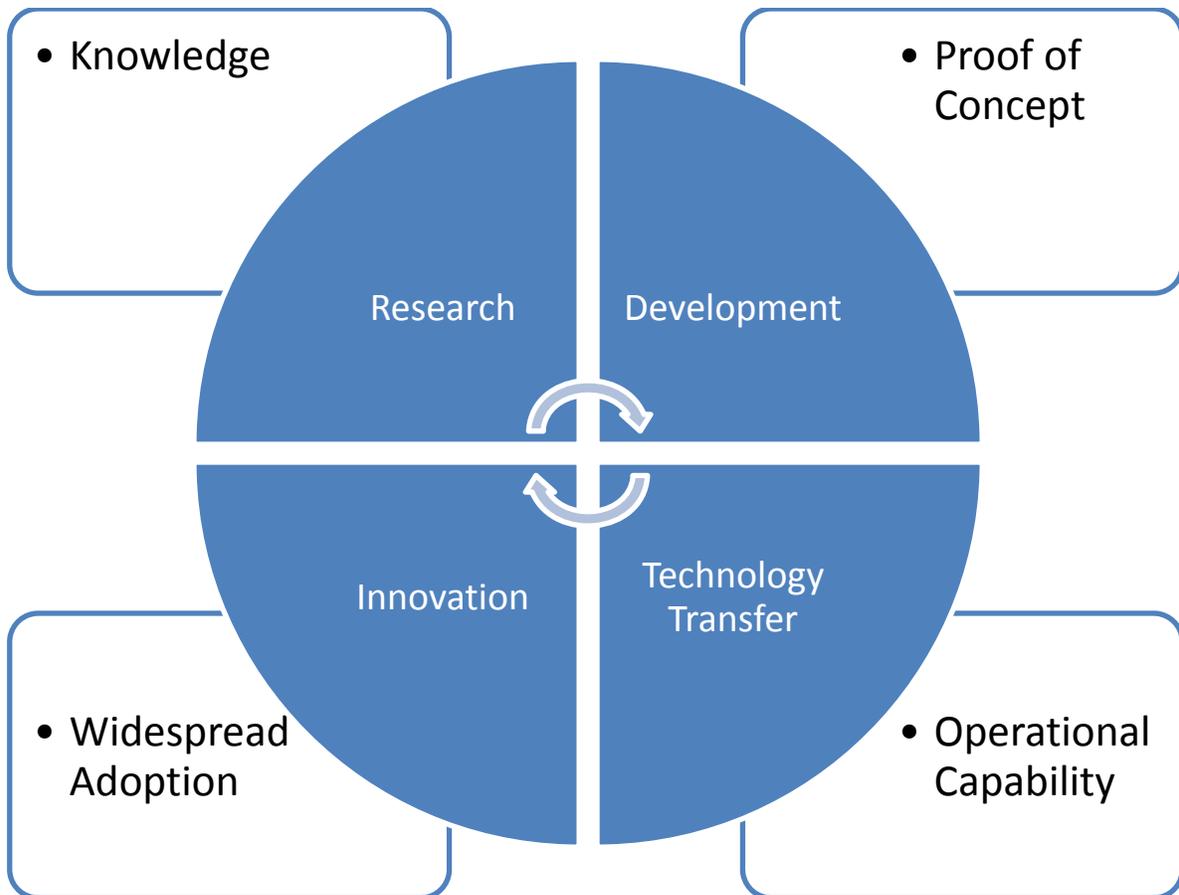


Volpe Center Office of Research and Technology Applications (ORTA)

Fiscal Year 2014 Annual Report



December 2014



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

Volpe

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SI* (MODERN METRIC) CONVERSION FACTORS

APPROXIMATE CONVERSIONS TO SI UNITS

Symbol	When You Know	Multiply By	To Find	Symbol
LENGTH				
in	inches	25.4	millimeters	mm
ft	feet	0.305	meters	m
yd	yards	0.914	meters	m
mi	miles	1.61	kilometers	km
AREA				
in ²	square inches	645.2	square millimeters	mm ²
ft ²	square feet	0.093	square meters	m ²
yd ²	square yard	0.836	square meters	m ²
ac	acres	0.405	hectares	ha
mi ²	square miles	2.59	square kilometers	km ²
VOLUME				
fl oz	fluid ounces	29.57	milliliters	mL
gal	gallons	3.785	liters	L
ft ³	cubic feet	0.028	cubic meters	m ³
yd ³	cubic yards	0.765	cubic meters	m ³
NOTE: volumes greater than 1000 L shall be shown in m ³				
MASS				
oz	ounces	28.35	grams	g
lb	pounds	0.454	kilograms	kg
T	short tons (2000 lb)	0.907	megagrams (or "metric ton")	Mg (or "t")
oz	ounces	28.35	grams	g
TEMPERATURE (exact degrees)				
°F	Fahrenheit	5 (F-32)/9 or (F-32)/1.8	Celsius	°C
ILLUMINATION				
fc	foot-candles	10.76	lux	lx
fl	foot-Lamberts	3.426	candela/m ²	cd/m ²
FORCE and PRESSURE or STRESS				
lbf	poundforce	4.45	newtons	N
lbf/in ²	poundforce per square inch	6.89	kilopascals	kPa

APPROXIMATE CONVERSIONS FROM SI UNITS

Symbol	When You Know	Multiply By	To Find	Symbol
LENGTH				
mm	millimeters	0.039	inches	in
m	meters	3.28	feet	ft
m	meters	1.09	yards	yd
km	kilometers	0.621	miles	mi
AREA				
mm ²	square millimeters	0.0016	square inches	in ²
m ²	square meters	10.764	square feet	ft ²
m ²	square meters	1.195	square yards	yd ²
ha	hectares	2.47	acres	ac
km ²	square kilometers	0.386	square miles	mi ²
VOLUME				
mL	milliliters	0.034	fluid ounces	fl oz
L	liters	0.264	gallons	gal
m ³	cubic meters	35.314	cubic feet	ft ³
m ³	cubic meters	1.307	cubic yards	yd ³
mL	milliliters	0.034	fluid ounces	fl oz
MASS				
g	grams	0.035	ounces	oz
kg	kilograms	2.202	pounds	lb
Mg (or "t")	megagrams (or "metric ton")	1.103	short tons (2000 lb)	T
g	grams	0.035	ounces	oz
TEMPERATURE (exact degrees)				
°C	Celsius	1.8C+32	Fahrenheit	°F
ILLUMINATION				
lx	lux	0.0929	foot-candles	fc
cd/m ²	candela/m ²	0.2919	foot-Lamberts	fl
FORCE and PRESSURE or STRESS				
N	newtons	0.225	poundforce	lbf
kPa	Kilopascals	0.145	poundforce per square inch	lbf/in ²

*SI is the symbol for the International System of Units. Appropriate rounding should be made to comply with Section 4 of ASTM E380. (Revised March 2003)

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List of Abbreviations

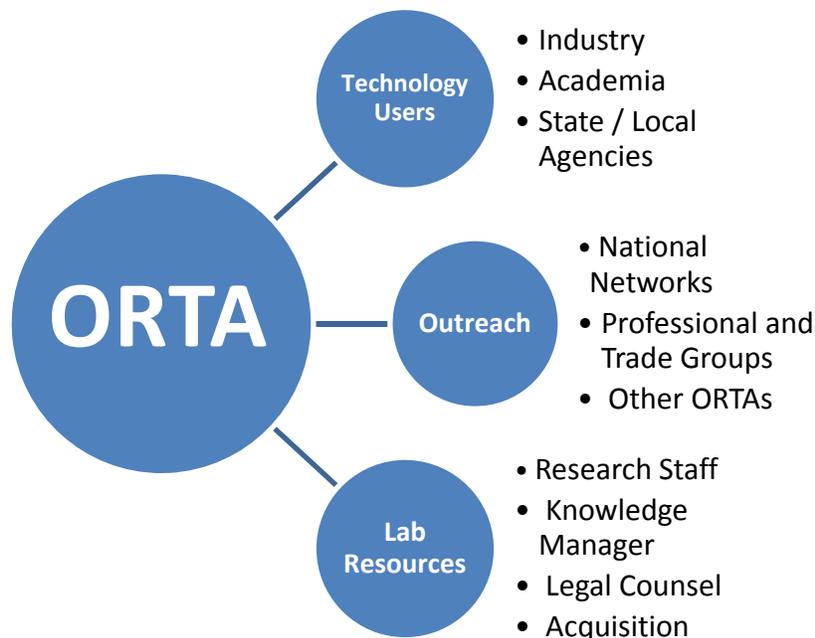
Abbreviation	Term
AEDT	Aviation Environmental Design Tool
AASHTO	American Association of State Highway and Transportation Officials
ATCA	Annual Meeting, and the Air Traffic Control Association
CRADA	Cooperative Research and Development Agreement
DOE	Department of Energy
DOT	Department of Transportation
FLC	Federal Laboratory Consortium
FLC-NE	Federal Laboratory Consortium – Northeast Region
FY	Fiscal Year
IAA	Inter-Agency Agreement
IP	Intellectual Property
IPAC	Industry Professional Advisory Council
ITS	Intelligent Transportation Systems
ITS America	Intelligent Transportation Society of America
MassDOT	Massachusetts Department of Transportation
MPO	Metropolitan Planning Organization
NIOSH	National Institute for Occupational Safety and Health
NIST	National Institutes of Standards and Technology
NTIS	National Technical Information Service
NTL	National Transportation Library
OMB	Office of Management and Budget
ORTA	Office of Research and Technology Applications
RITA	Research and Innovative Technology Administration
R&D	Research and Development
SBA	Small Business Administration
SIPCC	State-wide ITS Planning and Coordination Committee
SLG	State and Local Government
STAMP	Systems-Theoretic Accident Model and Processes
T2	Technology Transfer
TRB	Transportation Research Board
TRIS	Transportation Research Information Services

I. Background

The 1980 Stevenson-Wydler Act, as amended (15 USC 3710) requires that federal labs with 200 or more technical staff, and/or with more than a \$20M annual budget establish an Office of Research and Technology Applications (ORTA). As a federal U.S. Department of Transportation (DOT) national laboratory, Volpe, the National Transportation Systems Center must fulfill the five ORTA functional requirements defined in the Act, namely:

- (1) Prepare application assessments for selected laboratory research and development (R & D) projects which may have potential commercial applications;
- (2) Provide and disseminate information on federally owned or originated products, processes, and services having potential application to state and local governments and to private industry;
- (3) Cooperate with, and assist the National Technical Information Service (NTIS), the Federal Laboratory Consortium for Technology Transfer (FLC) and other organizations which link the research and development resources of that laboratory and the federal government as a whole to potential users in state and local government and private industry;
- (4) Provide technical assistance to state and local government (SLG) officials; and
- (5) Participate, where feasible, in regional, state, and local programs designed to facilitate or to stimulate the transfer of technology for the benefit of the region, state, or local jurisdiction in which the federal laboratory is located.

The ORTA role as a focal point for technology transfer (T2) activities is depicted below:



2. Volpe ORTA Activities and Achievements

Volpe, The National Transportation Systems Center, is a fee-for-service organization that does not have appropriated budget authority. Thus, Volpe has evolved a distinct approach to fulfilling the ORTA mission requirements that works in conjunction with agencies that sponsor the research conducted by Volpe—in recognition that the agency that funds the research has a primary role in determining the disposition of results.

2.1 Roles and Responsibilities

Volpe fulfills its ORTA responsibilities through a distributed, cross-organizational, approach, which overall amounts to the required minimum of 1 full-time equivalent (FTE) staff level of effort. Key contributions come from the following:

- Director of the Advanced Transportation Technologies technical center, director of Strategic Initiatives for Research and Innovation, and Volpe's FLC representative and technology transfer (T2) liaison to the U.S. DOT Office of the Assistant Secretary for Research and Technology and the modal agencies (0.4 FTE combined.)
- Director, Communication and Knowledge Management, and staff in Volpe's technical library (0.3 FTE);
- Office of Legal Services (0.2 FTE);
- U.S. DOT Small Business Innovation Research (SBIR) program office outreach (0.1 FTE)
- Multiple technical staff-as needed to fulfill requests from state DOTs, local authorities, universities and professional associations, as further described below (0.1 – 0.2 FTE)

ORTA activities are conducted under the overall coordination of the director of the Center for Advanced Transportation Technologies, and the director for Strategic Initiatives who supports FLC liaison activities and DOT reports to FLC and the Congress, including:

- Initiatives on the part of technical staff, in consultation with their research sponsors, to identify technology transfer opportunities and work with legal staff to share project-related information and knowledge and transfer technology when appropriate, as an integral and explicit part of sponsored research.
 - ❖ Typically, Volpe research products (technical reports, software, technologies, integrated devices, test protocols) produced for other agencies, which have a primary yet shared responsibility for technology applications, deployment and transfer.

- ❖ Consistent with the Stevenson-Wydler Technology Innovation Act and the Bayh-Doyle Act, intellectual property (IP) rights are assigned to contractors involved in performing the work, subject to a non-exclusive right for federal government use.
- Contributions of Volpe legal services staff in reviewing IP contract clauses and rights to technology use, and related technology transfer terms and conditions in inter-agency agreements (IAAs) and reimbursable agreements (RAs) that fund Volpe research and innovation activities, and assist, as necessary, in patent applications and IP licensing, and Cooperative Research and Development Agreements (CRADAs).
- Efforts by the director of Communication and Knowledge Management to promote awareness of Volpe research and innovation results through the Volpe library, website, and monthly newsletter that is emailed to over 7,500 subscribers and disseminated indirectly to over 40,000 people worldwide via research organizations and trade associations.
- Activities of the U.S. DOT SBIR program office to promote widespread adoption and commercialization of program results. The U.S. DOT SBIR program is administered in association with the U.S. DOT modal operating administrations.
- Responses to requests for technical assistance to and knowledge sharing with state DOTs, MPOs and transportation-related trade associations.
- Activities of the director of Strategic Initiatives for Research and Innovation, who:
 - ❖ Provides guidance to and support for the Volpe technical liaison to interface and interact with the FLC national and regional leadership and with peer federal laboratories, the U.S. DOT Assistant Secretary for Research and Technology technology transfer program manager, and other U.S. DOT modal administration technology transfer staff.
 - ❖ Conducts thought leadership and outreach activities to share knowledge with transportation stakeholders via webinars, conferences, symposia, and seminars, as part of a three-tiered technical information exchange initiative

2.2 FY14 ORTA Activities and Accomplishments

ORTA activities in FY14 were funded both as part of sponsored research activities and by overhead funding to support the technical liaison to the FLC, participation in U.S. DOT Office of the Assistant Secretary for Research and Technology accelerated tech transfer activities, U.S. DOT SBIR program administration, and annual contributions to U.S. DOT T2 reports to the Office of Management and Budget (OMB), the National Institutes of Standards and Technology

(NIST), and the Small Business Administration (SBA). Highlights of Volpe activities and accomplishments in fulfillment of statutory ORTA responsibilities are outlined in the following five subsections.

2.2.1 Assessments for selected laboratory R & D projects which may have potential commercial applications:

Several Volpe projects were identified as having the potential for widespread or commercial application and/or intellectual property (IP) patenting and licensing activities. Recent examples, and related CRADA activities, that have potential for future commercial applications, include:

- **SafetyHAT** – a safety hazard analysis software tool applying System-Theoretic Process Analysis ([STPA](#)) methods to complex, safety-critical, transportation control systems was made available on March 26, 2014, via end user license agreement. [SafetyHAT](#) is available for free download.
- **SaferCar** – a web-based mobile vehicle safety data application for consumers was updated in FY14 to allow consumers to learn of outstanding vehicle recall notices issued during the past fifteen years simply by entering the Vehicle Identification Number (VIN) for a particular motor vehicle. See: <http://www.volpe.dot.gov/news/nhtsa-arms-drivers-with-easy-find-vehicle-safety-information>.
- Ongoing refinements to the [Aviation Environmental Design Tool](#) (AEDT) that is used to model dynamic aircraft fuel consumption and emission performance— continues to be publically available at a modest cost via the Federal Aviation Administration. Version 2b of AEDT currently is in development and is scheduled to be released by the FAA on May 29, 2015. See: (<http://www.volpe.dot.gov/news/enhanced-environmental-analysis-tool-slated-release>).
- A Volpe Center licensing arrangement for an **Aircraft Deicing Decision Support Tool** is being finalized for use in FY15 and beyond. The method, apparatus and system for aircraft deicing and estimating deicing completion times was granted a U.S. patent, US 7725410 B2, in 2010.
- A multi-year **CRADA with the MIT** Center for Transportation and Logistics for joint R&D on human-machine interactions in various transportation system design and operations.
- A set of **three CRADAs, one each with Rockwell Collins, Inc., Astronics DME Corporation, and the University Research Foundation**, to collaboratively analyze and quantify sensor performance for low visibility technology applications in aviation operations.

In addition, several research results in FY14 have the potential for widespread impacts on transportation throughout the nation. Examples include:

- **Wake turbulence** research findings that allow aircraft operations to be increased significantly. Memphis International Airport reports a 19% increase in peak airport operations, and aircraft fuel savings of \$1.8 million per month. An [infographic](#) was created to convey the impact of Volpe wake turbulence research.
- Volpe research findings related to **proactive safety in the rail industry** are informing important rail industry decisions. Two safety management system programs, Clear Signal for Action (CSA) and the Confidential Close Call Reporting System (C3RS), zero in on risky behavior and conditions, and close calls in the rail industry. CSA and C3RS haven't just improved safety; these have transformed the worker-manager paradigm. Volpe developed an [infographic](#) to show how Volpe's safety management design and analysis in support of the Federal Railroad Administration can stimulate safety culture change across an entire industry.

2.2.2 Dissemination of information on federally-owned or originated products, processes, and services having potential application to state and local governments and to private industry

Technology transfer is accomplished through outreach and communication of Volpe research and technology products, and knowledge sharing with transportation stakeholders via technical publications, committee participation and conference presentations—mostly in conjunction with sponsored research activities. Volpe also has a [webpage](#) dedicated to technology transfer.

Volpe technical staff members serve on over fifty National Academy of Sciences Transportation Research Board (TRB) committees, and chair and/or present findings at several national and international conferences each year. Volpe also showcases its research activities as an exhibitor at conferences, including the TRB Annual Meeting that draws nearly 12,000 transportation professionals from around the world, the the Intelligent Transportation Society of America (ITS America) Annual Meeting, and the Air Traffic Control Association (ATCA) annual conference that attracts over 3,000 participants from more than 40 countries.

Broad dissemination of technical findings is assured by publication of reports on applications of advanced technologies and operational improvements, new transportation data and modeling products, and outreach to stakeholders through technical information exchange mechanisms supporting the ORTA mission, including:

- Updates and technical project work and news postings on the [Volpe website](#)
- Volpe [news](#) disseminated to over 7500 stakeholders on a monthly basis and is available on a rolling basis via the Volpe website.
- Descriptions of Volpe [project work](#) via the Volpe website.
- Published [technical reports](#) searchable via the Volpe Technical Reference Center and cataloged by the DOT/BTS National Transportation Library (NTL).

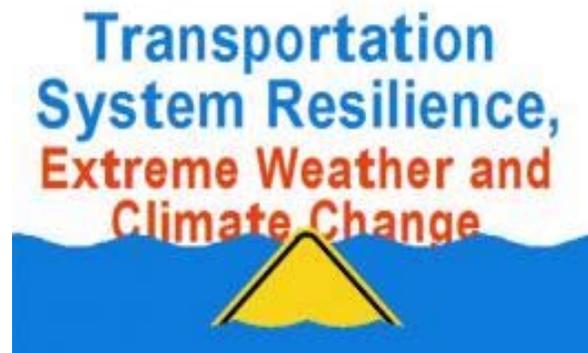
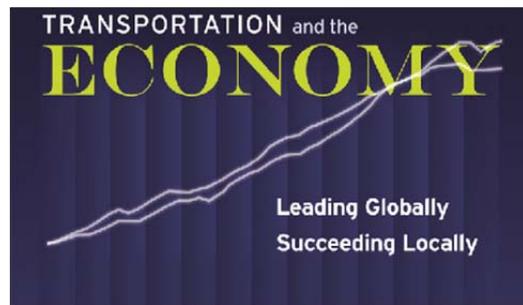
- [Infographics](#) that bring research to life, telling stories through statistics to demonstrate the real-world impacts of our work.
- Technology Transfer ‘success stories’ submitted to the DOT Technology Transfer program manager for inclusion in the annual report to NIST for Congress, and flagged for potential publication via the FLC.
- SBIR program [success stories](#).

Volpe brings together thought leaders, decision makers, and stakeholders from across the global transportation enterprise to anticipate future transportation issues, generate fresh approaches to emerging issues, anticipate transportation trends, and inform decision making.

Through high-impact, Volpe-wide initiatives, including stakeholder outreach and engagement activities, Volpe facilitates knowledge exchange across the transportation community and heighten awareness about Volpe’s technical portfolio, capabilities, staff, and ongoing contributions to the nation. Recent thought leadership and outreach programming includes:

Transportation and the Economy

Volpe’s newest thought leadership series considers emerging and future issues that are critical to the U.S. transportation system's ability to keep pace with the rising demand to move people and goods efficiently, while remaining competitive in today's global economy.



Transportation System Resilience, Extreme Weather and Climate Change

Today’s global transportation infrastructure faces significant vulnerabilities, including escalating environmental threats from our changing climate. This thought leadership series brought together distinguished experts to explore pressing climate change issues confronting our nation and the world.

Straight from the Source

Engages experts from across the transportation enterprise to explore new ideas, look beyond the horizon, and raise awareness of emerging and future transportation challenges.





Transportation Trajectories

Featuring Volpe experts, Transportation Trajectories is a dialogue on advancing transportation for the public good. The series spotlights real-world impacts of the Volpe Center's work as well as new, emerging, and future transportation issues.

Transportation Colloquia

This roundtable exchange allows time for expert panels to drill down on transportation challenges and opportunities facing our nation. Recent panels have addressed critical transportation infrastructure resiliency, automation and the human, transportation safety and operator performance, and big data analytics.



The reach and impact of these strategic outreach activities is growing. The Transportation System Resilience, Extreme Weather and Climate Change series engaged 2,200 stakeholders including more than 220 state, regional, and local transportation professionals who attended or viewed the speaker series. Nearly 200 large and small businesses also engaged in the series. The scope and extent of stakeholder engagement in the Transportation System Resilience, Extreme Weather and Climate Change series is illustrated by the participant organizations listed in an Appendix (p. 16-17). It is indicative of the breadth of Volpe's reach and the extensive level of engagement from stakeholders in all sectors of the transportation enterprise.

In addition, Volpe staff responded to private sector requests for information on Volpe vehicle functional safety analysis methods and tools, and on advanced transportation technologies generally.

- The GKN Driveline Vice President of Safety invited Dr. Van Eikema Hommes of Volpe to deliver a kickoff address at a GKN safety workshop among senior managers for electronic control systems from around the world.
- General Motors Research invited Dr. Van Eikema Hommes to discuss SafetyHAT, and how STPA has been applied to adaptive cruise control hazard analysis, as well as to engage in a technical exchange regarding International Standards Organization (ISO) 26262, a functional safety standard for road vehicles.
- In March 2014, Volpe staff hosted a technical exchange with General Motors systems safety engineers on topics of mutual interest related to hazard analysis and safety assessment of complex motor vehicle control systems.

Further, Volpe research on air traffic noise and emissions modeling was referenced in the [ICAO 2013 Environmental Report: Destination Green](#).

2.2.3 Cooperation with the National Technical Information Service (NTIS), the Federal Laboratory Consortium for Technology Transfer (FLC) and other organizations which link the R&D resources of the laboratory, and the federal government as a whole to potential users in state and local government and private industry

Volpe continued its membership and involvement in the FLC, the nationwide network of federal laboratories that provides the forum to develop strategies and opportunities for linking laboratory mission technologies and expertise with the marketplace.

During FY14, Volpe participated in the FLC's 2014 National Meeting on Accelerating Innovation for Economic Impact. Volpe leveraged this opportunity to coordinate its activities with other labs, and to distribute Volpe infographics, Technical center information and the Meet Volpe brochure broadly to peer federal lab FLC representatives, academia and industry. Dr. Brecher, the Volpe liaison to FLC, served as a panelist at the FLC-NE meeting on how to write successful awards nominations and focused on laboratory contributions and value-added impacts.

Volpe works closely with FLC Northeast, and nominated two Volpe technology transfer efforts for the regional Excellence in Tech Transfer award. The Volpe SafetyHAT technical and legal team was recognized with the FLC-NE [2014 award](#) for Tech Transfer Excellence at the FLC-NE fall conference. Participation in the fall conference resulted in follow-up opportunities for cooperation with the University of Connecticut Director of Technology Exchange, and interest by the New England Clean Council (NECEC) Institute in potential collaboration.

Volpe provides a new stream on Volpe's technology transfer activities to the FLC NewsLink. Volpe is frequently featured in FLC publications including their online FLC newsletter, quarterly newsletters for the Northeast region, and in their special publications. The following are links to Volpe work recently featured by the FLC:

- [SafetyHAT: A Transportation System Safety Hazard Analysis Tool](#)
- [Volpe/NYC Partnership: A Lifesaver for Pedestrians, Cyclists](#)
- [Volpe Infographics Demonstrate T2 Results](#)
- [Crash Energy Management: An Overview of Federal Railroad Administration Research](#)
- [Volpe Helps MassDOT Lead the Way in Carbon Neutrality](#)
- [New Tools Tackle Deteriorating Infrastructure](#)
- [Volpe's Annual Innovation Challenge Now Underway](#)

Volpe also assisted the U.S. DOT technology transfer manager by selecting and contributing Volpe technology transfer success stories for inclusion in the U.S. DOT annual report input to National Institute of Standards and Technology, which collects and communicates to Congress and the White House Office of Management and Budget information on how federal labs implement ORTA technology transfer requirements.

In FY14, over 50 technical reports were made available to the public through the [National Transportation Library](#) (NTL). Volpe staff produced more than 60 reports and conference papers in FY14. Volpe technical reports frequently are available through the National Technical Information Service (NTIS), as well as the Volpe Library, research sponsor websites, the National Transportation Library (NTL), and referenced in the Transportation Research Board (TRB) Transportation Research Information Services (TRIS) database of some 1,000,000 documents covering all transportation modes and disciplines.

Volpe technical experts also responded to requests from federal agencies in need of specialized expertise to evaluate research opportunities, as well as federal labs and others with interests in leading edge research topics. These included:

- A December 16 keynote address on “Connected Transportation: Realizing the Vision,” to the Institute of Electrical and Electronics Engineers (IEEE) Vehicular Networking Conference.
- January 22, 2014, presentation on “Transportation Planning Models: Recent Advances and New Opportunities,” to the IEEE Life Members Society hosted at MIT Lincoln Laboratory.
- Participation in a February 6, 2014, future cities forum in New York City with a visiting delegation from the United Kingdom. The forum addressed urban infrastructure, energy, transportation, big data, and social science considerations, and the Volpe Center was invited to speak about the implications of Intelligent Transportation Systems.
- A February 19, 2014, presentation “Can the Aviation Industry Achieve Carbon Neutral Growth,” to the IEEE Life Members Society and the IEEE Aerospace & Systems Society hosted by MIT Lincoln Laboratory.
- Information sharing with the IBM Global Business Services, Center for the Business of Government, regarding global best practices in Intelligent Transportation Systems and connected vehicles in February 2014.
- A technical exchange on future transportation infrastructure and policy considerations with representatives of the 3M Traffic Safety Security Division on February 26, 2014.
- A Department of Energy (DOE) request relative to its June 2014 Merit Review and Peer Evaluation Meeting—seeking technical review and recommendations on R&D project awards related to advanced vehicle technologies for improved fuel efficiency and reduced emissions.

- Participation in a National Research Council Transportation Research Board Expert Task Group for Technology Issues Associated with Implementation of Safety Databases.
- An August 11, 2014, briefing at the U.S. Army Tank Automotive Research Development and Engineering Center on analytical methods and tools for analyzing safety hazards associated with complex electronic vehicle control systems.
- Response to an inquiry from the Princeton Plasma Physics Lab regarding the potential application of the SafetyHAT hazard analysis tool outside of the transportation domain.

2.2.4 Technical assistance to state and local government (SLG) officials

Throughout FY14, Volpe responded to requests for information from various professional associations (ITS America, AASHTO), state DOTs, Metropolitan Planning Organizations (MPOs) and local agencies. In addition, Volpe technical staff provided specialized technical assistance to SLGs as outlined below:

- Collaboration with the Massachusetts Department of Transportation to create the first-ever carbon-neutral airport at Nantucket Memorial Airport in Nantucket, MA. See: <http://www.volpe.dot.gov/news/volpe-and-massdot-partner-create-first-ever-carbon-neutral-airport>.
- Expert technical review of research proposals submitted to the Texas Department of Transportation (TxDOT) Strategic Research and Innovation Program on a variety of technical transportation topics, including: renewable energy, advanced materials, and energy transmission technologies (wireless or inductive charging for electric vehicles).
- Continued participation as a technical advisor to the MassDOT State-wide ITS Planning and Coordination Committee during the development of an ITS statewide strategic plan.

2.2.5 Participation in regional, State, and local programs designed to facilitate or stimulate the transfer of technology for the benefit of the region, State, or local jurisdiction in which the Federal laboratory is located.

In addition to Volpe support to state DOTs and local requests as listed above, technology transfer activities included:

- A technical exchange with the Intelligent Transportation Society of Massachusetts on March 4, 2014 to share information on the Volpe Center and its research in Connected Transportation, the SafetyPilot model development of vehicle-to-vehicle technology, the Integrated Corridor Management program, and the Urban Partnership Agreement program.

- Expert technical review regarding human factors considerations regarding prospective implementation of train collision avoidance system technology by the Massachusetts Bay Area Transportation Authority.
- Participation on the Civil Engineering Technology Industrial Professional Advisory Committee (IPAC) and the Applied Math IPAC at the Wentworth Institute of Technology to provide input on trends and corresponding needs for curriculum development and/or professional capacity building initiatives.

APPENDIX: State, Regional and Local stakeholder engagement

State DOTs	Other state	MPOs
<p>Arizona California Colorado Connecticut Delaware D.C. Florida Georgia Illinois Indiana Maryland Massachusetts Michigan Minnesota Montana Nevada NH New Jersey New York Ohio Oklahoma Oregon Rhode Island Tennessee Texas Vermont Virginia Washington Wyoming</p>	<p>agencies, transit agencies and local government</p> <p>AC Transit District, CA Bay Area Rapid Transit, CA Charlotte Area Transit System (CATS), NC City of Cambridge, MA City of Newport, RI City of Seattle, WA Executive Office of Health and Human Services, MA Galveston Island Transit, TX Maine Emergency Management Agency Metro. Transportation Authority, NY New Jersey Transit New York City DEP Town of Mashpee, MA MBTA, MA Prairieland Transit System, Southwestern MN Port Authority of NY, NJ Port of Portland, WA RI Dept. of Envir. Mgt Seattle DOT, WA Triangle Transit, Durham, NC Utah Transit Authority VT Div. of Emergency Mgt and Homeland Security VIA Metropolitan Transit, San Antonio, TX Williamsburg Area Transit Authority, VA Washington Metropolitan Area Transit Authority</p>	<p>Adirondack/Glens Falls Transportation Council, NY Atlanta Regional Commission, GA Baltimore, Metropolitan Council, MD Boston Region MPO, MA Broward MPO, FL Capital Area Metropolitan Planning Organization, TX Central Mass Regional Planning Commission, MA Cobb County Regional DOT, GA Delaware Valley Regional Planning Commission, DE Fresno Council of Governments, CA Genesee Transportation Council, NY Greater Buffalo Niagara Regional Transp. Council, NY Houston-Galveston Area Council, TX Ithaca-Tompkins County Transportation Council, NY Kern County MPO, CA Kings County Association of Governments, CA Metropolitan Area Planning Council, MA Mid-America Regional Council, KS Mid-Ohio Regional Planning Commission, OH Mobile County Commission, AL MD-National Capital Park and Planning Commission Mid Region Council of Governments of NM New Orleans Metro Region MPO, LA New Bern Area MPO, NC NJ Transportation Planning Authority, NJ New York Metropolitan Planning Council, NY North Slope Borough, Arctic Regions, Alaska Northeast Ohio Area-wide Coordinating Agency, OH Northern Shenandoah Valley Regional Commission, VA Oahu MPO, Hawaii Red Cliff Band of the Lake Superior Chippewa Indians, WI Regional Transportation District for Denver, CO Rockingham Planning Commission, NH Sacramento Area Council of Governments, CA Southwest Michigan Planning Commission, MI Southwestern Pennsylvania Planning Commission, PA Syracuse Metropolitan Transportation Council NY Ulster Country Transportation Council, NY West Virginia Environmental Council, WV</p>
<p>Non-Profits</p> <p>AASHTO American Council for an Energy Efficient Economy ACI-NA APTA Association of Metropolitan Planning Organizations Center for Clean Air Policy Climate Protection Campaign Coalition of NE Governors Policy Research Center Environmental and Energy Study Institute Enterprise Community Partners</p>	<p>Minnesota Center for Environmental Advocacy National Association of Regioal Councils National Transportation Research Center Rails to Trails Conservancy RAND Sierra Club</p>	

APPENDIX: Academia, Private Sector, and Global engagement

Academia	Private sector	Private sector cont.
<p>Carleton College Clemson University Cleveland State University Columbia University George Mason University Georgetown University Harvard University Jackson State University (MI) Massachusetts Institute of Technology Michigan Technological University New York University Northeastern University Oregon State University Penn State Purdue University San Jose State University Stanford University University of Colorado University of Iowa University of Maryland University of Massachusetts – Amherst University of Massachusetts - Boston University of Minnesota University of Michigan University of Pittsburgh University of Southern Florida University of Rhode Island University of Vermont University of Wisconsin Virginia Tech</p>	<p>Abt Associates AECOM Atkins Global Amtrak Azymuth Telecon Battelle BEM Systems, Inc. Bloomberg Media Booz Allen Hamilton Bosch BTG Ventures LLC Cadmus Group Cadmus Sustainable Transportation Practice Cambridge Systematics CDM Smith CDR Maguire CEVA Logistics Chevron CINSA Clary Corporation Clean Tech Strategy Group ClimateProgress (media) Coleshill Associates Collins Engineering Coral Sales Company CSC ee Publishing’s ClimateWire (Media) Efecto Verde Engineering (Mexico) ERG Global Innovative Solutions</p>	<p>Greenman-Perderson, Inc. Gresham, Smith and Partners Hatch, Mott McDonald HDR Alaska, Inc. HDR, Inc. Hitachi Consulting HNTB iBiz ICF International Jacobs JT Environmental Consulting KAG Engineering, PLLC Kleinfelder Leverage Information Systems LF Consulting LTK LWV McClatchy Washington Bureau (Media) Meadow Networks Nakanishi Research & Consulting Parsons Brinkerhoff Raytheon Research Systems Group RSG RTGR Consulting SGT Southwest Airlines SRTA Stahl Sheaffer Engineering Stantec Strategic Technology Assessment STV Incorporated Taminco US, Inc. Toole Design Group TPRG TransCore TREDIS Software Truline TY Lin International Urban Engineers of NY, PC URS Corporation Venner Consulting VHB Vionics WeatherStrategy LLC Weir Environments</p>
International		
<p>British Columbia Mistry of Trans. Caanadian Trucking Alliance China City of Toronto, Canada Civil Aviation Authority of Fiji Government of the Northwest Territories EU Delegation to the United States Imperial College, London Ministry of Transport, Public Works & Water Management, The Netherlands</p>	<p>Ministry of Transportation, Ontario, Canada Port Metro Vancouver Railway Association of Canada Royal Netherlands Embassy TELCOM Bretagne, France Transport Canada University of Nottingham Ville de Montreal Ministry of Sustainable Development and the Environment, Canada</p>	

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