



Volpe National Transportation Systems Center

Centers of Innovation

The Year in Review
2008



U.S. Department of Transportation

Research and Innovative
Technology Administration

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Introduction

As the John A. Volpe National Transportation Systems Center approaches its 40th year of service to the U.S. Department of Transportation (U.S. DOT) and the Nation, it is a good time to both reflect upon some of our most significant contributions during the past 12 months and to look ahead to an even brighter future under the new Centers of Innovation (COI) structure of the Volpe Center. The COIs present greater opportunities for research and technology synergy, both within and outside U.S. DOT, and increase the effectiveness of the Volpe Center's crossmodal and multimodal capabilities. The new structure also institutionalizes and strengthens the Center's ability to anticipate future transportation challenges to expand U.S. DOT's horizon and to show how innovation can arise from creative and collaborative use of internal and external assets.

This annual review breaks from previous editions, with our accomplishments now aligned by the eight COIs. Although activities are listed under individual COIs, many projects, programs, and initiatives, in reality, cut across multiple COIs and benefit more than one national goal. The achievements contained in this document illustrate the Volpe Center's vital role as a unique Federal resource within the Department's Research and Innovative Technology Administration (RITA), an organization that continues to earn respect and appreciation from clients and stakeholders across all modes of transportation.

The Center is committed to helping its clients achieve their goals through safer, simpler, and smarter transportation solutions. The projects identified in this document exemplify the Volpe Center's tradition of providing outstanding support to U.S. DOT, other organizations in the Executive Branch, and the broader transportation community.

2008 has been an exciting year at the Volpe Center. Perhaps it is fitting that, in a year when we celebrated the 100th birthday of our namesake, John Volpe, the restructured Volpe Center looks forward to continued growth and service to the transportation enterprise. Secretary Volpe was an innovator, a builder, and a true visionary—virtues that our staff seek to infuse in all their work.

Multimodal Systems Research and Analysis

The Multimodal Systems Research and Analysis COI undertakes transportation policy analysis and research that contribute to a compelling vision of the 21st-century transportation enterprise. It also supports decision-making in the development, management, operation, and financing of an integrated multimodal national transportation system that meets today's and tomorrow's mobility needs for goods and people.

The Environmental Competency Navigator: Identifying and Enhancing Environmental and Transportation Skills and Knowledge

Governmental policies such as the National Environmental Policy Act and the Clean Water Act seek to include environmental factors in the transportation planning and project development processes. At the same time, today's transportation projects often present unique environmental and regulatory challenges that make understanding and compliance difficult even for experienced practitioners. Officials expect those employed in the environmental analysis and review of transportation projects to possess a depth and breadth of knowledge in both the environment and transportation. Many of these professionals and specialists, however, lack an awareness of (1) the complete range of competencies required for their jobs, (2) the level of understanding necessary in each competency area, and (3) the resources and training opportunities that would help them to develop the requisite skills and knowledge for their work.

To address some of these issues, the Volpe Center collaborated with the Federal Highway Administration (FHWA) Office of Project Development and Environmental Review and the Environmental Competency Building Steering Committee, which collectively comprised members of Federal and state transportation and environmental agencies and private sector firms. Participants identified a suite of environmental competencies and developed a framework for tailoring sets of competencies to job positions. The Volpe Center gathered a comprehensive collection of resources, including webinars, guidance documents, and information on courses and networking events, which it used to develop the *Environmental Competency Navigator*, an interactive web portal that helps professionals to identify and discover key environmental competencies and allows them to access over 1,000 resources in those areas.



The Environmental Competency website identifies a suite of environmental competencies and presents a framework for tailoring sets of competencies to job positions. The results generated here are for a planner.

The *Environmental Competency Navigator* debuted in June 2008. Since then, the Volpe Center has received extremely positive feedback from initial users, who have attested to the utility and originality of the online tool. Various transportation and environmental stakeholders have commented that the Navigator is a great way for practitioners to stay up to date in their fields, prepare them to do their jobs, and advance through the ranks. During FY 2009, the Volpe Center plans to incorporate additional interactive elements into the Navigator, such as “wiki” capability and Web 2.0 technologies. These enhancements, suggested by the Navigator’s enthusiastic early users, demonstrate the high level of user acceptance and buy-in from policymakers and field professionals alike.

For more details go to <http://www.environment.fhwa.dot.gov/ecb/search.aspx>.

(Sponsored by DOT/FHWA)

Streamlining the Transportation-Project-Delivery Process through the Planning and Environmental Linkages Program

Major transportation projects take an average of 13 years to complete, with the preparation of an Environmental Impact Statement (EIS) typically consuming about half that time. In order to streamline project delivery, FHWA set a goal of reducing the average processing time for an EIS to three years. To accomplish this, FHWA sought the help of the Volpe Center, which led to the development of the Planning and Environment Linkages (PEL) program. PEL seeks to streamline the project-development and environmental-review processes by improving coordination among stakeholders and solidifying the connection between systems-level planning and project-level decision-making. For example, planning and environmental staff at transportation and resource agencies are encouraged to share information and tools and to begin working collaboratively early in the planning process. This approach minimizes duplication of effort and helps to make the life cycle of a transportation project seamless and more responsive to environmental concerns.

Support provided by the Volpe Center to the PEL program has included:

- Outreach and communication materials to publicize the PEL approach.
- Research and information dissemination on effective practices in applying PEL concepts.
- Performance metrics and measurement of the progress and benefits of integrated planning and project development processes.
- Strategies to expand the PEL approach to include linkages between transportation and environmental planning and climate change, freight planning, and nonmotorized transportation.

The PEL approach holds great promise for reducing delays in transportation projects and for helping transportation agencies to balance safety, mobility, environmental, community, and economic goals. By adopting an integrated approach to decision-making, communities can work together to identify opportunities to support multiple goals and improve the quality of life within the project area. *(Sponsored by DOT/FHWA)*

Developing a Comprehensive Regional Plan for Metropolitan Chicago

Created in 2005 to integrate transportation and land-use planning in northeastern Illinois, the Chicago Metropolitan Agency for Planning (CMAP) has developed a long-range comprehensive regional plan known as *GOTO2040*. In addition to focusing on transportation and land-use issues, the plan will consider economic development, environmental and natural resources, housing, and human services. Through detailed and thorough technical analysis, effective public engagement, and innovative approaches to planning, *GOTO2040* sets a high standard for long-range planning in the region. The centerpiece of the plan will be a scenario-evaluation process to identify policies and investments that can best move the region toward its desired future.

The Volpe Center supports CMAP in three key areas: (1) research on best practices and innovative thinking among peer organizations with regard to climate change/energy, public-private partnerships, and freight and security/emergency management; (2) development of strategy planning papers based on that research, which will examine scenarios of options for distinct sets of actions (policies, investments, and other key decisions and initiatives) to be taken in the region; and (3) development of transportation performance indicators for use in the detailed evaluation of scenarios.



(© iStockphoto.com/Lumigraphics)

Looking ahead, the Volpe Center will support CMAP in the development and implementation of public- and stakeholder-engagement activities. This will ensure maximum support for implementing the 2040 regional vision and for translating these activities into workable policies, strategies, and investments. CMAP presented the scenarios to its stakeholders in the late fall of 2008, will evaluate them in 2009, and recommend policies and supporting capital investments in 2010.

By distilling research findings, industry best practices, and innovative approaches of peer organizations to guide CMAP in tailoring the findings to the unique regional situation, the Volpe Center will help to deliver a comprehensive regional plan rooted in industry best practices that can serve as a model for metropolitan planning organizations throughout the Nation. To view the first strategy planning paper on climate change and energy, visit the CMAP website at <http://www.goto2040.org/ideazone/default.aspx?id=11454>.

(Sponsored by CMAP)

Safety Management Systems

The Safety Management Systems COI anticipates and responds to challenges in safety management for all modes of transportation, addressing highly complex safety requirements. It acquires, maintains, distributes, and analyzes transportation safety data to enable the Federal government, states, municipalities, nongovernmental organizations, and industry to take effective actions to reduce the number and severity of transportation-related deaths, injuries, and instances of property damage.

Flight Standards Service Staffing Model

The Federal Aviation Administration's (FAA's) Office of Flight Standards Service (AFS) helps to ensure the flight safety of civil aircraft in air commerce. Through certification standards-setting and oversight activities, the AFS directs, manages, and executes certification and inspection. It also oversees surveillance activities to ensure the adequacy of flight procedures and operating methods, appropriate operator qualifications and proficiency, proper aircraft maintenance, and maintenance aspects of continued airworthiness programs.

FAA Aerospace Forecast—Fiscal Years 2007–2020 predicts significant growth in the number of passengers and the amount of flight activity over this time period. In order to carry out its safety mission under anticipated levels of growth, FAA needs to ensure that it has an appropriate number of skilled inspectors. Accordingly, AFS engaged the Volpe Center, in partnership with Price Waterhouse Coopers (PWC), to develop the *AFS Staffing Tool and Reporting System (ASTARS)* project. ASTARS enables FAA to more accurately predict the inspector-staff resources needed to sustain oversight performance at an acceptable level and to distribute available staff resources equitably and effectively.

The Volpe Center-PWC team completed the first phase of the ASTARS project in June 2008, developing a concept of operations for the staffing model and documenting its functional and operational requirements. The second phase of the effort, currently in process, will identify relevant workforce supply and demand factors that ASTARS needs to consider. It will also analyze and define the computational algorithms needed to enable ASTARS to project staffing requirements under a number of different scenarios on the basis of these factors.

In FY 2009, the Volpe Center will develop a software tool that automates the model and provides for its standardized use by AFS management. The AFS staffing model is a key part of FAA's ongoing initiative to incorporate system-safety principles into its oversight processes. The successful development and implementation of the staffing model, slated for October 2009, will address congressional concerns resulting from a 2006 report by the National Academy of Sciences (NAS) that pointed out areas for improvement in FAA's existing staffing-model/staffing-resource analysis process. When implemented, ASTARS will enable FAA to more effectively monitor factors that influence the demand for work and to determine appropriate, empirically valid staffing levels under changing environmental conditions. *(Sponsored by DOT/FAA)*

Outsourcing Maintenance by Air Carriers: Oversight Tool

FAA's Office of Aviation Safety (AVS) certifies all U.S. civil aviation operational and maintenance enterprises. It is also responsible for the certification, production approval, and continued airworthiness of aircraft as well as the certification of pilots, mechanics, and others in safety-related positions. Over the past several years, FAA has seen an increased level of maintenance outsourcing by air carriers. The *Outsource Oversight Prioritization Tool (OPT)* supports FAA's surveillance of outsourced maintenance by air carriers. OPT is part of the Enhanced Repair Station and Air Carrier Outsourcing Oversight System; it incorporates a Safety Management System (SMS)-based approach that identifies specific procedures to enhance oversight of air-carrier-safety outsourcing.

In FY 2008, the Volpe Center reengineered the OPT to provide web-based outsource surveillance planning for air carriers certified under Title 14 of the Code of Federal Regulations (CFR) Parts 121 and 135 (commercial air carriers). The reengineered OPT provides an effective means of identifying areas of concern in relation to an air carrier's outsourced maintenance providers, assisting safety inspectors, supervisors, and managers in targeting resources to the providers who have been assigned the highest-priority responsibilities. The tool focuses inspectors' attention on key factors in the assessment of providers, including the adequacy of operator staffing, subcontracting relationships, the type and complexity of work performed, and previous surveillance findings. *(Sponsored by DOT/FAA)*

Motor-Carrier Emergency Preparedness and Continuity of Operations

The Federal Motor Carrier Safety Administration (FMCSA) has a congressional mandate to improve the overall safety of the Nation's roadways. A nationwide Mission Continuity Program requires FMCSA to have a robust disaster-recovery program in place. In support of this initiative, the Volpe Center conducted a technical and business-process assessment of *Disaster Recovery and Continuity of Operations (COOP)* procedures at FMCSA Service Centers and Division Offices. The Volpe Center defined the implementation requirements for an Electronic Document Management System (EDMS) COOP library for FMCSA field offices and Headquarters, and disseminated critical COOP and Disaster Recovery (DR) information to the field.

During 2008, two-day workshops held in Denver, Chicago, and Baltimore, brought together subject-matter experts from FMCSA Headquarters and field offices to help the Volpe Center better understand current COOP/DR activities and to gather additional expertise from invited participants. Participating FMCSA staff members outlined the needs of a remotely accessible COOP library through a series of facilitated sessions. They were, in turn, provided with new and updated information regarding information security, Federal requirements, and standards. The outcome of the workshops was a list of business requirements, documentation, and critical processes to be addressed by the new COOP library. *(Sponsored by DOT/FMCSA)*

Motor-Carrier Roadside Inspection System Technical Assistance

The FMCSA Technical Support project is assisting FMCSA safety specialists and state partners through FMCSA's information systems. FMCSA and state safety specialists use investigative systems in their offices and in the field, to perform safety audits and compliance reviews and to prepare enforcement cases on interstate and intrastate motor carriers. Roadside-inspection systems are used by both Federal and state inspectors to collect vehicle- and driver-inspection data and to provide electronic access to FMCSA's data systems.

With regard to software products used for enforcement-related activities, this work supports FMCSA by providing technical support and accounts-administration services to Headquarters, field offices, and state partners.

In FY 2008, it was estimated that the FMCSA Technical Support project would respond to 37,000 requests for technical assistance from FMCSA application users, including users of 24-7 on-call support. Call logs cover 30 technical areas. Technical Support Team members also participate in FMCSA information technology (IT) workshops and numerous state and Federal training sessions. FMCSA Technical Support users include (but are not limited to) FMCSA safety investigators, border inspectors, state commercial enforcement personnel, and state DOT partners.

Both Federal and state inspectors collect roadside inspection data and provide electronic access to FMCSA's data systems with the use of FMCSA's investigative and roadside inspection systems. The Volpe Center provides technical as well as account-management support to all of these users. The Center's accomplishments in 2008 included expanded support of (1) the FMCSA COMPASS portal, (2) licensing and insurance operations, and (3) Motor Carrier Safety Assistance Program (MCSAP) initiatives, such as Commercial Vehicle Information Systems and Networks (CVISN) and Uniform Carrier Registration (UCR). The Volpe Center also supported FMCSA workshops, improved customer service, initiated metrics to resolve and prevent stale calls, and provided technical training and on-site support to FMCSA Headquarters. *(Sponsored by DOT/FMCSA)*

Commercial Space Transportation

The Federal Aviation Administration (FAA) Office of Commercial Space Transportation (AST) is entrusted with protecting U.S. public, property, national security, and foreign policy interests during a commercial space launch or reentry activities as well as with facilitating and promoting U.S. commercial space transportation. AST fulfills this role by licensing commercial space activities, monitoring launches, and determining the overall economic impact of U.S. commercial space transportation activities. Additionally, AST issues safety regulations for private spaceflight launches and reentries, and for crews and passengers, on the basis of scientific studies and risk assessments.

AST requires launch-vehicle operators to verify the integrated performance of a vehicle's hardware and software in an operational environment. Among its chief goals is a commitment to protecting the safety of the uninvolved public. AST accomplishes this goal by promulgating measures that enable passengers to make informed decisions about their personal safety and establishing requirements for crew notification, medical qualifications, and training as well as for environmental control and life-support systems.

In support of AST, the Volpe Center provides technical expertise, including analyses of commercial space issues regarding vehicle technology, human factors, operating conditions, environmental factors, and analyses of risks to crews, passengers, and the uninvolved public. During the past year, the Volpe Center team completed the following safety-related studies:

- *Potential for Protection of Aircraft from the Hazards of Reentering Space Objects*: Examines the hazard posed to aircraft from space-hardware debris that survives reentry into the atmosphere.
- *Cecil Field Spaceport Risk Analysis*: Provides flight-safety analyses of launch/reentry risk for the proposed spaceport at Cecil Field Airport in Jacksonville, Florida, in association with suborbital launches of three reusable launch-vehicle concepts.
- *Analysis of Tethered Flight Systems*: Addresses various types of tethered systems, methodologies used to evaluate tethered-rocket flight-safety systems, key assumptions, methodology limitations, and criteria and assumptions for performing a failure analysis. Vehicle tethering allows a vehicle to lift itself off the ground under its own power while physically restraining it from moving too far or building up too much speed.
- *Space Weather Biological and System Effects for Suborbital Flights*: Assesses the impacts of space weather (radiation) on launch vehicles. The study presents a broad overview of the space environment; quantifies the system effects and biological hazards of radiation exposure; describes potential hazards that a suborbital vehicle, passengers, and crew can expect to encounter; and addresses the potential need for space-weather safety regulations.
- *Expected Casualty Analysis for the SpaceX Falcon-1 from the Reagan Launch Site (Kwajalein Atoll)*: Assesses the risks to people from potential launch debris on the ground, in aircraft, and on ships. (Sponsored by DOT/FAA)

Environmental and Energy Systems

The Environmental and Energy Systems COI provides technical and analytical support for decision-making at all levels of government and industry on (1) transportation-related environmental and energy policies, including those pertaining to climate variability, air, noise, environmental compliance, engineering and remediation, and hazardous materials; (2) transportation's role in achieving energy independence, both as a consumer of energy and as the critical element in the energy-supply chain; and (3) research and development capabilities supporting all modes of transportation and other COIs within the Volpe Center.

Aviation Environmental Design Tool

In its 2004 Report to Congress on "Aviation and the Environment," the Federal Aviation Administration (FAA) recommended that "The Nation should develop more effective metrics and tools to assess and communicate aviation's environmental effects... The tools should enable integrated environmental and economic cost/benefit analysis ..." As a consequence of this recommendation, FAA launched a multiyear effort, which will result in the development of an entirely new suite of tools, including the *Aviation Environmental Design Tool (AEDT)*.

The Volpe Center leads the management, design, development and integration of AEDT, which will replace existing FAA Office of Environment and Energy (AEE) aviation noise, emissions, and air dispersion computer-modeling tools. It is anticipated that this effort will lead to the development of an unprecedented suite of tools for the establishment of international environmental policy, to be used by the International Civil Aviation Organization (ICAO) Committee for Aviation Environmental Protection (CAEP). It will also support development of the Next Generation Air Transportation System (NextGen) and associated environmental policy changes in the United States.

During FY 2008, as part of AEDT, the Volpe Center developed a new method to compute fuel burn for Boeing aircraft using the Boeing Climb-Out Program (BCOP). This method improves fuel-burn modeling in the terminal area, as compared with actual airline-reported fuel-burn data. Work has begun to expand the aircraft fleet coverage of the database and implement the new terminal area fuel-burn method into AEDT for use in future FAA, NextGen, Atlantic Interoperability Initiative to Reduce Emissions (AIRE), and CAEP analyses.

Also during FY 2008, FAA set the goal of identifying and analyzing uncertainties of source-data algorithms and assumptions for each core computational AEDT module, including the Aircraft Acoustics, Aircraft Emissions, Aircraft Performance, Ground Emissions, and Fleet and Operations modules. The process used in the first round of assessment will serve as a template for future module-level assessments, with the ultimate goal of evaluating the entire integrated system. *(Sponsored by DOT/FAA)*

NextGen Alternative Aviation Fuel Development

By 2025, U.S. air traffic is predicted to more than double. The current air traffic control system will not be able to manage this growth. NextGen, which uses 21st-century technologies to ensure that future safety, capacity, and environmental needs are met, represents a transformation of the National Airspace System (NAS) and the national system of airports. NextGen will be realized through coordinated efforts by the Departments of Defense, Homeland Security, and Commerce, as well as U.S. DOT, the National Aeronautics and Space Administration (NASA), and the White House Office of Science and Technology Policy. The NextGen vision was developed by the Joint Planning and Development Office (JPDO), which facilitates interagency cooperation. A major component of FAA's NextGen implementation plan is the rapid advancement of technologies that will mitigate the impact of aviation on the environment, including the development of alternative aviation fuels.

During FY 2008, as part of NextGen, the Volpe Center supported two main alternative aviation fuel initiatives: the *Commercial Aviation Alternative Fuels Initiative (CAAFI)* and the *Alternative Aviation Fuel X PRIZE Roadmap*. CAAFI promotes the development of alternative fuel options that offer equivalent levels of safety and compare favorably with petroleum-based jet fuel in relation to cost and environmental impact. Its goal is to enhance the security of the energy supply. The Volpe Center provided CAAFI with alternative aviation fuel expertise and extensive logistics support.

The Volpe Center also led efforts to bring the X PRIZE model of innovative technology development to the area of alternative aviation fuels by establishing a working relationship with the X PRIZE Foundation of Santa Monica, California, that will culminate in the Alternative Aviation Fuel/PRIZE Roadmap. This will offer substantial financial and public relations incentives to industry and academic participants to develop a viable, environmentally friendly alternative to aviation fossil fuel. *(Sponsored by DOT/FAA)*

Transportation-Related Noise Measurement and Modeling for National Parks

The 1987 National Parks Overflight Act requires that FAA and the National Park Service (NPS) work together to achieve "substantial restoration of the natural quiet" in Grand Canyon National Park. In 2000, the National Parks Air Tour Management Act further directed the two agencies to develop *Air Tour Management Plans (ATMP)*. The Volpe Center

has supported FAA and NPS in meeting the environmental directives of both of these acts.

In FY 2008, Volpe Center staff supported the FAA Western-Pacific Region, the Office of Environment and Energy, and the NPS Natural Sounds Program by: (1) developing a national guidance document for measuring and analyzing ambient noise in low-level environments, such as National Parks, with appropriate methodology and procedures for establishing benchmark ambient conditions for different park settings; (2) researching advanced methodologies to enhance modeling of the effects of terrain and meteorology on sound propagation in FAA's AEDT; (3) initiating expansion of the AEDT noise database to include three common air-tour aircraft, the Piper PA-42 fixed-wing aircraft, the Bell 407 helicopter, and the Schweizer 300C helicopter, through an aircraft noise measurement program; and (4) performing baseline ambient sound-level measurements at Death Valley National Park, Cape Hatteras National Seashore, Biscayne National Park, and Big Cypress National Preserve. *(Sponsored by DOT/FAA & NPS)*



Noise measurement equipment gathers data for use by Volpe Center teams in developing acceptable and effective measures to mitigate or prevent significant adverse impacts from commercial air tours. (Volpe Center photo)

Tire-Pavement Noise and Quiet Pavements Applications

Between 1983 and 2004, \$3.4 billion was spent on the construction of highway noise barriers along U.S. roadways. Budget-conscious state DOTs, along with the Federal Highway Administration (FHWA), are researching innovative highway-noise-abatement technologies that go beyond barrier construction. Development of *Quiet Pavements* technologies has emerged as one of the more promising technologies. With tire-pavement interaction being the dominant source of vehicle noise at highway speeds, the use of quiet pavements for noise abatement is an important area of research. The Volpe Center has been extensively involved with national and international tire-pavement noise research.

In FY 2008, the Volpe Center supported the Quiet Pavements Program by (1) helping to guide research plans and field measurements for several states, (2) participating in expert panels to help guide projects for the National Cooperative Highway Research Program, (3) participating in the development of standard practices for tire-pavement noise measurements, and (4) conducting noise-measurement research to help quantify the benefits of quiet pavements. *(Sponsored by DOT/FHWA & State of Arizona DOT)*

Carbon Sequestration along Highway Rights of Way: Piloting a Concept

As threats of climate change become increasingly understood, states and the Federal government are exploring ways to reduce emissions of greenhouse gases, particularly carbon dioxide (CO₂). Some states now require their agencies to measure and reduce their emissions, and the Federal government may soon do the same. The method likely to be selected is emissions trading, or “cap and trade,” which requires entities that do not reduce

emissions to a certain level to buy emissions “credits” from those that emit less than the allowed amount.

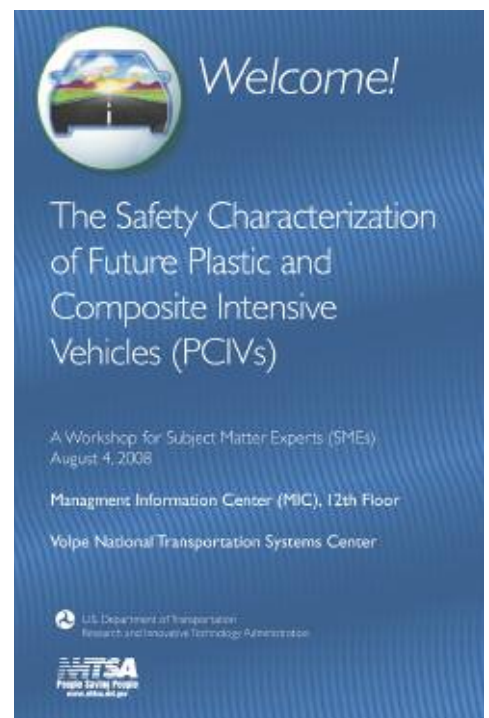
Because vegetation naturally captures, or “sequesters,” CO₂ from the air, state transportation agencies have an opportunity to reduce their total emissions and even to earn revenue by changing vegetation-management practices in state-DOT-owned rights of way (ROW). To explore this potential, the Volpe Center has been working with FHWA’s Office of Natural and Human Environment to conduct a *Carbon Sequestration Pilot Project*. The goals are to quantify the amount of carbon that can be sequestered with use of native vegetation management on DOT lands and to estimate the revenue that could be generated through the sale of “carbon credits” on an emissions trading market. Marketable carbon credits could include not only carbon sequestered in plants but also emissions reductions resulting from reduced mowing and other management actions.

The Volpe Center team developed a framework for selecting a pilot test state, interviewed potential participants, and visited top-tier candidates. The State of New Mexico Department of Transportation (NMDOT) was selected for the pilot on the basis of total DOT-owned ROW acreage and the state’s existing commitment to CO₂ emissions reductions. The Volpe Center is now helping NMDOT to quantify and verify the acreages available for carbon sequestration and to estimate the vegetation costs and potential value of marketable credits. The pilot project is expected to substantially assist NMDOT in meeting its emissions-reduction goals while helping it save on fuel costs from mowing and generate revenue by selling credits for its qualifying ROW. The results, which will be shared with Division offices and state DOTs, could help to inform future transportation and climate change legislation. FHWA may expand the pilot program to include other states. *(Sponsored by DOT/FHWA)*

Safety of Next Generation Plastic-and-Composite-Intensive Vehicles (PCIVs)

For the last three years, the Volpe Center has performed research for the National Highway Transportation Safety Administration (NHTSA) to ensure the safety of the emerging generation of lightweight, fuel-efficient vehicles. In response to congressional guidance and global pressure to improve vehicles’ energy efficiency while protecting safety and sustainability, NHTSA turned to the Volpe Center to explore the potential safety benefits of using plastics and composites.

Initial Volpe Center research is summarized in a 2007 report, *A Safety Roadmap for Future Plastics and Composites Intensive Vehicles (PCIVs)*, posted online at http://www.nhtsa.dot.gov/staticfiles/DOT/NHTSA/NRD/Multimedia/Crashworthiness/4680PCIV_SafetyRoadmap-Nov2007.pdf. The report evaluates the potential safety benefits of PCIVs and identifies crash-safety research needs and priorities to enable the deployment of these systems by 2020.

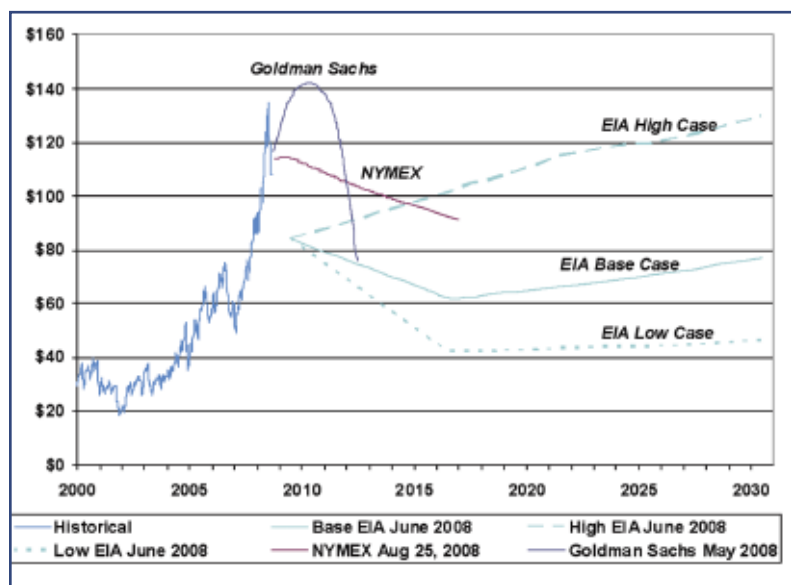


In a follow-on research effort, the Volpe Center organized and hosted an August 2008 workshop on PCIVs. The workshop convened 50 subject-matter experts and stakeholders who shared insights and provided inputs on key research priorities for characterizing and quantifying the safety benefits of advanced plastics and composite materials for PCIVs. The summary and presentations from the proceedings, posted online at http://www.volpe.dot.gov/safety/pciv/docs/summary_pciv_workshop.pdf, will assist NHTSA and the Volpe Center in targeting research resources to address knowledge gaps in modeling and standards for testing the crashworthiness of composite materials, and in leveraging ongoing research partnerships in government, industry, and academia. *(Sponsored by DOT/NHTSA)*

Transportation in an Age of Volatile Oil Prices

The Volpe Center recently developed a critical report on the volatility of global oil prices and their effect on the national transportation enterprise for the Administrator of the Research and Innovative Technology Administration.

Oil prices have been highly unstable for the past three decades with recent prices akin to a roller-coaster ride, nearly tripling from about \$50 per barrel in early 2007 to nearly \$140 per barrel in mid-July 2008 and back to around \$45 per barrel by December 2008. Oil price forecasts show these wide variations for the near term as well.



The graph shows oil price volatility since 2000 as well as projections of future prices through 2030. The Energy Information Administration (EIA) provides these projections of future prices, which vary significantly based on model assumptions.

The Organization of Petroleum Exporting Countries (OPEC) and countries with national oil companies control most of the world's oil reserves. Given the political instability of some of the oil-rich countries, many plausible scenarios exist in which civil or political unrest might seriously disrupt oil supply. America holds only about 2 percent of world oil reserves. All these issues factor into the EIA cases.

Over the past year, Americans have reacted to high fuel prices by driving less and using public transit more. Motor vehicle miles traveled appreciably declined after continuously increasing for nearly four decades. Additionally, logistic chains in most industries are being shortened and in some cases manufacturing facilities are being relocated to the U.S. from abroad. Profits for freight modes decreased with higher fuel costs; as a result, nearly 1,000 trucking companies went bankrupt in the first quarter of 2008 alone.

Sources: EIA, "World Crude Oil Prices: Weekly," August 28, 2008; EIA, Annual Energy Outlook 2008, June 2008; New York Mercantile Exchange, August 25, 2008; news reports on Goldman Sachs announcement, May 2008.

The report developed by the Volpe Center is helping to shape discussions of the future of the transportation enterprise in the United States. *(Sponsored by DOT/RITA)*

Federal Fuel Economy Standards: Analysis to Support Major Regulatory Reforms

Since the mid 1970s, NHTSA has been issuing and implementing Corporate Average Fuel Economy (CAFE) standards that have reduced the Nation's dependence on foreign oil, conserved petroleum, reduced carbon dioxide emissions, and saved consumers money by reducing fuel costs. Pursuant to the Energy Independence and Security Act of 2007 (EISA), which became law in December 2007, NHTSA issued a Notice of Proposed Rulemaking (NPRM) in May 2007 and is currently working toward issuing a final CAFE rule. EISA tasked NHTSA with setting separate maximum feasible fuel economy standards for both passenger cars and light trucks that yielded a combined fleet fuel economy average at or above 35 miles per gallon (mpg) by model year (MY) 2020.

In 2008, the Volpe Center performed significant underlying analytical work to continue support for NHTSA's CAFE rulemaking activities. The Volpe Center team played a vital role in the modeling and analysis used to develop the NPRM standards and is continuing that role in the forthcoming final rule standards. Volpe Center experts were part of a technical team that assessed the estimates of the availability, applicability, and incremental effectiveness and cost of fuel-saving technologies. The team was also involved in analyzing manufacturer product plan data (used as a forecast of the future vehicle market), as well as economic factors such as estimates of vehicle survival, mileage accumulation patterns, the rebound effect, future fuel prices, and the social cost of carbon.

The Center developed a computer model to further aid in the formulation and evaluation of potential CAFE standards. The model is a Windows-based desktop application that uses market data, technology estimates, and economic parameters to estimate the ability of each manufacturer to apply additional technologies in response to potential future CAFE standards. The model evaluates the costs, effects (e.g., saved fuel and reduced emissions), and monetized benefits of these additional technologies, and can be used to estimate the stringency at which specified benefit-cost criteria are satisfied. NHTSA has used (and continues to use) the Volpe Center model as a tool to inform its consideration of potential standards. In November 2008, the DOT Fuel Economy Team, including six Volpe Center employees, was awarded the U.S. Department of Transportation's Gold Medal—the highest award granted by the Secretary of Transportation. *(Sponsored by DOT/NHTSA)*

Research and Innovative Technology Administration Hydrogen and Alternative Fuels Program

In an effort to support efforts to break the Nation's dependence on oil, the Volpe Center drafted the U.S. DOT Alternative Fuels Roadmap (AFRM). Released in January 2009, AFRM outlines potential alternative fuel sources and identifies activities within all offices and administrations at DOT in support of alternative fuels for transportation as well as

future considerations needed. Established to act as a baseline reference and starting point for the DOT to monitor and react to developments and technological breakthroughs within the energy transportation sector, AFRM aims to act as a vehicle for DOT to harmonize crossmodal programs and projects in order to achieve energy independence while reducing transportation energy use and its impact on the environment.

In addition to the strategic high-level drafting of AFRM, the Volpe Center supported two highly successful outreach events. Hydrogen Drive 2008 took place in Sacramento, CA in March and enabled local and national media and interested parties to experience hydrogen-powered vehicles from major automotive manufacturers in real-world operation. The event concluded with a roundtable discussion which included officials from RITA, the U.S. Department of Energy, the California Air Resources Board, local Sacramento area government and transit agencies, and representatives from the automobile industry. Hydrogen Drive 2008 was followed up by Hydrogen Road Tour 2008, a 13-day, 31-stop event covering 18 states and stretching from Maine to California. The road tour included nine different automotive original equipment manufacturer (OEM) vehicles which were driven cross country in an effort to increase awareness for hydrogen and hydrogen-powered vehicles. The Volpe Center provided the planning, logistics support, and staffing for this series of events.

Additionally, the Volpe Center provided support for RITA's leadership of and participation in several committees and working groups including the Biomass Research and Development Board (Distribution Infrastructure Interagency Working Group), the Hydrogen Fuels Initiative Coordination Group, the Interagency Working Group on Hydrogen and Fuel Cells, the Federal Interagency Working Group on Alternative Fuels, the California Fuel Cell Partnership, the Hydrogen Technical Advisory Committee (which included drafting of white papers and presentations), the International Partnership for a Hydrogen Economy Standards, Codes and Regulations subcommittee, the Rail Energy Transportation Advisory Committee, the Southeast Alternative Fuels Task Force and groups within the DOT including the Alternative Fuels Council and Hydrogen Working Group.

Presentations by Volpe Center personnel were made to the Interagency Biomass Research and Development Board, the California Energy Commission, the University Transportation Centers, and the U.S. Council for Automotive Research. The Volpe Center also administered and awarded contracts in support of alternative fuels research to the National Association of State Fire Marshalls, and the University of California at Davis Sustainable Transportation Energy Pathways program. *(Sponsored by DOT/RITA)*

Environmental Cleanup Program

FAA must comply with Federal and state legislation that was enacted to protect the public from exposure to hazardous materials. FAA's Environmental Cleanup Program (ECU) oversees the Agency's implementation of these environmental laws and policies. FAA ECU created the Environmental Site Cleanup Report (ESCR) to track and report on the progress of contaminated FAA sites throughout the United States.

The Volpe Center supports FAA's Eastern Service Area (ESA) by annually updating the ESCR for all contaminated sites in the legacy New England and Eastern regions. Additionally in FY08, Volpe Center staff completed four preliminary assessments and four site investigations at properties listed in the ESCR. The Volpe Center then worked with state regulators to facilitate site closure at two of the sites where a site investigation was performed.

In 2009, Volpe Center staff will continue to support FAA ESA and will perform seven preliminary assessments, oversee three site investigations, and perform remediation activities at two facilities. *(Sponsored by DOT/FAA)*

Freight Logistics and Transportation Systems

The Freight Logistics and Transportation Systems COI maintains awareness of changes in local, regional, national, and world freight and logistics transportation infrastructures, including consolidation of all elements of safety, security, economic, environmental stewardship, and energy issues. Technical expertise is provided to support the deployment of the next generation of global logistics and transportation systems.

Maritime Safety and Security Information System (MSSIS)

In September 2008, The Volpe Center's Global Maritime Domain Awareness (MDA) team was awarded the prestigious 2008 Innovations in American Government Award from Harvard University's Kennedy School of Government Ash Institute for Democratic Governance and Innovation for its efforts in enhancing levels of safety and economic stability on the global seas. Harvard's Innovations in American Government Program is a significant force in recognizing and promoting excellence and creativity in the public sector. Through a highly competitive awards competition, the program highlights exemplary models of governments' innovative performance and serves as a catalyst for continued progress in addressing the Nation's most pressing public concerns.



Tony Saich and Stephen Goldsmith of the Harvard Kennedy School Ash Institute with the Volpe Center program team.

(Photo courtesy of the Ash Institute)

In 2006, the Volpe Center, on behalf of the U.S. Navy Sixth Fleet, initiated efforts to produce an MDA network known as the Maritime Safety and Security Information System (MSSIS). The unclassified, low-cost, shared network is now used to track the movements of vessels from around the world. This effort continued the Volpe Center's historical contributions to the development of MDA networks such as its groundbreaking work on the Panama Canal and the St. Lawrence Seaway.

The original goal of MSSIS was to enhance maritime security in the European Command Area of Responsibility through a comprehensive situational awareness display of vessels equipped with Automatic Identification System (AIS). Another critical goal was to foster cooperation among the United States and its allies by allowing active partnership in the network. By 2007, the system was already an overwhelming success, with 29 member nations agreeing to share AIS data over MSSIS. In 2008, the network expanded its coverage to include nations in the Arabian Gulf, Africa, and South America. The system currently tracks over 20,000 vessels in over 50 countries. MSSIS continues to be a valuable tool. It provides support for international military operations and exercises as well as search-and-rescue (SAR) missions. MSSIS has also opened new diplomatic avenues for the United States, resulting in a heightened international understanding of the need for increased MDA. Along with aiding traffic flow, MSSIS is essential for combating drug smuggling, human trafficking, piracy, and global terrorism.

Since its initial deployment, the Volpe Center has been critical to discussions on the benefits of global maritime domain awareness with countries across the globe. “This is the future. This is the thousand-ship navy, except there are no ships,” said retired U.S. Navy Admiral Harry Ulrich. *(Sponsored by DoD/U.S. Navy)*

Enhancing the Performance of U.S. Global and Domestic Maritime Transportation

The Volpe Center’s Marine Systems Team is expanding the applications of advanced marine technologies and systems analysis to achieve an efficient, safe, and environmentally sound marine transportation system that facilitates global commerce.

(© iStockphoto.com/lctor)

In two closely coordinated projects, the Volpe Center team is providing support to the National Oceanic and Atmospheric Administration (NOAA) and the U.S. Army Corps of Engineers (USACE) by (1) developing a benefit-cost analysis (BCA) model for estimating the value of NOAA’s electronic navigation data and (2) conducting a risk-and-resiliency assessment of the U.S. Marine Transportation System (MTS), in support of a forthcoming report to Congress.

In the NOAA project, the Volpe Center is currently evaluating the impacts of the Agency’s electronic navigation charts (ENCs) and real-time tide and current data on navigational safety and efficiency



by measuring the way that ENC's facilitate efficient movement of domestic and international vessels while enabling them to avoid grounding, collisions, and spills. A graphic display of the depth and contour of the ocean floor, charts ships' precise positions as derived from GPS signals, and using real-time tidal currents and storm-surge forecasts, ENC's provide situational awareness to commercial vessel operators, boaters, and SAR officers. By triggering alarms that sound when a vessel is near a dangerous area, the MTS system enables mariners to avert catastrophic accidents, oil spills, and environmental damage. The BCA study is estimating the net benefits of NOAA technologies as stand-alone devices or integrated with other systems, such as Automatic Identification System (AIS), Integrated Bridge System (IBS), Vessel Traffic Service (VTS), and radar for providing domain awareness and promoting safe and efficient navigation.

In the USACE-funded MTS assessment project, the Volpe Center is examining system risks and vulnerabilities in tandem with the NOAA BCA study. Focusing on the deployment of proven technologies to mitigate MTS vulnerabilities, the Center has identified system attributes that make MTS adaptive, fault-tolerant, and resilient in the face of adverse events and disruptions. This project is anticipated to generate significant crossover synergies with the NOAA study and, potentially, systemwide transportation network benefits, by building on lessons learned from the deployment of the Volpe Center AIS in support of the Global Maritime Security System (GMSS).

The Volpe Center is also evaluating the application of NOAA navigational data for promoting domestic Short Sea Shipping cargo operations as an efficient and environmentally sound alternative to highway freight transportation. The Center developed the TransView T-32 prototype system, which is currently being tested in several locations, including the Columbia River and the Great Lakes/St. Lawrence Seaway. The system visualizes inland waterways, provides location information to vessels, and guides Federal dredging and waterway-capacity-management operations. It is hoped that further market penetration of these and other domestic Short Sea Shipping technologies and strategies will ultimately promote the DOT Marine Highway Initiative, designed to enhance energy efficiency, reduce highway congestion, and improve air quality. *(Sponsored by DoD/U.S. Navy)*

Regional and Multimodal Electronic Payment System (EPS) Convergence Study

Many innovations in transportation payment systems are being demonstrated and proposed throughout the United States, including partnerships between transit agencies and financial institutions, regional clearinghouses for transit and toll roads, dynamic pricing to reduce congestion, and application of electronic payment systems (EPS) for public and private parking. These are largely independent efforts; few, if any, involve multimodal applications. Further, as more payment options become available, there will be a need for objective information about the relative advantages of various approaches, and for guidance about how transportation agencies should proceed.

In the Regional and Multimodal Electronic Payment System Convergence Study, the Volpe Center will provide an independent description of emerging payment-system alternatives and explore opportunities for payment innovations and convergence in all modes of transportation. The primary focus of this study is to examine paths for using advanced-payment technologies in ways that will provide the traveling public with a more coordinated approach. Many forward-thinking projects are occurring outside the United States, and this study includes relevant international programs and best practices as well.

The study is sponsored by the I-95 Corridor Coalition, a consortium of member organizations from throughout the Interstate 95 Corridor whose mission is to work together to improve multimodal transportation services in the region through information sharing and coordinated management and operations.

The Coalition is made up of volunteer committees in specific program tracks. One of these committees, the EPS Program Track Committee, has the stated goal of fostering the implementation of interoperable, corridorwide, multimodal EPS. This Volpe Center project is focused on helping the Committee to achieve its goal by assisting in the development of a long-term vision for convergence of payment systems, improving ease of use of multimodal transportation services, and enhancing the ability to make travel-mode choices within the Corridor. Volpe Center staff is working closely with I-95 Corridor Coalition stakeholder organizations as well as national subject-matter experts in the private and public sectors, in diverse industries such as transportation, banking, regional politics, cellular communications, and the Internet.

The study will generate information on best practices in multimodal EPS systems with regard to critical issues that transportation agencies are likely to face, now and in the near term, such as congestion mitigation, use of external partnerships, standards design, and the need to develop a successful strategy to implement multimodal payment systems. It will be coordinated with U.S. DOT initiatives, including those of the U.S. DOT Research and Innovative Technology Administration (RITA) and other parts of U.S. DOT, as appropriate.

The Volpe Center is examining linkages between electronic payment applications and ITS applications such as traveler information systems, and is leveraging synergies with other key Center projects, such as SafeTrip-21.

The Center is proposing a second phase to the program, which will entail planning and facilitating a workshop to discuss EPS convergence issues and to develop a long-term vision for the I-95 Corridor. *(Sponsored by I-95 Corridor Coalition)*

Information Assurance/Web-Configuration Management (WebCM)

The Volpe Center manages the Information Assurance Program for the Federal Aviation Administration's (FAA) ATO-W WebCM system, a major software application managed by the FAA Enterprise Configuration Management Program Office. The system helps to automate the National Airspace System (NAS) change-proposal process. It significantly

reduces the time and cost for processing changes to FAA systems as well as for managing engineering drawings and other required technical documentation by providing accurate, timely configuration information to support business decision-making and operations.

The Volpe Center's Information Assurance Program provides project management and engineering services in support of the:

- Configuration Management Automation Program
- Information System Security
- Systems Development Life Cycle
- Baseline Management and NextGen Automation

The program requires close coordination with Systems Development Life Cycle operations and support personnel at the Program Management Office in Washington, DC; the William J. Hughes Technical Center in Atlantic City, New Jersey; the Mike Monroney Aeronautical Center in Oklahoma City, Oklahoma; and various product and vendor sites.

The Volpe Center also performs certification and accreditation activities to determine and evaluate ongoing information-systems security-posture and risk criteria used by FAA to establish mitigation strategies.

On the basis of its technical expertise in comprehensive information systems security, information assurance, and network security practices, the Volpe Center enhances FAA organizational excellence and ensures that the intricate regulations surrounding information integrity are maintained across the enterprise. Working with various offices within FAA, the Center helps to impart technical knowledge and to implement sound processes and information-security best practices. It also helps to direct the efforts of technical contractors who provide critical resources to achieve the goals of FAA and its programs. *(Sponsored by DOT/FAA)*

Physical Infrastructure Systems

In the face of ever-increasing demand and accumulated loads, the Physical Infrastructure Systems COI maintains cognizance and provides technical support in the inspection, maintenance, and rehabilitation of the existing and future transportation infrastructure, including vehicles, guideways, and intermodal facilities. It maintains an internationally recognized knowledge base and provides technical support, including utilization of new materials, engineering concepts, and institutional approaches to ensuring the resilience of existing and future transportation infrastructure in response to natural and man-made disturbances.

Army Rail Modernization Program

The U.S. Army Tank-Automotive and Armaments Command (TACOM) is responsible for the Army rail fleet, which is essential for unit deployments and sustainment equipment, ammunition, and medical deliveries. Army locomotives in the fleet carry equipment and vehicles from Army installations to mainline railroads where they are picked up by the commercial railroad locomotives and transported to the nearest port or training area. The Army rail fleet eliminates dependence on Army trucks to transport equipment and supplies, a cost-prohibitive option that would negatively affect Army logistics and unit operating parameters, as well as increase roadway congestion and clog ports. Additionally, TACOM provides acquisition and contract management to the Rail Transportation Modernization Program of the Department of the Army, Deputy Chief of Staff, Logistics Office (DALO).



A U.S. Army locomotive at Fort Bliss, Texas. (Volpe Center photo)

The Volpe Center provides overall program management support for the U.S. Army railway and technical expertise to assist TACOM with addressing critical transportation issues in the U.S. Army's Rail Modernization Program. The Volpe Center continues a long tradition of railroad technical support expertise to the Department of Defense (DoD). This began in 1989 with the support of the Aviation Troop Command (ATCOM) and continued when railway operations were moved to TACOM in 1994, transferred again to the U.S. Army Program Executive Office, Combat Support & Combat Service Support (PEO CS&CSS) in July 2004, and returned to TACOM in April 2007.

Currently, the Army has requirements to upgrade 103 locomotives in the U.S. Army railway, one of the largest industrial railroad fleets in the world. The Volpe Center is leading the acquisition of new, modern equipment from technical specification through procurement, delivery, and acceptance. The new railway rolling stock consists of higher fuel-efficient models, which contribute to improved emissions as well as increase the efficiency and safety of operators and cargo. The modernization program also helps eliminate transportation-related deaths and injuries and protects and enhances communities and the environment.

The Volpe Center supports all engineering requirements for the U.S. Army railway. The Center's engineers ensure that contractors properly follow technical specifications and select and oversee contracted installation teams. They determine whether necessary engineering changes are properly designed and executed, maintain program master schedules, conduct engineering, safety compliance, and quality assurance inspections, and ensure proper integration with existing U.S. Army railway equipment, including spare parts. The Center also ensures proper training procedures are developed and prepares operational and maintenance manuals. Staff engineers participate in the annual U.S. Army Inter-Service Locomotive Management Committee Steering Group.

The Volpe Center supports the U.S. DOT Strategic Goal to promote transportation solutions that protect our national security as well as public health and safety in communities in which the railway operates. The Volpe Center strives to provide organizational excellence to TACOM. *(Sponsored by DoD/U. S. Army TACOM)*

Digital Microwave Radio Communications Network for the Iraqi Republic Railways

Seamless railroad radio communication is essential to maintaining safe and efficient train operations on the Iraqi Republic Railways (IRR) as is the safety of all employees, equipment, and the public.

The Volpe Center supports the Iraq Transition Assistance Office, Transportation Councilor by managing the development, manufacturing, installation, integration, and acceptance of a turnkey digital microwave radio communications network for IRR between the port facilities of Umm Qasr to the Syrian border. This effort is part of the U.S.-led reconstruction relief effort to rebuild Iraq. The network will function as the railway's backbone communications link for both voice and data transmission and is an essential component

of a communications-based train control system that is being deployed for IRR.

Over the past year, the Volpe Center has accomplished many major milestones for the project. The design, manufacturing, and shipping phases are complete and all the communications equipment is now in Iraq. As of January 2009, all 33 telecommunication towers have been erected, security walls have been built around all towers, and 32 of 33 telecommunication shelters are installed.

When completed, the microwave system will allow IRR to communicate between the Baghdad dispatching office and all locomotives and stations along their north-south right-of-way.

(Sponsored by U.S. State Department, Iraq Transition Assistance Office, U.S. Embassy, Baghdad, Iraq)



Antenna installation at Umm Qasr. (Photo courtesy Mafeks International, LLC)

Highway Rail Intersection and Rail Right-of-Way Research Program

Highway rail intersections (HRIs), rail rights-of-way (ROWs) and grade crossings present a significant hazard to motor vehicle users, trespassers, and pedestrians, as well as to rail passengers and crew. The Volpe Center supports the Federal Railroad Administration (FRA) HRI and ROW Program (formally known as Grade Crossings Program) that seeks to address these issues.

According to 2008 statistics from the FRA Office of Safety Analysis, in 2006 there were a total of 2,927 incidents (public and private) resulting in 369 fatalities and 1,036 injuries. There were also 989 trespass casualties, comprising 518 fatalities and 471 injuries. In addition, with the increase in development of high-speed passenger rail corridors, the risk posed by railroad ROW infrastructure will become even greater.

The Volpe Center provides technical support to the FRA railroad infrastructure research on all aspects of the railroad ROW including HRI research. One major effort underway is the development of a more precise understanding of the risks presented by the railroad ROW in order to decrease or eliminate these various risk elements. This ROW research addresses such areas as visual and audio warnings, motor vehicle and train presence detection, crossing geometry, and crossing gate and flashing light technologies.

This multiyear railroad ROW infrastructure safety program includes research in the areas of system operations analysis, technology development and assessment, evaluation and implementation, and advanced technology opportunities. The primary objective of the program is to identify those technologies, methodologies, and hardware that will increase safety and help continue the downward trend of collisions and fatalities. *(Sponsored by DOT/FRA)*

Right-of-Way Fatality and Trespass Reduction Workshop

The FRA Office of Railroad Safety and the Federal Transit Administration (FTA) sponsored the first Rail Right-of-Way (ROW) Fatality and Trespass Prevention Workshop in April 2008. The workshop was hosted by Caltrain at its headquarters in San Carlos, California. The Volpe Center continued its tradition of providing innovation and thought leadership in the area of ROW and grade crossing safety and security through several technical presentations, as well as supporting the FRA in the planning and organization of the workshop itself.

This event took an in-depth look at the issues surrounding one of the biggest risk areas facing the rail community—that of third party intrusions (i.e., trespass) and the fatalities on the ROW. This workshop was the first event to bring together multiple rail constituents—including transit, freight, and commuter rail—to focus on common problems and solutions surrounding ROW fatality and trespass prevention. The goal of the workshop was to identify and share existing industry leading practices and explore new strategies that the rail industry could pursue to reduce the number of right-of-way and trespasser incidents and fatalities. The results and activities of this workshop were captured in the recent report published by the FRA Office of Railroad Safety entitled “Right-of-Way (ROW) Fatality and Trespass Reduction Workshop 2008: Summary of Results.”

The workshop was attended by 121 delegates from 62 organizations from across railroad industry sectors including Federal government and state officials, railroad and transit operators, industry groups, consultants, unions, law enforcement, and four international organizations. The breadth of attendees speaks to the common issues faced by transit, commuter, and freight rail operations.

The workshop presented a varied program presented by rail/transit experts and safety professionals who shared their ideas on key issues, best practices, technical developments, human behavior, suicide prevention, law enforcement, and education methods and techniques related to ROW fatality and trespass reduction. The workshop included 23 presentations from multiple organizations on ROW fatality/trespass issues covering such topic areas including community outreach, police/enforcement, hazard management, technology, and infrastructure.

The workshop allowed attendees to discuss advances, accomplishments, challenges, approaches, and best practices in ROW fatality and trespass prevention and provided an interesting and motivational look at advances in ROW fatality and trespass reduction technologies, education, and operations. The result was a vibrant exchange of ideas and excellent networking as well as a showcase of the newest and best safety-related developments from around the world and an opportunity to set the foundation for future cooperation. Attendees left the workshop with new tools, methods, and solutions that can be implemented or introduced at their respective organizations. *(Sponsored by DOT/FRA and FTA)*

Engineering, Installation, and Integration Support to the U.S. Air Force – Department of Defense (DoD), National Airspace System (NAS)

In 2008, the Volpe Center continued its ongoing support of the DoD National Airspace System (NAS) Program for the U.S. Air Force (USAF) Electronic Systems Center (ESC), at Hanscom AFB in Lexington, Massachusetts. The NAS program is a long-term project to replace DoD's terminal radars, voice switching systems, and terminal automation systems, as well as to consolidate several existing informational displays. The program goal is to achieve interoperability between DoD and Federal Aviation Administration (FAA) Air Traffic Control (ATC) facilities.

The Volpe Center contributes to meeting this goal through engineering and implementation of multiple major systems:

- Digital Airport Surveillance Radar (DASR)
- Enhanced Terminal Voice Switching (ETVS)
- Standard Terminal Automation Replacement System (STARS)
- Airfield Automation System (AFAS)

The Volpe Center has completed its task support for the ETVS and continues to support the other three systems. The Center is also engaged in the deployment of these systems at over two-thirds of the 177 USAF and Air National Guard (ANG) Bases worldwide.

The Volpe Center project team consists of 13 highly skilled program managers and engineers that are expert in areas ranging from electrical engineering to aviation operations. For nearly a decade, they have played a major role in requirements definition, system engineering, site engineering, and analysis of communications, surveillance, and automation systems for the NAS program office. These efforts are spearheaded by the Infrastructure and Facility Engineering Division, but draw technical expertise from several other areas of the Volpe Center.

In addition to primary responsibility for the site-level engineering and integration of NAS systems, staff provided input for system requirements, evaluation of system performance and troubleshooting of faults, and resolution of interface issues. The Volpe Center established each site's capability to support the new equipment, engineer the removal of old equipment, and install the new equipment, all while keeping the site system on-line.

The Volpe Center creates and maintains facility drawings and provides the government's technical oversight by conducting System Acceptance Tests (SAT) for STARS and AFAS, and participating in SAT for STARS at each installation location. By demonstrating their world-class technical knowledge and project management abilities, the Volpe Center staff has become an integral part of the USAF program office team, steadily increasing the level of support and responsibilities. Volpe Center experts now perform flight checks on behalf of the program office.

In 2008, the Volpe Center aided NAS in achieving the full deployment of AFAS systems. Of the 63 systems installed over a three-year period, 44 were completed at a rate of nearly one per week. Volpe Center staff also helped achieve the deployment of 9 STARS and 4 DASR systems, including substantive support for system upgrades and improvements such as the incorporation of Mode S into both the radar and automation systems. Additionally, the Volpe Center team led the continued development of the DASR Advanced Signal Data Processor (ASDP), with a test bed facility established at the FAA's technical center. The ASDP will ultimately provide the DASR with capabilities no other terminal radar in the world will have.

The Volpe Center chairs the joint DoD-FAA DASR-STARS interoperability working group, which has developed and refined the process for optimizing these systems as single entity, rather than individual components, resulting in the best possible air picture for air traffic controllers. *(Sponsored by DoD/USAF)*

Federal Transit Administration Office of Safety and Security Five-Year Strategic Plan

To support the public transportation industry in fulfilling its critical obligations in safety, security, and emergency preparedness, the FTA Office of Safety and Security is responsible for overseeing the implementation of transit-related safety regulations, providing safety and security training, developing guidelines and best practices manuals, partnering with other Federal agencies and industry associations, and creating programs to encourage voluntary improvements in security, safety, and emergency preparedness.

The Volpe Center leads a team of industry experts to develop a Five-Year Strategic Plan for the FTA Safety, Security and Emergency Management program. The strategic plan's comprehensive, all-hazards scope encompasses safety, security, and emergency management. Its data-driven, continuous-improvement focus is in line with FTA's "Baldrige" customer service approach.

The strategic planning process and vision were developed in partnership with key industry stakeholders. Those stakeholders provide the blueprint for FTA's next-generation safety and security programs. The plan builds on the success of the original Security Emergency Management Technical Assistance Program (SEMTAP), by incorporating an all-hazards approach, as well as a systems approach, into new programs and products targeted to specific needs of the transit industry. Transit agencies need technology tools that are proven to be reliable in the transit environment, justifiable from a cost-benefit evaluation derived from a security risk assessment viewpoint, and balanced between human resources and technology applications. The plan also defines the role of FTA in relation to its Federal partners such as other DOT agencies and the Department of Homeland Security, which are involved in complementary activities. *(Sponsored by DOT/FTA Office of Safety and Security)*

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

The Communication, Navigation, and Surveillance and Traffic Management Systems COI maintains and applies internationally recognized capabilities in communication, navigation, surveillance, operations management, and associated information technology disciplines to enhance the capacity, safety, and security of next-generation transportation systems. It serves as a focal point on Positioning, Navigation, and Timing (PNT) systems engineering for the civil community and fosters interagency coordination efforts.

FAA Terminal Facilities Enhancements Support

The Volpe Center supports the Federal Aviation Administration (FAA) in program and schedule management and systems engineering for the replacement of airport traffic control towers (ATCTs) and terminal radar approach control (TRACON) facilities. FAA's Terminal Facilities Group is responsible for the establishment, replacement, and modernization of terminal air traffic control facilities to ensure cost-effective infrastructure platforms for the control of air traffic in the National Airspace System (NAS). This project supports FAA's management of capital investment projects that will improve the aviation infrastructure and provide increased reliability throughout the NAS.

During the past year, the Volpe Center supported the Terminal Facilities Group in three distinct areas:

- Played a key role in establishing baselines for new projects, including the LaGuardia ATCT (New York); the Memphis, Tennessee ATCT/TRACON; the Dayton, Ohio

ATCT; the Pensacola, Florida TRACON; the Islip, New York ATCT; the Reno, Nevada ATCT; and the Boise, Idaho ATCT.

- Provided systems-engineering support to ensure that implementation and integration requirements associated with ATCT and TRACON replacement facilities were fully and accurately defined and addressed. Systems-engineering documents were developed for the Boise, Idaho TRACON realignment into the Salt Lake City, Utah TRACON. Ongoing analysis includes the Dayton, Ohio TRACON realignment into the Columbus, Ohio TRACON; the Reno, Nevada TRACON realignment into the Northern California TRACON in Sacramento; and the Gulfport, Mississippi ATCT/TRACON replacement.
- Provided safety and risk-management analysis to terminal air traffic control facility projects in Memphis, Tennessee; the New Orleans, Louisiana Lakefront; Morristown, New Jersey; and Charlotte, North Carolina. *(Sponsored by DOT/FAA)*



Artist's rendering (left) and photo (right) of new ATCT at La Guardia Airport in New York City.

National Airspace System Performance Analysis System

FAA operates and maintains NAS facilities and equipment dedicated to the provision of safe, reliable, and cost-effective air traffic control services for NAS users and the flying public. FAA also maintains a schedule of improvements to the NAS in order to meet the continuing demands of aviation growth and safety.

The Air Traffic Organization Technical Operations (ATO-W) NAS Quality Assurance and Performance Team is responsible for two major components of NAS operations and maintenance: (1) achieving zero unscheduled outages for NAS facilities and facility equipment, and (2) ensuring the cost efficiency of ATO-W ongoing operations and maintenance activities.

The Volpe Center developed the NAS Performance Analysis System (NASPAS) to support operations and maintenance within NAS. This system is a computer-based repository for NAS facility and equipment performance data, containing statistical analysis tools for converting these data into management reports. The NASPAS is used to track service performance at air traffic facilities, analyze facility outages, compare facility performance with national averages, and identify equipment problems.

NASPAS was originally developed as an FAA Headquarters-only information system in 1983. Since then, it has undergone major changes in equipment platforms and software. The

Volpe Center recently completed development of a web-based version of NASPAS. This system was deployed nationally in February 2008. FAA intranet users can easily access and use Web NASPAS. Enhancements to the new system are now being developed with a scheduled release in late 2008. The Volpe Center is also developing classroom training materials for the web NASPAS system. A beta training session was held at the Center during September 2008. In FY 2009, classroom training for the system will be conducted at Headquarters and in the three Service Areas (Eastern, Central, and Western). *(Sponsored by DOT/FAA)*

Vehicle Simulation Tool Development

The Volpe Center has developed a Monte Carlo-based computer simulation capability to enable rigorous analysis and certification of terminal procedures, equipment, and airspace in the NAS for the FAA Flight Standards Office. This simulation capability will play a critical role as FAA seeks to safely implement new terminal arrival procedures based on Automatic Dependent Surveillance-Broadcast (ADS-B) technology to meet the expected capacity gains anticipated for the Next Generation Air Transportation System.

The overall goal of the Vehicle Simulation Tool (VST) project has been to provide a thoroughly documented, life-cycle managed, multiprocessor-capable, Government-owned stochastic-simulation capability enabling a rigorous analysis and certification of procedures, equipment, and airspace in the NAS for the FAA Flight Standards Office. The VST consists of approximately 60,000 lines of code and is the result of nearly 14 labor years of development effort. Unique elements of this complex computer simulation are the stochastic (i.e., random, but with known probability distributions) models of almost every component of the NAS, mechanical, electronic, and human, including navigation aids, surveillance systems (such as radar), pilots, aircraft, air traffic controllers, and weather. These models are combined with known, discrete artifacts such as FAA-database-supplied runway size and configuration, and obstacles. The Volpe Center has enhanced the VST by developing an airframe-type-specific kinematic aircraft model, a high-performance random number generator, a precise WGS-84-compliant elliptical earth model, and a graphical user interface integrating worldwide photo-realistic airport depictions and real-time 3-D animation.

Due to the complexity and aviation safety-critical nature of the simulation development effort, the Volpe Center approach to the project entailed a Public Request for Information Solicitation followed by extensive consultation with FAA, industry, and academic experts to plan the development effort. Program planning steps included extensive risk mitigation planning, organization of the multitude of tasks into two distinct and progressively more complex development phases, seating of a peer-review board, and design of a detailed verification and validation process that compared VST results with previous benchmarked FAA analysis results using several powerful statistical tools. *(Sponsored by DOT/FAA)*

FAA Runway Status Lights Program Support

Runway Status Lights (RWSL) is an FAA program to reduce airport runway incursions, which rank near the top of both the FAA and the U.S. DOT Inspector General lists of airport safety concerns.

The Volpe Center is providing project management support to the RWSL program. Volpe Center project staff maintain an overall program master schedule and a project schedule status review spreadsheet, and circulate the schedule and review spreadsheet to the FAA project team for status and progress updates. The Volpe Center team identifies key milestones and resources and associated reporting capabilities, and develops and monitors schedules for the site-by-site RWSL implementation efforts, including key FAA and contractor activities and dependencies. The key site implementation is scheduled to start in early 2009 at Orlando (Florida) International Airport.

Runway incursions have been included in the National Transportation Safety Board's (NTSB) "top ten" list for over a decade. Runway status lights constitute a response to the NTSB recommendation that the FAA require "a ground movement safety system that will prevent runway incursions; the system should provide a direct warning capability to flight crews." Runway status lights provide a direct indication to flight crews that it is unsafe to enter a runway or to begin a take off. The Volpe Center provides a crucial element in ensuring the RWSL System provides safety backup to controllers, pilots, and vehicle operators by increasing situational awareness in the runway environment. The FAA demonstrated RWSL capabilities using prototype systems at the Dallas-Fort Worth and San Diego International airports, and is now tailoring the system for deployment at 22 airports during its first phase of RWSL implementation with an option to include 13 additional airports. *(Sponsored by DOT/FAA)*

FAA Telecommunications Orders Review and Reference Data Support

The Volpe Center's Communication and Operations Division designed, developed, and continues to maintain the FAA Telecommunications Information Management System (TIMS). Now in its final year of operation, many functions performed by TIMS are being transferred to other information systems. The FAA's Telecommunications Services Group (TSG), however, has a continuing need for accurate, up-to-date FAA-owned reference data and for a centralized review of its orders to the Defense Information Technology Contracting Organization (DITCO) for administrative telecommunications services.

Under an Intra-Agency Agreement established with the TSG, the Volpe Center now performs technical and financial reviews of FAA requests for administrative telecommunications services. Financial review ensures that requests have sufficient support funding. Technical review verifies the technical contents of requests before its submission to DITCO, and also includes working with the National Communications System within the

Department of Homeland Security to obtain the appropriate level of Telecommunications Service Priority.

The Volpe Center is also developing the Telecommunications Reference Data Toolkit for use in maintaining master lists of FAA facility, program, and project codes and is also supporting the FAA in transitioning the maintenance of FAA telecommunications facility address data support from FAA Headquarters to the Volpe Center. *(Sponsored by DOT/FAA)*



Volpe Center wake instrumentation during a landing at Lambert–St. Louis International Airport (STL). (Volpe Center photo)

Aircraft Wake Turbulence Program

Wake vortices are turbulent eddies generated by the motion of air flowing from the wings of heavy aircraft. The Volpe Center develops procedures and systems that mitigate aircraft wake avoidance requirements in the airport area, while also increasing the safety of operations. This requires the collection, analysis, and interpretation of aircraft wake and related meteorological and flight trajectory data in order to demonstrate the safety and effectiveness of proposed new aircraft and flight procedures.

Several years ago, the Volpe Center collected and analyzed wake and related data for 250,000 approaches to San Francisco International Airport (SFO). Data were used to obtain approval of the Simultaneous Offset Instrument Approach (SOIA) procedure for improving arrival efficiency at SFO during low-visibility conditions. The Volpe Center then completed a three-year data collection and analysis effort at Lambert-St. Louis International Airport (STL) to evaluate a proposed simultaneous approach/landing procedure to closely spaced parallel runways for situations where previously only a single traffic stream had been permitted. That procedure, approved in 2007, led to subsequent assessments resulting in the approval of similar procedures at airports in Boston, Philadelphia, Cleveland, and Seattle during the past year.

During the past two years, the Volpe Center collected departure data at three airports (in St. Louis, Houston, and Frankfurt, Germany) to evaluate lessening restrictions on departures behind heavy aircraft (i.e., those with two aisles). Current rules require departing

aircraft to wait two minutes after a heavy aircraft departs on the same or parallel runway with centerline separation of less than 2,500 feet. By taking advantage of the wind speed and direction, departing aircraft on a parallel runway upwind of a departing heavy aircraft would not have to wait. The FAA now has an approved program to develop a system called Wake Turbulence Mitigated Departures (WTMD) that will implement this approach.

During 2005-2008, the Volpe Center was part of a Working Group (other members included the FAA, Eurocontrol, and Airbus) to determine the appropriate separation of aircraft following the new jumbo A380 aircraft. The Volpe Center analyzed data collected at several locations in Europe. Findings of the Working Group were accepted by the International Civil Aviation Organization (ICAO) in the summer of 2008 and are now being used worldwide. The Volpe Center currently participates in a Working Group to analyze and recommend aircraft separation requirements for the proposed stretched version of the Boeing 747.

As part of a U.S.-European team, the Volpe Center develops and specifies aircraft wake separation standards. The current wake turbulence categorization system used by FAA involves three broad categories of aircraft (primarily based on aircraft weight), in addition to several special cases of aircraft, which are treated separately. With the advent of several new aircraft types—including Very Light Jets (VLJs) and jumbo commercial transports—and newer controller automation tools, this is an appropriate time to investigate a wake turbulence categorization system that involves more aircraft classes and different criteria for establishing the classes. Initial results from that work are expected in 2010. *(Sponsored by DOT/FAA)*

National Positioning, Navigation, and Timing Architecture

The term—Positioning, Navigation, and Timing (PNT)—generally refers to a combination of three technologies that enable position determination within a grid, the ability to achieve a new position on that grid through navigational techniques, and the precise knowledge of time in relation to some known standard. In this context, the technologies are generally thought of as space-based. They are fundamental to surveillance and traffic flow management in many modes of transportation.

The Assistant Secretary of Defense for Networks and Information Integration and the Under Secretary of Transportation for Policy sponsored a National PNT study in response to Department of Defense (DoD) and civil agency recommendations to develop a comprehensive architecture for PNT as a framework for developing future PNT capabilities and supporting infrastructure. The study aimed to provide more effective and efficient PNT capabilities focused on the 2025 timeframe, and an evolutionary path for government-provided systems and services.

The Architecture Development Team was co-chaired by the Research and Innovative Technology Administration (RITA) and the National Security Space Office and included representatives from several other Federal stakeholders. The Volpe Center led this effort for RITA as the lead civil agency.

The current PNT Architecture consists of an ad hoc mix of external and autonomous PNT providers, as well as PNT augmentations. These systems provide PNT to a wide array of space, air, land, and maritime users, both civil and military. PNT is enabled by a large number of PNT enabling capabilities and infrastructure, and must be provided in an environment which includes spectrum, weather, fiscal, and geopolitical challenges.

Even with all of the capabilities currently available or planned, there are a number of gaps in PNT capabilities that have been identified from now through 2025. Development of the National PNT Architecture is largely driven by these identified PNT gaps:

- Physically Impeded Environments
- Electromagnetically Impeded Environments
- Higher accuracy with integrity
- Hazardously Misleading Info (Integrity)
- High Altitude/Space Position and Orientation
- Geospatial information - access to improved GIS data (regarding intended path of travel)
- Insufficient modeling capability

The PNT Architecture Development Team identified three architectures: 1) an “As-Is” Architecture describing the current mix of ad hoc capabilities; 2) an Evolved Baseline (EBL) anticipating future capabilities based on current planning, programming documents, and expected technology advances; and 3) a “Should-Be” Architecture addressing projected future needs and capability gaps with a long-term enterprise architecture approach. The PNT Architecture identifies the vision, strategy, vectors, and recommendations that lead to the “Should-Be” architecture capabilities. *(Sponsored by DOT/RITA)*

Surveillance and Broadcast Services (SBS) Support

The FAA Air Traffic Organization (ATO) created the Surveillance and Broadcast Services (SBS) Office to define and manage agencywide resources in the development and implementation of: (a) Automatic Dependent Surveillance – Broadcast (ADS-B) messages transmitted by aircraft to Ground Based Transceivers (GBTs) and other aircraft; (b) Automatic Dependent Surveillance Re-Broadcast (ADS-R) of messages received by GBTs from one data link and re-broadcast onto the other data link; (c) Traffic Information Services – Broadcast (TIS-B) of surveillance information obtained by GBTs from the National Airspace System (NAS) radar network; (d) Flight Information Services – Broadcast (FIS-B), e.g., weather and Special Use Airspace information, also provided by GBTs; and (e) integration of these new services/systems into the NAS.

SBS Office responsibilities include: establishing standards/rules for both aircraft and ground equipment/systems, development/deployment of GBTs, and integration of ground

systems with Automation systems (Terminal, En Route and Oceanic). Initial application regions include: Juneau, Alaska, for ADS-B and Wide Area Multilateration (WAM); Western Colorado for ADS-B and WAM, in conjunction with the Colorado Department of Transportation (CDOT); the Gulf of Mexico (GoMex) for ADS-B as well as communication and weather systems; the Louisville area for air-to-air applications; and the Philadelphia area for ADS-B/FIS-B/TIS-B services. Ground systems are supplied, installed, and operated by an FAA contractor team comprised of ITT Corporation and 13 subcontractors.

The SBS Office is led by FAA and staffed by a team of managers, engineers, operational specialists, and program analysts from FAA and the Volpe Center, Federally Funded Research and Development Centers, and for-profit companies. Volpe Center responsibilities include: (1) system engineering for the Continental United States deployment of ADS-B/TIS-B/FIS-B, including monitoring and evaluation of the functional architecture and design, developing a system coverage tool, determination of avionics equipage needs and plans, and support of CODOT WAM system; (2) developers and maintainers of the Midwest prototype ADS-B system being used to reduce the risk of the production system and obtain initial quantitative measures of ADS-B benefits as part of the Airline Based En route Sequencing and Spacing (ABESS) tool; (3) system engineering support for the Juneau/Capstone WAM; (4) deployment and certification of Very High Frequency (VHF) communications and ADS-B in the Gulf of Mexico; (5) investigating the impact of ADS-B/broadcast services on systems now using the 1030/1090 MHz frequencies; (6) Federal lead for deployment of six ground sites by the State of Oregon; (7) field engineering services for the WAM and ADS-B ground infrastructure in Alaska and Colorado; and (8) Information Technology (IT) and Physical Security for the SBS Program. *(Sponsored by DOT/FAA)*

Human Factors Research and System Applications

The Human Factors Research and System Applications COI provides internationally recognized human factors research and development capabilities supporting all modes of transportation and other COIs within the Volpe Center. Pioneers new relationships between humans and current automation technologies, thus improving transportation safety, security, and productivity, with due concern for unintended consequences.

Flight-Simulation Requirements for Training Devices

Over the past several decades, the degree of operational complexity, both inside and outside the flight deck, has been rapidly increasing due to higher volumes of traffic, greater variety in the traffic, and the flight-deck technologies and air traffic control measures intended to handle it. This complexity will continue to increase with the implementation of measures related to the Next Generation Air Traffic System (NextGen), and it may present a serious threat to the safety of the flying public. The changing demographics of newly hired pilots is yet another factor to consider. All of these factors make access to effective training tools essential, both for maintaining current levels of safety and for retaining a pilot workforce with the best cognitive and flying skills.

FAA turned to the Volpe Center's Human Factors team to examine the requirements for flight-simulation training devices (FSTDs), focusing on those used for zero-flight-time initial and recurrent training and evaluation. The data generated by this work has led to a growing debate about the need for a hexapod-platform motion system for FSTDs in the presence of a wide-field-of-view visual system. This controversy, coupled with the need for accessible and efficient training tools, has, in turn, led to the development of a high-level simulator that provides motion simulation through a visual system and a dynamic seat. It has also resulted in the development of an alternative means to provide an à la carte training tool that corresponds to the needs of particular airlines, as specified in the draft for Edition 3 of the International Civil Aviation Organizations (ICAO) Document 9625, *Manual of Criteria for the Qualification of Flight Simulators*.

The Volpe Center's research has also provided a scientific basis for the inclusion of a requirement to simulate realistic radio communications in FSTDs. Currently, the Volpe Center, in collaboration with a French training center and under the auspices of French National Aviation authorities, is performing an experiment to evaluate the Full Flight Trainer, which utilizes visual- and seat-motion instead of platform-motion cues. This joint enterprise is exceptionally challenging because it must be conducted solely through e-mail and telephone in both English and French. *(Sponsored by DOT/FAA)*

Confidential Close Call Reporting System (C3RS) for Railroads

U.S. DOT is working to eliminate transportation-related fatalities and injuries in the United States. Nearly all transportation incidents are preceded by a chain of events or circumstances, any one of which might have been "interrupted." In many cases, operators are aware of these "close calls" or "near misses" and may have information that could prevent future mishaps. The Volpe Center worked with railroad industry stakeholders from the Federal Railroad Administration (FRA), the Bureau of Transportation Statistics, railroad carriers, and labor organizations to develop a demonstration program for evaluating the effectiveness of the Confidential Close Call Reporting System (C3RS). Consensus among key stakeholders was critical because close call reporting succeeds only when information is submitted voluntarily. The C3RS will enable the railroad industry to take action to prevent hazardous events before they occur.

Two freight railroads, Union Pacific and Canadian Pacific, have volunteered to participate in this project, and two passenger railroads, Amtrak and New Jersey Transit, have expressed interest in participating. The system is anticipated to be launched in the second or third quarter of 2009. The system began accepting close call reports in February 2007 and had received over 800 reports as of the end of September 2008. *(Sponsored by DOT/FRA)*

Clear Signal for Action (CSA) Safety Demonstrations

In support of FRA, the Volpe Center is evaluating two pilot demonstrations of the Clear Signal for Action (CSA) safety process being implemented at the Union Pacific Railroad. The CSA project involves trained workers providing peers with nonconfrontational feedback and discussing work practices in order to reduce the probability of personal injury, collision, and other types of accidents. Peer-compiled data are also being used to identify and implement corrective actions that will prevent similar risk exposure in the future.

The Volpe Center has concluded its analysis of one CSA demonstration site and reported its findings to Union Pacific and FRA. Key conclusions are that CSA is associated with safer work practices, reductions in accidents and close calls, and improvements in labor-management relations. Union Pacific has embraced the findings and is expanding the application of CSA throughout its network. By providing a third-party, rigorous scientific evaluation of CSA, the Volpe Center has made a convincing case for its implementation in an industry that is skeptical of change and that has a history of adversarial labor-management relations. *(Sponsored by DOT/FRA)*

Advanced Vehicle and Information Network Systems

The Advanced Vehicle and Information Network Systems COI provides systems engineering and analysis, operations research, and related capabilities to identify, assess, and deploy advanced technologies and new operational strategies for reducing the frequency and consequences of transportation-related crashes. It also assesses alternative approaches for overcoming institutional, financial, technical, and other barriers to the deployment of Intelligent Transportation Systems (ITS) at the local, regional, and national levels. Volpe Center experts have been at the vanguard of research, development, and deployment of ITS for more than 20 years.

Integrated Vehicle-Based Safety Systems (IVBSS)

Integrated Vehicle-Based Safety Systems (IVBSS) is a research initiative of U.S. DOT's Intelligent Transportation Systems (ITS) program, undertaken in cooperation with an industry team led by the University of Michigan Transportation Research Institute (UMTRI). This initiative seeks to accelerate the introduction and commercialization of integrated vehicle-based crash-warning systems for light vehicles and heavy trucks. The systems warn drivers of crash-imminent situations in order to prevent rear-end, lane-change, and road-departure crashes and incidents. The objectives of IVBSS are to assess potential safety benefits and driver acceptance of the integrated safety systems. This project fulfills the mission of the National Highway Traffic Safety Administration (NHTSA) to save lives, prevent injuries, and reduce vehicle-related crashes. The integrated systems are expected to prevent conflicting warnings, reduce false alarms, enhance consumer and fleet-operator acceptance, and boost product marketability. IVBSS is the first large-scale initiative for both light-vehicle and heavy-truck platforms that focuses on safety-system integration.

The Volpe Center serves as the independent evaluator of integrated safety systems for NHTSA. In 2008, the Center worked closely with NHTSA and industry-team members to



IVBSS car prototype set-up for verification test. (Volpe Center photo)

complete the development and verification testing of IVBSS prototypes. On the basis of test results, the project will proceed with large field operational tests (FOTs) of IVBSS-equipped light vehicles and heavy trucks in 2009. The Volpe Center team provided expert input on IVBSS system design and functionality, developed and validated verification test procedures for track and public road tests for cars and trucks, evaluated the results of test track and public road verification testing of prototype IVBSS on cars and trucks, and made recommendations for enhancing system performance prior to field trials. The team also prepared an independent evaluation plan for IVBSS on the basis of data to be collected in the FOTs. This plan included development of data-mining algorithms and analysis techniques to forecast the safety benefits likely to accrue from widespread national IVBSS deployment. (Sponsored by DOT/NHTSA)



SafeTrip-21 Intelligent Transportation System (ITS)

In 2008 RITA and the Volpe Center launched a bold new intelligent transportation system (ITS) initiative, commonly known as “SafeTrip-21.” SafeTrip-21 builds upon the U.S. DOT IntelliDriveSM research, and leverages current technologies that are widely used, such as cellular phones, GPS, WiFi, Bluetooth, and the Internet, to accelerate the advance of safety and mobility applications.

In June 2008, the Volpe Center entered into a cooperative agreement with the California Department of Transportation (Caltrans), and established the inaugural SafeTrip-21 field test site in the San Francisco Bay Area. In November 2008, the Volpe Center entered into a Cooperative Agreement (CA) with the I-95 Corridor Coalition, through the University of Maryland. This agreement will have the potential—through a variety of information resources—to make more informed travel decisions and better monitor travel through work-zone areas as it advises approaching motorists of queues in traffic, ultimately allowing travel along the East Coast to flow more efficiently.

SafeTrip-21 technology on display on a New York MTA hybrid electric bus at the ITS World Congress on the streets of Manhattan. (Photo courtesy of University of California Partners for Advanced Transit and Highways)

Successful establishment of these CAs was a “first” for the Volpe Center’s Acquisition Division (AD). A challenge arose when it was determined that the Federal Acquisition Regulation (FAR) was not applicable to CAs. However, the AD staff obtained guidelines and procedures on CAs through many hours of researching and conducting internal reviews of multiple Office of Management and Budget (OMB) Circulars.

SafeTrip-21 technologies were unveiled at the 15th ITS World Congress in New York City in November 2008. A New York MTA bus and two rental vehicles were equipped to demonstrate applications for both drivers and transit riders on the streets of Manhattan. Key driver and pedestrian applications were also showcased at a special “Integrate Show,” which included technologies developed worldwide. New SafeTrip-21 partners were also announced at the World Congress: iCone deploys active road cones to help increase roadway safety by using radar to measure traffic speed and Parking Carma fields a mobile web-enabled parking application that allows travelers to find, reserve, and pay for a parking space at a participating “smart” parking lot.

SafeTrip-21 is the first multimodal public ITS demonstration directed toward integrating existing technologies to achieve measurable improvements in safety, mobility and convenience for the commuting public. SafeTrip-21 is a testimony to the power of innovation and public-private partnerships by enabling government, nonprofits, transit agencies, private industry, and people to solve transportation challenges. *(Sponsored by DOT/RITA ITS Joint Program Office)*

High-Tech Wireless Communication for Transportation

On behalf of the U.S. Deputy Secretary of Transportation and the Administrator of the Research and Innovative Technology Administration, the Volpe Center brought together leaders from the private sector, academia, and government to explore how advanced telecommunications technologies might be leveraged to achieve measurable reductions in vehicle crashes and congestion. The Volpe Center, with approval by the Deputy Secretary, released a new report, *Advanced Wireless Communication for the Transportation Sector*, which summarizes this successful roundtable held on May 22, 2008, that brought together 40 leading experts in the field of wireless communications. The report reveals that significant opportunities exist to make use of expertise in wireless communications and related technologies. The new language of technology—including wiki collaboration, mashups, and Mobile Ad Hoc Networks, or MANETs—represents challenges, but more importantly, potential opportunities for growth.

Harnessing and rapidly deploying these emerging communications technologies will lead to fewer crashes on our roadways and result in overall improvements in the performance of the transportation system. Such efforts will also result in improved situational awareness, including dynamic rerouting, signal timing, and synchronization based on real-time data, and evolving traffic and weather conditions. Electronic tolling and fees for all modes of transit can be enabled through existing technologies as well as through development of

mobile electronic devices. Finally, bridges, roads, rails, and other critical infrastructure can be monitored remotely, leading to improved operations of the Nation's transportation enterprise. *(Sponsored by DOT/RITA)*

Organizational Excellence

The Volpe Center cannot achieve its strategic goals without vision, leadership, and a culture of teamwork, collaboration, and continuous improvement. The Volpe Center is committed to pursuing best practices and achieving results that benefit taxpayers and the Nation. Organizational Excellence activities range from improving internal controls; continuous human capital development, and innovative contracting and acquisition processes, to project management, important greening initiatives, and volunteer efforts.

Improving Internal Controls of Business Processes

The Office of Management and Budget's (OMB) government-wide call for Federal agencies to strengthen internal controls over financial reporting continued to be a major departmental initiative in 2008. Volpe Center staff participated in a DOT-wide Internal Control Working Group to ensure that OMB internal control responsibilities were performed, documented, and assessed. Major activities comprised a self-assessment and documentation of controls for four key Volpe Center business processes and associated subprocesses: procure-to-pay, credit card management, cash management, and travel management.

The Volpe Center also completed an entity-wide Internal Control Self-Assessment (ICSA) consisting of the five components for internal control established by the Government Accountability Office: control environment, risk assessment, control activities, information and communication, and monitoring. The ICSA focus area in FY 2008 was control environment, which warranted a full assessment and review of Volpe Center responses and submittals by U.S. DOT's Office of Financial Management. The remaining four components will be focus areas in FYs 2009 and 2010. The Office of Financial Management found sufficient documentation to support the Volpe Center's self-assessment ratings and deemed controls to have been effective. Of the 15 Operating Administrations tested in FY 2008, six had no findings, including the Volpe Center.

Customer Satisfaction

As a fee-for-service organization with a vast array of customers, the Volpe Center has sought customer feedback on product delivery and services since 1995 and is now conducting formal customer feedback evaluations on a biennial basis. In FY 2008, the Center conducted its fourth round of customer satisfaction surveying. An independent contractor interviewed active customers, primarily face to face, at both the project and senior levels of their organizations. Both groups were asked about their overall satisfaction and their perceived value of the Volpe Center's project work. Project-level customers were also asked about their satisfaction with staff performance and the value of project work.

Round IV of the Volpe Center's customer-satisfaction monitoring, which comprised 176 interviews—105 at the project level and 71 at the senior level—yielded a 45 percent response rate. The Volpe Center improved in 8 out of 9 rating areas compared with those in Round III, and attained an improved overall mean rating of 8.4 for overall customer satisfaction (on a scale of 1 to 10, with 10 indicating "extremely satisfied").

Round IV provided an independent and credible assessment of customer satisfaction for all customers and stakeholders, actionable data for the Volpe Center's project teams, and important customer-trend data, a key performance metric.

Hiring Tools to Promote Organizational Growth

In recognition of the continual need for acquiring new talent and for deploying it strategically, the Volpe Center has enhanced its hiring tools. Some of the tools that have been utilized extensively this fiscal year are described below.

Federal Career Internship Program (FCIP)

The Federal Career Internship Program (FCIP) is designed to attract, develop, and retain personnel by means of providing developmental opportunities to improve performance in present job assignments and to prepare for future assignments. The goal is to noncompetitively convert high-quality interns to career or career-conditional positions. In FY 08, the Volpe Center employed eight employees under FCIP.

Student Conversions

The Volpe Center continued its proud tradition of hiring students through the Student Career Experience Program (SCEP) and noncompetitively converting them to permanent or two-year-term positions upon graduation. Student trainees must have completed at least 640 hours of work prior to graduation. In FY 2008, the Volpe Center made nine student trainee conversions across multiple disciplines and grade levels.

Volpe Center Career Day Open House

In May 2008, the Volpe Center hosted a Career Day Open House, targeting recruitment of undergraduate and graduate students for the SCEP and FCIP programs. Technical Division managers and employees talked directly with attendees and explained their technical portfolio. The event attracted job-seekers and six school/organizational representatives and led to the hiring of two engineering students.

Leadership Development Program (LDP)

LDP is a critical component of the Volpe Center's Leadership Succession Plan. In December 2007, the first class of the Volpe Center's LDP graduated. The class consisted of 11 employees at grades 12 and 13 who spent 18 months learning and practicing six leadership competencies: teamwork, adaptability/flexibility, interpersonal skills, leadership, communication skills, and global/strategic thinking. In 2008, a second, 14-member class began the program, which offered mentor matching and training and a one-day training entitled "Leadership Competencies and Teambuilding."

Professional Development Training

In support of the U.S. DOT's Research and Innovative Technology Administration's (RITA) goal that every employee obtain 40 hours of training and professional development each fiscal year (or 80 hours over two fiscal years), the Volpe Center increased the FY 2008 training budget by approximately 45 percent over the FY 2007 level of funding. Nearly half of all training funds were decentralized to the Directorate level and, in some cases, the Division level, with the aim of increasing the amount of specific technical training available to employees.

To help employees achieve the training goal, the Human Resources (HR) Division, in collaboration with managers, made a wide variety of training and professional development activities available to employees, including conferences, individual courses and virtual opportunities, offered through the electronic Learning Management System. The Center also revised supervisory and employee performance plans to incorporate incentives for achieving training goals. These training efforts put the Volpe Center well on track to fulfilling the Administrator's training goal.

Reducing Project Risk and the Cost of Doing Business through Better Project Management

The Volpe Center is working to improve the performance of its project managers. Implementation of project management standards and training on best practices increases customer satisfaction, reduces project risk and the cost of doing business across the Center, and strengthens the Volpe Center's contributions to achieving the Nation's

transportation goals. The Volpe Center also provides high-level oversight and guidance to Volpe Center management to meet its project portfolio information requirements and compliance with project management-related directives. Project management efforts to date have improved and simplified Volpe Center business processes to fully support the project manager.

There has been a strong effort to provide training and support to increase the numbers of certified Project Management Professionals across the Center. The Volpe Center has trained over 220 Volpe Center staff members in Microsoft Enterprise Project Management; 33 staff members have received their project management certification.

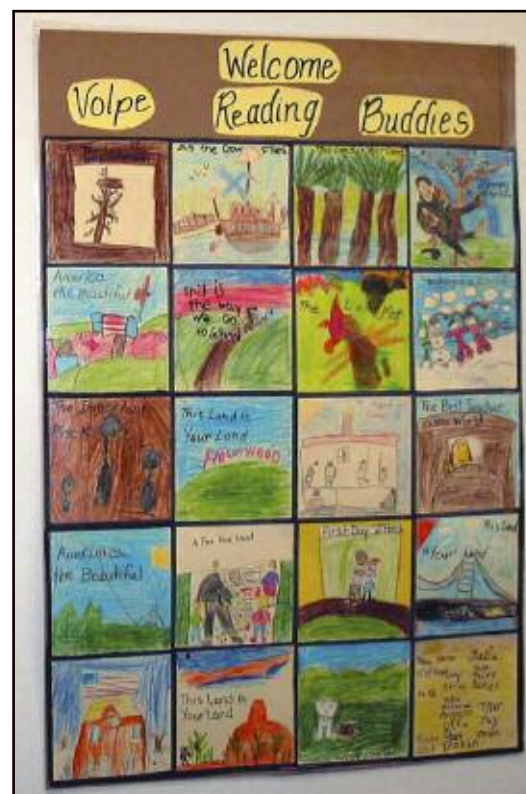
Collaboration between National Association of Government Employees (NAGE) and Management

The Volpe Center believes that a key component of Organizational Excellence is robust collaboration between labor and management. In 2008, this collaborative effort produced significant results. The Center’s Labor/Management Team developed a template for nonsupervisory GS-12/13/14 performance appraisal plans as well as a template for GS-15 technical experts. Both templates are in alignment with the U.S.DOT’s Organizational Excellence goal and contain measurable performance standards. Additionally, the Labor/Management Team, in response to employee feedback, developed a workable draft Telework Order, which was adopted by the Volpe Center’s parent agency, RITA, as its telecommuting policy. Volpe Center management also worked collaboratively with the NAGE Local R1-195, revising the NAGE collective bargaining agreement to include compressed work schedules. This recruitment-and-retention tool expands the options available to employees, enabling them to select from more than one work-schedule option. Employees can now choose from three types of flexi-time, either alone or in conjunction with telework. All employees were briefed on the changes to the collective bargaining agreement.

Volpe Center reading buddies are always welcome at the Kennedy-Longfellow Elementary School!

Volpe Center Lunch Buddies Reading Program

In 2008, the Volpe Center Lunch Buddies Program celebrated its tenth anniversary. Lunch Buddies is a collaborative reading program between the Volpe Center and the neighboring Kennedy-Longfellow Elementary School. Volpe Center employees volunteer their lunch breaks to read to second- and third-graders every two weeks during the school year. Since its inception, Lunch Buddies has attracted 296 Volpe Center volunteers. The program enhances children’s interest in reading, advances the school’s commitment to early literacy, and provides Volpe Center staff with an opportunity to give back to the community.



Lunch Buddies has been the recipient of many awards, including those bestowed by the Volpe Center Director, the RITA Administrator, the U.S. DOT Secretary, the City of Cambridge, and the Cambridge School Volunteers (CSV). At its 2008 annual Awards Program, CSV recognized the Volpe Center's long-term commitment to the children of Cambridge with a certificate of appreciation "on the 10th anniversary of its participation in the Lunch Buddies program at the Kennedy-Longfellow School." Also at the ceremony, the nine Volpe Center volunteers who have been Lunch Buddies for all 10 years were recognized for their dedication to the program.

Service Disabled Veteran-Owned Small Business Campaign

During fiscal year 2008, the Volpe Center engaged in an internal marketing campaign encouraging the use of Service Disabled Veteran-Owned (SDVO) small businesses. The purpose of the campaign was to educate the Volpe community and increase awareness of the program and to ultimately ensure the Volpe Center met its SDVO goal. The result was a dramatic increase in obligations to SDVO small businesses. In FY07, the Volpe Center obligated \$1.9 million or 1.4 percent of total obligations to SDVO small businesses. In FY08, the Volpe Center obligated \$4.4 million or 2.9 percent of total obligations to SDVO small businesses.

Due to the success of this innovative and creative campaign, the U.S. DOT's Office of Small Disadvantaged Business Utilization (OSDBU) requested Volpe Center's campaign information and planning documents to share with all of DOT's Operating Administrations. Additionally, members of the Department of Defense Northeast Regional Council for Small Business Education and Advocacy have requested permission to duplicate this campaign in other Federal agencies in the New England area.

Volpe Center Awards Operations Research and Analysis (ORA) Multiple Award Contracts to Small Business Development Program 8(a) Companies

On October 2, 2008, three contracts were awarded to 8(a) companies in the Transportation Operations Research Analysis (ORA) and Communications Services functional areas. The Small Business Administration's (SBA) 8(a) Business Development Program provides critical business development assistance to companies owned by socially and economically disadvantaged businesses. These are multiple award task order contracts with a total estimated value of \$90 million. The period of performance will be five years from the date of award. This award helped to fulfill a RITA initiative to establish more multiple award contracts for services previously acquired through a single award. The Volpe Center expects to use this multiple award vehicle to primarily fulfill on-site requirements.

Volpe Center Awards Operations Research and Analysis (ORA) Multiple Award Contracts Under Full and Open Competition

On December 22, 2008, five contracts were awarded under the ORA Services Full and Open Procurement. These are multiple award task order contracts with a total estimated value of \$40 million. The period of performance is five years from the date of award. This award completed another major element to the Administrator's initiative to establish more multiple award contracts providing these services. The Volpe Center expects to use this multiple award vehicle to primarily fulfill off-site requirements.

Volpe Center Greening Initiatives

The Volpe Center achieved a number of "greening" initiatives in 2008, particularly in energy efficiency and recycling. The Volpe Center is also pursuing a rigorous environmental performance improvement process through the U.S. Green Building Council (USGBC).

Energy Efficiency

The Volpe Center has received previous recognitions for its energy conservation efforts. Earlier in the year, NSTAR sponsored an energy audit to identify additional opportunities for savings. The audit team determined that the Volpe Center's performance in regard to energy consumption is better than that of 75 percent of contemporary buildings. The Center is adopting a number of recommendations from the audit report, including the "delamping" of selected hallways, upgrading of fluorescent lights, installation of energy-conserving devices on vending machines, and the addition of more occupancy sensors.

The IT and Facilities divisions have partnered to begin studying the ramifications of a data center consolidation. This effort will reduce electricity consumption and associated cooling costs. The Center has also issued directives and guidance to remove inefficient appliances from individual offices and common areas.

Recycling

In the last year, the Volpe Center's recycling rate has increased from about 2 percent to approximately 42 percent. This represents a significant increase in the tonnage of paper, plastic, glass, and aluminum that is recycled. Through recycling informational campaigns, installation of recycling receptacles in hallways, conference rooms, common areas, and a campus-wide clean-up event in May 2008, the Volpe Center "Green Team" fostered a culture of recycling and reuse. Participation was very high and the event was a success. There was also a competition with multiple award categories to incentivize recycling. Many items were donated to local nonprofit charities.

In recent months, the Center has started a program to compost yard waste and recycle "hard-to-recycle" items, such as recordable media and computer peripherals. The Volpe Center is also conducting a comprehensive waste audit to

Volpe Center Clean-Up event poster.



identify additional waste-reduction opportunities and provide tailored training to facilities staff and contractors. Prior to spring 2007, recycling was limited to printer paper and computers; it has since been expanded to include all types of paper, cardboard, and metal/glass/hard plastic.

Comprehensive Greening Plan

In February 2008, the Volpe Center registered for certification in USGBC's Leadership in Energy and Environmental Design (LEED) for excellence in operations and maintenance. LEED certification requirements help the Volpe Center to meet and exceed Federal facility requirements stipulated in Executive Order (EO) 13148, Environmental Management Systems, and EO 13423, Strengthening Federal Environmental, Energy, and Transportation Management. LEED requirements include attaining an ENERGY STAR building/campus rating of 65, reducing potable water consumption by 20 percent, and recycling at least 50 percent of consumable materials. Before the Center can apply for certification, it must revise a number of operating guidelines to incorporate "green" best practices for energy efficiency, water conservation, transportation, landscaping, indoor air quality, cleaning, waste management, lighting, ventilation, access to daylight, and environmentally beneficial procurement. Full implementation is expected between the fall of 2010 and the summer of 2011, well ahead of the 2015 deadline mandated by the Executive Order.

Support to Transportation Vision for 2030 and Strategic Planning

In Fiscal Year 2008, the Volpe Center was called upon to rapidly draft two high-profile strategic documents, *Transportation Vision for 2030*, signed by the U.S. Secretary of Transportation and the Administrator of RITA, and RITA's first-ever Strategic Plan, approved by the Office of the Secretary. *Transportation Vision for 2030* was designed to guide the Department's research, technology and investment decisions in order to improve safety and system performance and find 21st-century solutions to the challenges facing the Nation's intermodal transportation system. The vision document details current challenges in passenger and freight transportation, such as record-level gridlock at our Nation's airports and seaports and on our highways. It points out flaws in the current system of transportation financing and the need to improve the use of technology. The document then outlines the Department's "pathway" to addressing these challenges, such as safety-oriented technology programs, congestion-reducing technologies and pricing models, increased energy efficiency and alternative fuels, and public-private partnerships. The Volpe Center also led efforts to quickly develop RITA's first actionable strategic plan. The document lays out a vision and strategy for the agency for 2008-2012.



Thank You to Our 2008 Customers

U.S. Department of Transportation

Federal Aviation Administration
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
 Transportation Safety Institute
 Bureau of Transportation Statistics
Saint Lawrence Seaway Development Corporation
Surface Transportation Board

Other Federal

Central Intelligence Agency
Department of Agriculture
 U.S. Forest Service
Department of Commerce
 National Oceanic and Atmospheric Administration
 National Institute of Standards and Technology
Department of Defense
 U.S. Air Force
 U.S. Army
 U.S. Navy
 U.S. Transportation Command
Department of Health and Human Services
Department of Homeland Security
 Customs and Border Protection
 Federal Emergency Management Agency
 Transportation Security Administration
 U.S. Coast Guard
Department of the Interior
 Bureau of Indian Affairs
 Bureau of Land Management
 Fish and Wildlife Service
 National Park Service
Department of Justice
 Architectural Transportation Barriers Compliance Board
 U.S. Access Board
Department of Labor
Department of State
Environmental Protection Agency

Food and Drug Administration
General Services Administration
National Aeronautics and Space Administration
Social Security Administration
U.S. Capitol Police
U.S. Nuclear Regulatory Commission
U.S. Postal Service
U.S. Treasury Department

State and Local

Chicago Metropolitan Agency for Planning
City of Baltimore, Maryland
City of Chicago, Illinois
City of Washington, District of Columbia
Columbia River Pilots
Columbia River Regional Maritime Security Coalition
Commonwealth of Massachusetts
Fairfax County Department of Transportation
Massachusetts Port Authority
New York State Department of Transportation
Port Authority of New York and New Jersey
State of Arizona
State of California
Town of Southampton, New York

Foreign Entities

United Kingdom
 Defence Science and Technology Laboratory
 Ministry of Defence
NAV Canada
Panama Canal Commission

Other

Alliance of Automobile Manufacturers
American Concrete Pavement Association
American Public Transportation Association
American Trade Initiatives, Inc.
William Cowart
General Motors Research and Development Center
INOVA Healthcare Services
Maureen and Mike Mansfield Foundation
Medical College of Wisconsin
University of Alabama
University of Florida
Wake Forest University Health Sciences
Wyle Laboratories, Inc.

U.S. DOT Secretary's Awards

Volpe Center Recipients

Gold Medal

DOT Fuel Economy Team:

Gregory J. Ayres

Kevin Green

Ryan Harrington

Joseph Mergel

Don Pickrell

Mark Shaulov

Secretary's Award for Excellence

Stephen Costa

David Madsen

Secretary's Award for Meritorious Achievement: Silver Medal

Ellen Bell

Secretary's Award for Transportation Safety

Federal Railroad Administration Close Call Reporting System Team:

Jordan Multer

Joyce Ranney

Michelle Yeh

Secretary's Award for Outstanding Achievement in Equal Employment Opportunity/Affirmative Action

David S. Scali

Secretary's Award for Volunteer Service

Mary E. Doherty

Secretary's Partnering for Excellence Award

Federal Railroad Administration Multi-Modal Safety Review Team:

Gina Melnik

Secretary's Team Award

Poisonous by Inhalation Hazmat (PIH) Tank Car Rulemaking Team:

Michael E. Carolan

Michael Coltman

Jeffrey Gordon

Karina M. Jacobsen

David Jeong

Matthew Lyons

Michelle Priante

Brandon Talamini

Yim Tang

David C. Tyrell

Secretary's Award for Extraordinary Service and Valor

Ryan Cummings

Secretary's Award for War on Terrorism Medal

Robert Hoaglund

Vincent Orlando

RITA Awards

Administrator's Award

Ellen Bell

Administrator's Team Award

University Transportation Centers
(UTC) Program Team:

Judy A. Yahooik

Special Recognition

Harvard University's Ash Institute
Honors Initiative of U.S. Department
of Transportation MSSIS Team



U.S. Department of Transportation

Research and Innovative Technology Administration

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