations, including assessment of railroad system performance, investigation of human performance in railroad



Panoramic view of the CTIL simulator's interior. (Volpe Center photo)

operations accidents, and identification of methods for reducing accidents and improving working conditions for the Federal Railroad Administration (FRA).

Early in 2010, FRA installed the Cab Technology Integration Laboratory (CTIL), a full-size, state-of-the-art locomotive simulator, at the Volpe Center. The CTIL, which serves as a human factors research laboratory, will allow evaluation of new locomotive automation technologies, instrumentation, and add-on equipment prior to installation in actual cabs and in relation to their effects on operator workload, error rates, and productivity.

Alion Science and Technology constructed the \$1.6 million simulator. The simulator can accurately record behavior through the use of video, audio, and eye-tracking capabilities at the control and button-pushing levels, which allows researchers to carefully observe the actions of train crews and to monitor corresponding effects on the simulated locomotive that they are operating. Other features include modeling and visualization technologies to optimize the physical design and configuration of locomotive cabs and to enhance crew performance.

The locomotive simulator will also help researchers to improve the design of controls and displays to minimize potential errors, increase situational awareness, enhance operator awareness of the movements of other trains and of hazards that may appear on the right-of-way, and study the impact of impairment on





human perception and sensation. It will expand the transportation community's knowledge of safety policy, operating procedures, and organizational factors that promote safe rail operations.

CTIL will advance efforts to prevent train accidents caused by human error since it helps researchers to create realistic simulations of a number of conditions and scenarios encountered during railroad operations.

The Volpe Center, alongside FRA, is working to ensure that CTIL is shared with other researchers and industry. As part of a study on whole-body vibration being conducted for FRA by QinetiQ, the simulator is currently being used to analyze the seated-body position of crew who are operating a locomotive. *(Sponsored by FRA)*

## **Volpe Center Lends Critical Support to U.S. DOT Safety Council**

No strangers to crossmodal collaboration, Volpe Center staff provide critical technical and program support to U.S. DOT's Safety Council, a major secretarial initiative that reaches across the entire department.

Secretary of Transportation Ray LaHood, the U.S. DOT's safety advocate, established the Safety Council in October 2009, bringing together the department's leadership in a focused forum to address critical transportation safety issues. Before taking office, Secretary LaHood saw that many important safety initiatives were being pursued by the department's agencies without a formal process for sharing data,

best practices, and strategies. He created the Safety Council to serve that broadbased safety leadership role and help correct this organizational myopia, enabling an even stronger safety culture. "Now is the time to identify and address the top safety issues that cut across our agencies," he said. "The Council will take our commitment to safety, which is our highest priority, to the next level."

The Safety Council, chaired by Deputy Secretary John Porcari, comprises the modal Administrators and senior safety officials of each Operating Administration, as well as senior Office of the Secretary of Transportation decision-makers. These leaders identify key safety issues to be addressed, discussing best practices, desired results, and strategic plans to be implemented through various initiatives and actions. Currently, there are two Action Teams, one focused on transportation safety culture and the other on issues related to fatigue and hours of service. Upcoming deliverables from the Action Teams include the evaluation of current practices and commitment to safety, a synthesis of safety culture best practices applicable to regulatory organizations, and targeted communications and outreach campaigns to raise awareness about safety culture and operator fatigue.

The Volpe Center will continue to lend program support to the Safety Council as well as technical expertise in the different aspects of safety science while ensuring successful completion of the current project areas. *(Sponsored by U.S. DOT)*

# Advanced Vehicle and Information Network Systems

The Advanced Vehicle and Information Network Systems Center of Innovation (COI) is at the vanguard of research, development, and deployment of Intelligent Transportation Systems (ITS) and advanced vehicle and information technologies generally. Specifically, our team identifies, assesses, and deploys advanced technologies and new operational strategies to reduce the frequency and consequences of crashes and to enhance mobility. The COI specializes in formulating strategic roadmaps and in identifying and developing strategies for overcoming institutional, financial, and technical barriers to successful ITS implementation.

## Assessing Transit Wayfinding Technologies

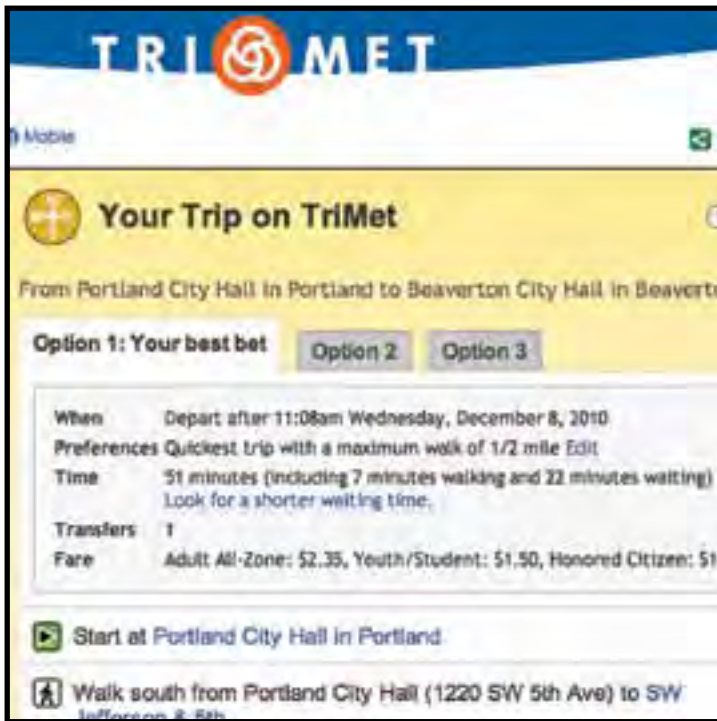
The dramatic increase in portable information technology products, including cell phones, personal digital assistants, and similar devices, has created the capability of providing real-time information directly to consumers as they are traveling. Recognizing the potential of this trend to increase transit ridership, the

Federal Transit Administration (FTA) commissioned the Volpe Center to undertake a Transit Wayfinding Technologies Assessment.

The study, by the Volpe Center's transit ITS team, part of the COI for Advanced Vehicle and Information Network Systems, includes a detailed literature and web search of potential applications more than 70 telephone and onsite interviews of transit service providers and academic experts in nine cities and development of an operational test framework to study an assortment of deployed wayfinding technologies in California, Illinois, New York, Oregon, Texas, Washington State, and Washington, DC. The results of this effort will be presented to FTA and transit agencies in reports and a variety of public forums.

Several interesting examples of wayfinding services have already been assessed. The TriMet transit agency in Portland, Oregon has implemented a Trip Planner and an interactive map application for buses, light rail, commuter rail, and streetcar services in that region. The Trip Planner enables users to access boarding-location, fare, and trip-length information, while the interactive map feature allows them to click on a specific transit stop and retrieve data on stop number, fare zone, bus services, next-bus arrival time, and connections to other transit services. Seattle's King County Metro agency provides route and schedule information to a third





The TriMet transit agency in Portland, Oregon, has implemented a trip planner, providing real-time departure information for travelers. (Screen capture of trimet.org)

party's One Bus Away application, which allows users to enter a trip parameter and starting address that the program then employs to create transit routes and estimated trip times. The system even connects to other databases, such as restaurant locations. *(Sponsored by FTA)*

## IntelliDrive<sup>SM</sup> Policy Research Program Plan<sup>1</sup>

The IntelliDrive initiative is the centerpiece of the current U.S. DOT ITS research program. IntelliDrive is a collaborative crossmodal effort to explore the transformative capabilities of advanced wireless communications to make transportation safer, smarter, greener, and, ultimately, to enhance livability for Americans. The initiative targets three types of critical factors for deployment: FTA's applications, secure and interoperable technology, and supporting policy and institutional frameworks. The Volpe Center worked

<sup>1</sup> IntelliDrive is a registered service mark of the U.S. Department of Transportation.

closely with the Research and Innovative Technology Administration (RITA) ITS JPO and other U.S. DOT modal agencies in developing the foundation for policy research and mapping the processes and timing for conducting the policy research necessary to successfully test, pilot, and deploy IntelliDrive.

The program plan identifies, prioritizes, and defines policy research over the next four years to meet the key milestones of piloting and testing new policies and institutional procedures, which, when revised to accommodate the real-world environment, will enable successful deployment. In order to engage key stakeholders from prospective agencies, academia, and the private sector, the Volpe Center team developed an easy-to-follow roadmap and execution plan for Safety IntelliDrive policy and institutional issues. This technique is now being applied to develop similar plans for IntelliDrive Mobility and Environment (known as Applications for the Environment: Real-Time Information Synthesis [AERIS]). *(Sponsored by RITA ITS JPO)*

## Emergency Transportation Team Responds to Northeast Floods

A Volpe Center emergency transportation response team was activated in late March to respond to record-breaking rains and severe flooding in New England. With bridges, highways, and train tracks affected from Maine to Connecticut, traffic was snarled and major East Coast routes were impacted significantly by detours and closures. The Volpe Center helped to staff the Federal Emergency Management Agency's (FEMA) Joint Field Offices in Andover, Massachusetts and Warwick, Rhode Island, providing key support to the coordination of critical transportation recovery efforts, public assistance, and rail and highway transportation restoration.

A Volpe Center team, led by staff member Terry Sheehan, U.S. DOT's regional emergency transportation representative for New England,



Amtrak train on flooded section of Northeast Corridor in Rhode Island. (Photo courtesy of Joe Sanchez, FRA)

New York, and New Jersey and comprising Lydia Rainville, Leo Wetula, and David Crawford, provided technical assistance to FEMA's Emergency Response/ Incident Management Assistance, Preliminary Damage Assessment, and Rapid Needs Assessment teams. The Volpe Center also coordinated with the Federal Highway Administration (FHWA), Federal Railroad Administration, Federal Aviation Administration, Amtrak, and state DOTs on rail freight and transit service disruptions. Situational awareness of critical transportation infrastructure was provided to U.S. DOT's Crisis Management Center, the Department of Homeland Security, state and local emergency operation centers, and nongovernmental organizations.

A key Volpe Center role was the support of efforts to identify and prioritize critical transportation infrastructure affecting commercial facilities and residential populations at risk during response operations. Of particular concern was the flooding of

Interstate 95 (I-95), Rhode Island's main arterial and also its lifeline to response efforts, in metropolitan Providence. The Volpe Center team worked with the Rhode Island DOT, FHWA, and the emergency Re-routing, Messaging and Inspection Task Force to respond to the I-95 closure and other critical highway disruptions throughout the state. (*Sponsored by U.S. DOT and FEMA*)

### **ITS Strategic Research Planning**

During 2010, the Volpe Center produced two strategic research plans for ITS — the ITS Strategic Research Plan, 2010–2014 and FTA's ITS Strategic Research Plan, 2010–2014. These plans, which set forth guiding research goals, objectives, and strategies, were developed through the active engagement of various stakeholder communities. The resulting plans have been vetted thoroughly with internal and external partners and are being used to guide future investments with both the ITS program and the FTA's Office of Demonstration, Research, and Innovation.



The plans are comprehensive and address highly conceptual content that employs intricate artwork and images to illustrate futuristic ITS concepts that are currently in the research and development phases. These plans communicate complex technical concepts in an easily readable manner, ensuring that the public has the ability to visualize, understand, and comment on the ongoing research that will one day benefit them. *(Sponsored by RITA ITS JPO and FTA)*

### **Partnering with NPS on Alternative Transportation Study at Cape Hatteras National Seashore**

The National Park Service (NPS) has partnered with the Volpe Center to perform an analysis of transportation strategies for visitors traveling to and from sites within the Bodie Island District of the Cape Hatteras National Seashore. The study is being funded by a planning grant awarded to NPS by the FTA's Paul S. Sarbanes Transit in Parks (TRIP) Program. The Volpe Center has extensive experience working with NPS and other public land agencies on TRIP and other projects. This study is one of several being conducted for a new sponsor, the Southeast Region of NPS.

The analysis has focused on the potential use of transportation services and nonmotorized vehicle options, such as shuttle, local bus, and water-ferry services and connections for bicyclists and pedestrians, as well as associated services, equipment, facilities, and infrastructure. The movement of visitors within developed areas of Bodie Island, especially in the context of an anticipated increase in visitation to the Bodie Island Lighthouse once it opens for climbing, is being analyzed; however, the analysis does not include the transport of visitors along the beach or to Bodie Island Spit. Planning-level recommendations and estimates are being provided to inform future decision-making, but the study is not a decision document.

Throughout July and August, NPS solicited input on proposed alternative transportation strategies,



Bodie Island Lighthouse, Cape Hatteras National Seashore, North Carolina. (Volpe Center photo)

developed for Bodie Island as part of the study. As part of this public outreach, Volpe Center staff member Lindsey Morse of the Advanced Vehicle and Information Network Systems COI participated in a public meeting at the First Flight Centennial Pavilion at Wright Brothers National Memorial in Kill Devil Hills, North Carolina. Ms. Morse, in collaboration with NPS staff, delivered a presentation and helped to facilitate discussion among attendees. The meeting successfully informed the public of the alternative transportation analysis and served as a channel for feedback on completed tasks, in particular the assessment of transportation needs and the identification and evaluation of potential strategies to address them. Volpe Center staff were able to incorporate feedback received into the final recommendations and report for the study. *(Sponsored by NPS)*

# Organizational Excellence

The Volpe Center remains committed to organizational excellence. The strength of the organization is its people — their knowledge, experience, enterprise, perspective, and commitment. In the last two years, the Volpe Center has recruited and hired over 125 highly qualified staff members and co-op students in a range of technical disciplines spanning economics, community planning, operations research analysis, information technology, and aerospace, civil, and mechanical engineering.

The Volpe Center has embraced the principles of open government — and has worked this year to make its transportation library collection accessible and transparent. At the same time, ensuring sound financial management, delivering innovative acquisition services, providing key resources to the small-business community, and standing out as an exemplary environmental steward have remained key objectives.

Worth noting — this year the Volpe Center received over \$280 million in new obligation

authority funding from its sponsors, representing the largest amount of annual new work in its 40-year history.

## Two New Deputy Associate Administrators Named at the Volpe Center

Research and Innovative Technology Administration (RITA) Administrator Peter H. Appel announced selections for two key posts at the Volpe Center this year: Deputy Associate Administrator for Research, Innovation and Technology and Deputy Associate Administrator for Operations. Both positions report to Robert Johns, Associate Administrator and Director of the Volpe Center.

### Anne Aylward, Deputy Associate Administrator for Research, Innovation and Technology

“Anne brings over 30 years of experience in transportation planning, policy, and research management, and is a nationally recognized expert in intermodal transportation planning and operations issues. Her extensive credentials position her well to take on this new challenge and lead the Volpe Center’s Centers of Innovation (COIs), which encompass all of the research, innovation, technology, and transportation



program analysis functions performed by the Volpe Center for Federal, state, local, international, and other organizations with transportation-related missions,”



Anne Aylward, Deputy Associate Administrator for Research, Innovation and Technology. (Volpe Center photo)

said Administrator Appel.

“Anne has extensive multimodal, interdisciplinary, and multisector experience, with years of success in working across those boundaries,” said Volpe Center Director Robert Johns.

Most recently, Aylward served as director of the

Multimodal Systems Research and Analysis COI and as Acting Director of the Advanced Vehicle and Information Network Systems COI.

At the Massachusetts Port Authority (Massport), Aylward served as port director for 10 years. She was also the first chairwoman of the American Association of Port Authorities. Since her initial Federal appointment at the Volpe Center in 2006, Aylward has developed a solid record of achievement in collaborating with colleagues inside and outside of the Center. Her work has consisted of hiring staff and helping them with professional development as well as facilitating transportation systems assessment and technology deployment.

Aylward has a master’s degree in city planning from the Massachusetts Institute of Technology (MIT) and a bachelor’s degree in history from Radcliffe. She has served on several committees of the Transportation Research Board of the National Academy of Sciences and was named Woman of the Year by the national Women’s Transportation Seminar.

## David Ishihara, Deputy Associate Administrator for Operations

RITA Administrator Peter H. Appel recently announced the selection of David Ishihara as the Volpe Center’s new Deputy Associate Administrator for Operations. “Dave’s significant record of achievement in a number of senior management roles positions him well to lead the Volpe Center’s internal business activities and programs, which encompass human resources, acquisition, information technology, and real property and facilities management. His in-depth knowledge of the transportation field combined with his operations management experience provide an ideal skill set for understanding the operations issues facing the Volpe Center,” said RITA Administrator Appel.

“Dave brings an enthusiasm for public service, a strong interest in learning and innovation, a focus on people and relationships, and an excitement about the unique role of the Volpe Center,” stated Mr. Johns. Ishihara has nearly 20 years of experience in airport management and transportation security, starting as Assistant Airport Manager of the Portland, Maine, International Jetport. Most recently, Ishihara was Director of Aviation Operations for Massport at Logan Airport, the nineteenth largest airport in the U.S. There, he was responsible for all landside, terminal, and airside operations and managed over 360 employees.



David Ishihara, Deputy Associate Administrator for Operations. (Volpe Center photo)

Prior to joining Massport, he spent five years with the U.S. Department of Homeland Security’s (DHS) Transportation Security Administration (TSA), where he was involved in the startup operations of this newly established agency. He received

the Distinguished Federal Executive of the Year Award for his DHS work. Ishihara advanced to the position of Deputy Director in Boston, with more than 1,000 employees. Subsequently, he served as Director of the TSA in Hartford, Connecticut, with over 330 employees and an area of responsibility that included the entire State of Connecticut.

Ishihara also worked for three years as Civil Aviation Security Field Office Manager and Federal Security Manager with the U.S. Department of Transportation's Federal Aviation Administration in Boston. Ishihara holds a bachelor's degree in aviation management from the Florida Institute of Technology.

### **Volpe Center Ambassador Program Promotes Diversity Outreach**

The Volpe Center launched the new Volpe Center Ambassador Program this year in order to promote diversity outreach and the hiring of veterans, people with disabilities, and individuals from underrepresented

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RITA Deputy Administrator Robert Bertini stands with recent Volpe Center hires, left to right: Hailing Yu, Dr. Matthew Cuddy, Rosalie Ray, Dr. Scott Stevens, Dr. Robert Bertini, Karland Barrett, Tom Green, Dr. Joanne Kang. (Volpe Center photo)

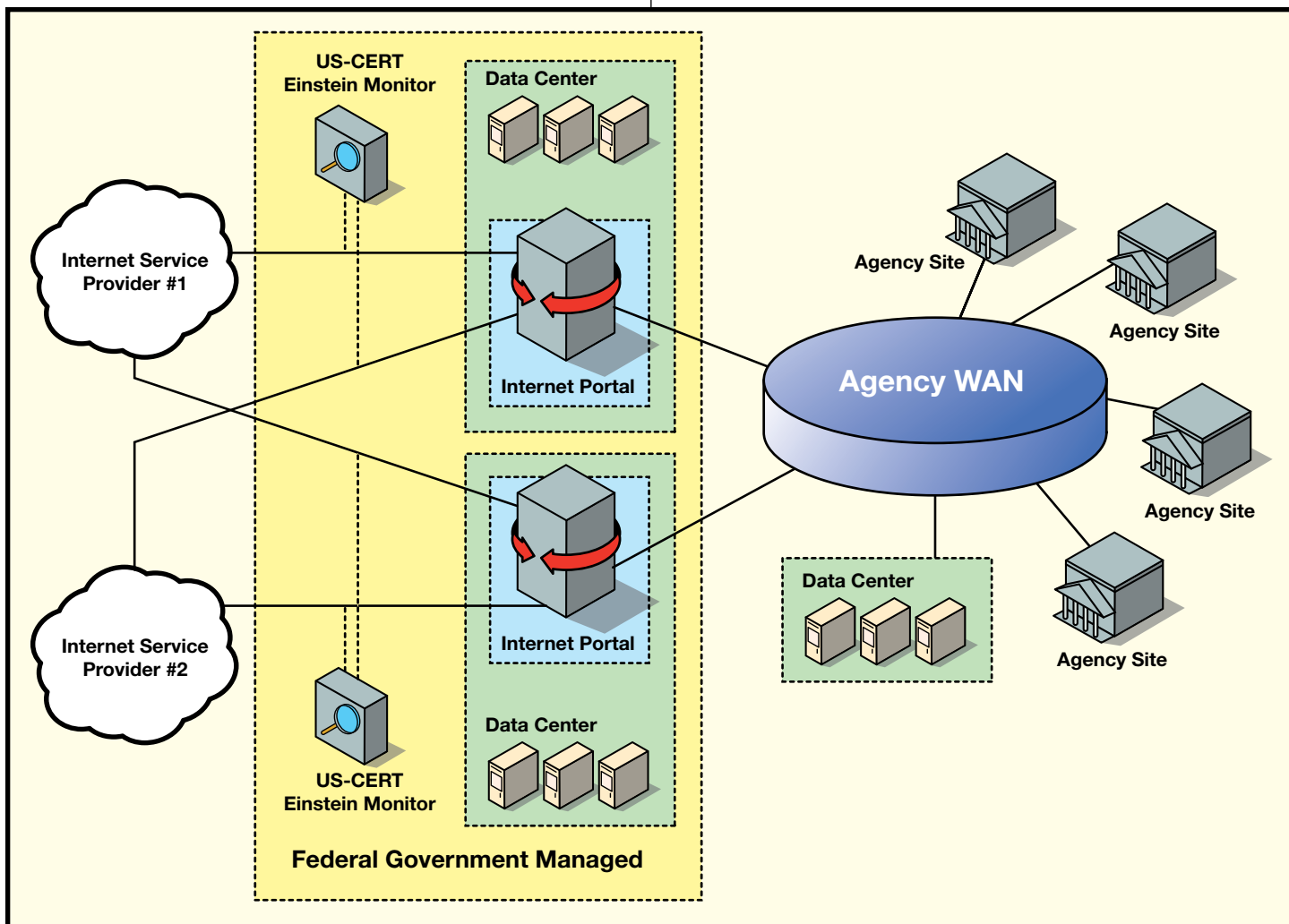
populations. As part of the program, the Volpe Center hosted a Careers in Transportation Diversity Fair in recognition of Hispanic Heritage Month and Disability Awareness Month. The event included exhibits and presentations on student programs and the Federal job application process. Participants represented a diverse mix of professional and college organizations, including the National Society of Black Engineers (NSBE), the Society of Latino Engineers and Scientists (SOLES), the Society of Hispanic Professional Engineers, the Society of Women Engineers (SWE), local university and career offices for Veterans Affairs and employment groups, and the Commonwealth of Massachusetts Rehabilitation Center.

The Volpe Center also hosted a Professional Society Reception, with participants from the Boston chapters of the Society of Hispanic Professional Engineers and the Society of Mexican American Engineers and Scientists (MAES). Other participants included members of NSBE, SWE, the Institute of Electrical and Electronics Engineers, the American Society of Mechanical Engineers, and the Boston Society of Civil Engineers.

For both events, Volpe Center operations and technical staff served as the Center's ambassadors.







Example summary of TIC connections. (Volpe Center illustration)

The Center exhibited its technical work in many areas, including vehicle safety, traffic flow management, and information technology (IT). The Volpe Center’s Human Resources recruitment team and the Equal Employment Opportunity manager coordinated this important effort.

### Ensuring a Trusted Internet Connection

During Fiscal Year 2010, the Volpe Center’s Information Technology Division participated in U.S. DOT’s Trusted Internet Connection (TIC) implementation, mandated by the Office of Management and Budget. The installation and usage of TIC is part of an overall initiative to improve the Federal government’s security posture and incident-response capability through the

reduction and consolidation of external Internet connections, also known as employees Internet points of presence to a target total of 50 throughout all Federal agencies.

Working with the DHS’s National Cyber Security Division and the U.S. DOT’s Office of the Secretary of Transportation (OST), Volpe’s Internet outbound and inbound data networking traffic is now sent through two high-capacity telephony circuits to a TIC access point.

These new connections allow for a centralized entity to manage Internet traffic, ingress and egress points, which include packet and data filtering, Intrusion Detection System/Intrusion Prevention System (IDS/IPS), and logging, auditing, and reporting capabilities. Volpe’s in-house networking and information system security support personnel continue to monitor internal network traffic as well as bandwidth utilization statics

on its IDS/IPS systems. Based on bandwidth utilization metrics, requests for additional bandwidth may be submitted to OST in the future.

## Embracing New Efficiencies with U.S. DOT's SBIR Program

The Volpe Center manages U.S. DOT's Small Business Innovation Research (SBIR) program. SBIR is a highly competitive program that encourages small businesses to explore their technological potential and provides them with the incentive to profit from commercialization. By including qualified small businesses in the nation's research and development (R&D) arena, high-tech innovation is stimulated and the United States gains entrepreneurial spirit as it meets its specific R&D needs.

In 2010, the Volpe Center worked with U.S. DOT and the White House to help the Small Business Administration (SBA) meet its goals and objectives. In the summer, the Administration set a new direction for the Federal SBIR program, which impacted its pace and structure. New initiatives, such as SBA's SBIR 2.0, were introduced government-wide in an effort to improve the effectiveness and efficiency of the overall program.

The SBIR program will implement three SBIR 2.0 initiatives. These initiatives will introduce new efficiencies in processing Phase II contract awards; leverage U.S. DOT research by using a proven SBIR technology-transfer approach to further innovation, established by the National Institute of Standards and Technology; and establish a Phase IIB bridge financing program, which will provide additional time and funding to further develop innovations geared toward commercial applications.

By the time that SBIR 2.0 was officially rolled out in September 2010, the SBIR program had been cited as a Shared Best Practice in making improvements that support innovative entrepreneurs.

In Fiscal Year 2010, the SBIR program solicited small-business proposals on 18 topics and made

17 Phase I and 9 Phase II awards totaling over \$7.4 million. The topics were developed and funded by the Federal Highway Administration, National Highway Traffic Safety Administration, Federal Railroad Administration, Federal Transit Administration, Pipeline and Hazardous Materials Safety Administration, and Federal Aviation Administration.

## Five New IT Support Contracts Awarded

The Volpe Center relies on contractor support to respond effectively to the constantly shifting transportation-related requirements of its sponsors and to augment its in-house IT expertise and staff. In early September 2010, the Volpe Center awarded five task-order contracts for Volpe-Transportation Information Project Support (V-TRIPS). The total estimated value of these contracts over the five-year award period is \$234 million.

The five companies listed in the box below demonstrate capabilities and experience related to existing technologies and methodologies that address current transportation systems issues. Moreover, they address cutting-edge technologies and methodologies that show promise in transforming the future of the transportation systems enterprise. These contractors

### V-TRIPS Awards

Abacus Technology Corporation  
*Chevy Chase, Maryland*

Computer Sciences Corporation  
*Lanham, Maryland*

L-3 Services, Inc.  
*Reston, Virginia*

Qinetiq NA, Inc.  
*Waltham, Massachusetts*

Stinger Ghaffarian Technologies, Inc.  
*Greenbelt, Maryland*





The Volpe Center's new Technical Library and Information Center was inaugurated with a ribbon-cutting ceremony. From left to right: Amanda Wilson, Director of RITA's National Transportation Library; Anne Aylward, Volpe Center's Deputy Associate Administrator for Research, Innovation and Technology; Peter Appel, RITA Administrator; Robert Johns, Volpe Center Associate Administrator and Director; and Sue Dresley, Volpe Center Librarian. (Photo courtesy of Linda Haas Photography)

bring a strong knowledge of and experience in transportation systems and functions in the IT work-requirement areas of systems analysis, development, operations and maintenance, deployment, and field support; systems architecture and framework; facility and operations support; information systems security; and technology assessment and modernization. It is anticipated that the first task orders under the new V-TRIPS contracts will be issued in early 2011.

### **New Volpe Library Embraces Accessibility and Knowledge-Sharing**

The Volpe Center's Technical Library and Information Center celebrated its grand opening with a ribbon-cutting ceremony this year. The new location officially opened in October during the 40th Anniversary Celebration in Cambridge, Massachusetts. The ceremony marked a new and improved library with a revamped website, emphasizing searchability and

electronic delivery of resources as well as modernization of the library space.

A new partnership with the National Transportation Library (NTL) and the U.S. DOT Library further supports the Volpe Center's efforts to make the knowledge base more open to the greater transportation research community. A major feature is the library's new publications search engine. The Volpe Center's catalogue holdings will also be available through the U.S. DOT's Library catalogue, and full text of Volpe publications is being made accessible through NTL.

In addition to becoming more accessible to transportation stakeholders, the new library provides a modern space for seminars and meetings for staff and visitors. The library is now better positioned to serve as a vital knowledge-sharing hub for transportation professionals. Plans are currently underway to more prominently showcase the work of our technical experts through greater access to publications and increased dialogue with staff.

Visit the new Volpe Center Library website featuring a Spotlight where new reports and publications written by Volpe Center staff are highlighted. Subscribe to our RSS Feed to stay up-to-date on new Volpe Center publications.





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# 2010 Customers

## U.S. Department of Transportation

- Federal Aviation Administration
  - Air Traffic Organization
  - Aviation Safety
  - Commercial Space Transportation
- Federal Highway Administration
- Federal Motor Carrier Safety Administration
- Federal Railroad Administration
- Federal Transit Administration
- Maritime Administration
- National Highway Traffic Safety Administration
- Office of the Secretary of Transportation
- Pipeline and Hazardous Material Safety Administration
- Research and Innovative Technology Administration
  - Bureau of Transportation Statistics
  - Intelligent Transportation Systems Joint Program Office
  - Office of Research, Development, and Technology
  - Transportation Safety Institute
- Saint Lawrence Seaway Development Corporation
- Surface Transportation Board

## Other Federal

- Central Intelligence Agency
- Department of Agriculture
  - U.S. Forest Service, subset of U.S. Department of Agriculture
- Department of Commerce
  - National Institute of Standards and Technology
  - National Oceanic and Atmospheric Administration
- Department of Defense
  - U.S. Air Force
  - U.S. Army
  - U.S. Navy
  - U.S. Transportation Command
- Department of Homeland Security
  - Federal Emergency Management Agency
  - Transportation Security Administration
  - U.S. Coast Guard
- Department of the Interior
  - Bureau of Indian Affairs
  - Bureau of Land Management
  - National Park Service
  - U.S. Fish and Wildlife Service
- Department of Justice
  - Architecture and Transportation Barriers Compliance Board
  - U.S. Access Board

- Environmental Protection Agency
- National Aeronautics and Space Administration
- U.S. Postal Service

## State and Local

- Columbia River Pilots
- Massachusetts Bay Transportation Authority
- Massachusetts Port Authority
- Minnesota Department of Transportation and Twin Cities Metropolitan Council (joint sponsorship of one project)
- New York State Department of Transportation
- New York State Thruway Authority
- Port Authority of New York and New Jersey
- State of Arizona
- Town of Southampton, New York

## Foreign Entities

- NAV Canada
- United Kingdom Ministry of Defence

## Other

- All Weather, Inc.
- American Concrete Pavement Association
- American Public Transportation Association
- American Trade Initiatives, Inc.
- Boeing Commercial Airplanes
- Harvard University
- Illingworth & Rodkin, Inc.
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