



Federal Laboratories & State and Local Governments

Partners for Technology Transfer Success





partnering for technology transfer

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Prepared by the FLC Management Support Office in collaboration with FLC's National Local Government Committee Chair Belinda Padilla.

FLC

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Federal Laboratories & State and Local Governments

The Federal Laboratory Consortium for Technology Transfer (FLC) was established and tasked by federal legislation to assist and encourage state and local governments and regional organizations, such as small business development centers and Chambers of Commerce, to participate in—and benefit from—the technology transfer process with federal laboratories. Specifically, the FLC’s State and Local Government Committee ensures that state and local government organizations are aware of the benefits available to them and their regions through technology transfer partnerships and collaborations with federal laboratories.

The roles of new technology and entrepreneurship remain keys to our nation’s economic vitality and leadership. In recent years, the important role of state technology-based economic development activities in our complex innovation ecosystem has taken center stage, with a variety of unique programs across the nation. Communities are promoting partnerships among local stakeholders, including research institutions, businesses, and local regional economic development entities, to obtain greater, collective impacts.

Increasingly, federal funding for research and development is supplemented and leveraged by states with additional resources for activities ranging from technology maturation to technology transfer to growing jobs and businesses. Our committee is proud to present the 2009 edition of *Federal Laboratories and State and Local Governments*, which highlights many of these strategic collaborations.

We hope you enjoy the following examples of successful partnerships between federal laboratories and state and local governments. The depth and breadth of these relationships affect everything from workforce training to education to the advancement of emerging industries.

Belinda Padilla



FLC State and Local Government Committee Chair





federal laboratories & state and local governments

Science, Technology, Engineering, and Math Education

- 3** ORNL, Volkswagen Team for Scholars Program
- 5** Ames Finds Pioneer for Science Education
- 7** LANL Develops Math and Science Academy
- 9** AFRL, Griffiss Institute Sign Partnership Intermediary Agreement for STEM Education
- 11** PNNL and University of Oregon Team to Develop Everlasting Battery for Marketplace
- 13** Federal Agencies, State and Local Governments, Industry, and Private Organizations Host Career Day for Postdoctoral Fellows

Tools for the Frontlines

- 17** SPAWAR System Center Pacific Partners with Counties and Cities for Robotic Advancements
- 19** Army Tactical Operations Center Technology Drives Alabama and Other State Homeland Security Command, Communication and Control Systems
- 21** NASA, Forest Service Team to Fight Wildfires with Imagery Technology
- 23** Midwest Forensics Resource Center Partners to Fight Crime
- 25** NIOSH Reduces Injuries for Alaska's Fishermen, Aviators, Loggers, and More

Assisting Small Businesses

- 28** NASA Stennis Supports Louisiana Businesses, Academia, and Government Entities
- 29** New Mexico Empowers Small Businesses





Industries of the Future

- 33** NREL Helps Vets, Gray Fields Go Green
- 34** Seed Fund Enables Lunar Analog Field Testing of Human Robotics and In-Situ Utilization
- 37** ORNL to Host Tennessee Solar Initiative

Protecting Our Environment

- 41** EPA Scientist Develops Rapid Methods to Assess New England Wetlands
- 43** EPA Teams with Maryland Department of Natural Resources to Get the Most Green for the Green

Leading Transportation

- 47** SafeTrip-21 Transportation Safety Technologies Hit the Streets of Manhattan
- 49** DOT Submits Plan for Surface Transportation Security Cooperation and Emergency Operations for the Port Authority of New York and New Jersey
- 49** Assessing Management of the New York Thruway Authority
- 51** Chicago Metropolitan Agency for Planning Advances Regional Vision Through Strategic Guidance on Transportation

About the FLC

- 56** FLC Technology Locator
- 58** FLC Tools for Technology Transfer Professionals
- 59** FLC Regions
- 62** FLC Member Laboratories

Partners for Technology Transfer Success





science,
technology,
engineering
& math

education





There are critical workforce needs that the United States faces in the science, technology, engineering, and mathematics (STEM) fields. In collaboration with a variety of state and local governments across the nation, federal laboratories are helping to facilitate educational initiatives that support the scientific and national missions of our national laboratories, while simultaneously contributing to development of the local workforce and the dissemination of scientific knowledge and understanding.

From high school students to post-doctoral fellows to business students, these partnerships demonstrate how federal laboratories and states can make significant contributions to the development of a competitive workforce by working together.





ORNL, Volkswagen Team for Scholars Program

Oak Ridge National Laboratory (ORNL) will be one of the beneficiaries of a \$5.28-million philanthropic commitment announced recently by Volkswagen Group of America, Chattanooga Operations, LLC.

The five-year Partners in Education program is designed to serve as a catalyst for educational enrichment in Tennessee. At ORNL, the funding will create a Volkswagen Scholars Program that will be administered through Oak Ridge Associated Universities.

“The Volkswagen Scholars Program at ORNL will give students access to some of the finest scientific facilities, equipment, and staff mentors in the world,” said ORNL Director Thom Mason. “It will boost these students’ career potential and strengthen the automotive industry workforce. We are very pleased to be one of the leaders in this exciting initiative.”

In addition to ORNL, the company’s program includes funding for Fisk University, Hamilton County Public

Schools, Tennessee State University, the University of Memphis, and the University of Tennessee’s Chattanooga and Knoxville campuses. It will also leverage and support the Volkswagen Group’s relationship with Chattanooga State Community College, the lead institution for workforce training at the company’s new plant in Chattanooga.

The Partners in Education program was unveiled during a ceremony at Chattanooga’s Calvin Donaldson Elementary School. Attendees included Dr. Horst Neumann, member of the Board of Management, Volkswagen AG for Human Resources and Organization; Frank Fischer, CEO and Chairman of Volkswagen Group of America, Chattanooga Operations; Stefan Jacoby, President and CEO of Volkswagen Group of America; and Tennessee Governor Phil Bredesen.

“We are employers, but we are also neighbors. That means pitching in and doing our part to make life better for the entire community,” said Dr. Neumann. “Our corporate philosophy demands that it is not enough to merely have an interest in education. We have an obligation to turn interest into action. If we’re going to create first-rate minds, we have to create first-rate schools.”

The Volkswagen Scholars program is just one example of a relationship that has emerged between Volkswagen and ORNL since the company’s mid-2008 announcement of its plans to build its first manufacturing facility in the U.S. after closing a Pennsylvania plant in the 1980s. The plant is less than 90 minutes from ORNL. During the past year, several groups of researchers have visited ORNL, and ORNL Director Mason was one of the presenters in May 2009 at a “VW Environmental Day on Capitol Hill” event.





Ames Finds Pioneer for Science Education

The Department of Energy's (DOE) Ames Laboratory has found itself a pioneer in science, technology, engineering, and math (STEM) education.

Dr. Adah Leshem-Ackerman is the director of the Academies Creating Teacher Scientists (ACTS) program at Ames Laboratory, a program designed to create a cadre of outstanding science and math teachers with the proper content knowledge and scientific research experience to serve as leaders and agents of positive change in their local and regional teaching communities.

Since its beginning in July 2007, the program has grown under her direction at Ames Lab, beginning with the first group of teacher participants in 2007. There are currently 46 K-12 teachers involved in the ACTS program.

In spring 2009, Ames Laboratory launched Pre-Service Teachers (PST), a program developed and initiated by Dr. Leshem-Ackerman. PST provides Iowa State University (ISU) preservice teachers with a chance to work in a research lab and gain first-hand experience that will equip them with a better understanding of the scientific research process. The preservice teachers will then be able to carry their experiences into the classroom. The program also pairs the preservice teacher with a master teacher—a high school science teacher who has gained much experience in a particular area and is highly respected as a leader in his/her field.

Even when travelling, Dr. Leshem-Ackerman is thinking of new ways to interest kids in STEM education. While at a DOE educational directors meeting, she began to think kids could really benefit from a noncompetitive science club—a club where middle school students could just have fun and one that might attract kids who otherwise are never encouraged to engage in science. She sought

out a former researcher at ISU and Ames Laboratory who currently runs his own sensor company to see if he was interested in leading the club. She then obtained funding from ISU this spring, secured 4-H as a partner, and “Tinkering with Science” was born.

The club was set up to run for seven weeks and was offered to kids in grades six through nine. Each week the kids are presented with challenges, such as figuring out how something works or why something might be broken. She is currently in the process of raising funds to continue the program.

When preparing for a submittal to the National Science Foundation (NSF) to form a new engineering research center on the ISU campus, Dr. Leshem-Ackerman was sought out to develop the educational component of the successful proposal. In September 2008, NSF awarded a five-year, \$18.5-million grant to ISU to establish the NSF Engineering Research Center for Biorenewable Chemicals (CbiRC). Dr. Leshem-Ackerman now serves as its director of pre-college education.

She set up a three-dimensional program that targets STEM middle and high school teachers, and middle and high school students showing strong aptitude in the STEM fields. She strives to create not only longstanding partnerships with central Iowa school districts, but also school districts located in relative proximity to CbiRC's partner institutions.

Dr. Leshem-Ackerman's devotion to STEM initiatives is endless. She also serves as the director of research opportunities in molecular biology, biotechnology and genomics at ISU, a summer research experience program for middle/high school biology teachers, as well as being the coordinator of “Partnerships for Research Education in Plants” in Iowa, a program started at Virginia Tech that she modeled and implemented in Iowa.

Dr. Leshem-Ackerman's tireless efforts have greatly increased the STEM outreach efforts of both Ames Laboratory and Iowa State University.



LANL Develops Math and Science Academy

In 2000, Los Alamos National Laboratory (LANL) and its community partners established the Northern New Mexico Math and Science Academy (MSA) as a direct response to the top priority concern of the region's business, academic, and government leaders, namely, the critical need to improve K–16 education in northern New Mexico.

Today, MSA has involved over 200 K–12 teachers from five rural northern New Mexico school districts in an intensive three-year professional development program designed to improve their teaching skills as well as their content knowledge of math and science. MSA's aim is to significantly improve math and science education as part of a larger systemic change initiative to improve the overall education of students in northern New Mexico.

Over 80 percent of the teachers and students are of Hispanic or Native American ethnicity; 87 percent of the students are also free/reduced lunch eligible; and 63 percent are English Language Learners.

Participating teachers commit to investing 200 hours annually in the MSA program. This commitment includes an intensive three-week Summer Institute followed by school-year interactions with the three MSA Master Teachers, in addition to meeting the requirements of their school district teaching contracts.

MSA teachers may also enroll in an optional Master of Arts in Teaching (MAT) math and science degree program. The two and one-half-year blended (face-to-face/online) master's program exposes the teachers to a variety of math and science content courses. The MAT is the result of a three-year partnership between MSA and New Mexico State University (NMSU).

Fifty-eight MSA teachers have participated in the program, including the first cohort of 25 who completed their degrees in December 2007.

Both the core MSA program as well as the mas-

ter's degree program are considered excellent and unique "best practice" examples nationally of the type of K–12 teacher professional development program suggested in the 2007 America COMPETES legislation designed to reestablish U.S. international leadership in scientific research and math and science education. In addition, the NMSU/MSA master's program and ongoing MSA Summer Institutes and school-year professional development efforts parallel the Final Report of the National Mathematics Advisory Panel (2008, p. 40) recommendation:

"The Panel recommends that a sharp focus be placed on systematically strengthening teacher preparation, early career mentoring and support, and ongoing professional development for teachers of mathematics at every level, with special emphasis on ways to ensure appropriate content knowledge for teaching."

Without MSA, these rural northern New Mexico teachers (over 200) and their 4,900 plus students would not realistically be able—logistically or economically—to acquire the enhanced math and science skills needed for them to progress to New Mexico's highest Tier III licensure level and for their students to compete effectively in today's technological world. Significant annual improvements in math proficiency scores are being realized by the students who have been taught by MSA-trained teachers. MSA has been highlighted at national K–16 education reform conferences in 2005, 2007, and 2008, and in testimony before Congress that led to the America COMPETES legislation. More information on MSA can be found at <http://www.lanl.gov/education/teachers/>.

According to one graduate of the Los Alamos MSA program, "This is one of the most positive professional development experiences I've ever had. I'm a veteran teacher, and I've participated in many, many staff development projects, but none has done for me what MSA has—rejuvenated my sense of wonder in teaching and learning. I'm trying new ideas, I'm thinking about things in dramatically different ways. There are so many reasons why this project works."

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HELLO
NAME

AFRL, Griffiss Institute Sign Partnership Intermediary Agreement for STEM Education

The Information Directorate of the Air Force Research Laboratory (AFRL/RI) has entered into a unique Partnership Intermediary Agreement (PIA) with a not-for-profit corporation, The Griffiss Institute, Inc. (GI), to facilitate technology transfer and assist in implementing the Defense Education Program for Science, Technology, Engineering and Mathematics (STEM) with local secondary schools.

With headquarters in Rome, N.Y., the Information Directorate develops information technologies for aerospace command and control, and its transition to air, space and ground systems. Its focus areas include a broad spectrum of technologies, including information fusion and exploitation, communications and networking, collaborative environments, modeling and simulation, defensive information warfare, and intelligent information systems technologies

Established in 2002 as a nonprofit corporation with New York State economic development funds, The Griffiss Institute advocates and facilitates the cooperation of private industry, academia, and government in developing solutions to critical information technology problems.

Charged with developing and expanding high technology employment opportunities in the Mohawk Valley by partnering with AFRL/RI, private industry and academia, GI provides business incubator and business accelerator services. The incubator service supports high technology business development specifically focused on information technology, with an emphasis on information assurance, computer forensics, and computer security. Services provided for incubator clients include business startup mentoring; financial planning; business development support; and operating facilities that include office space, computer network infrastruc-

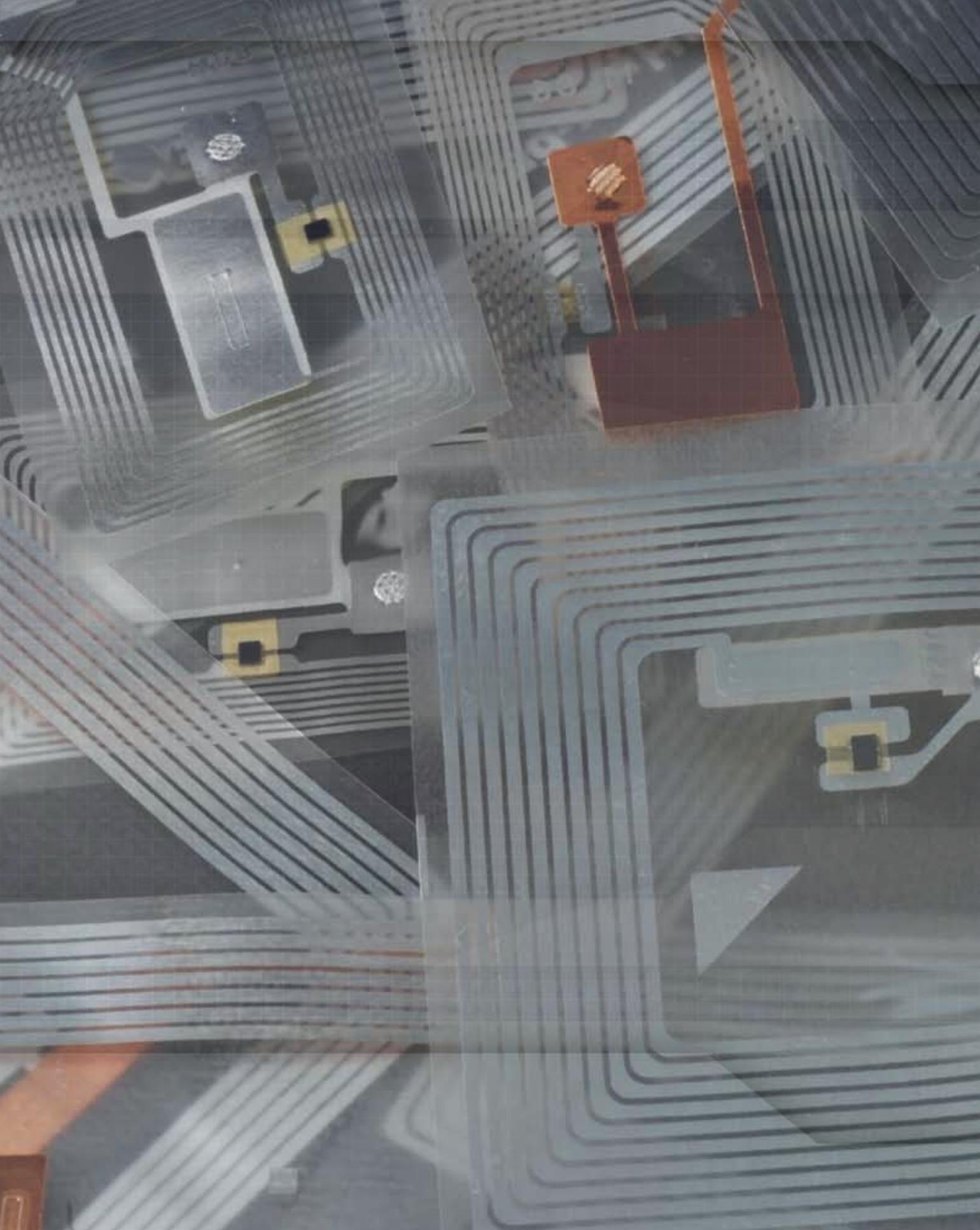
ture support, and a standalone computer network facility for development and demonstration activities. Welcoming new and expanding businesses to the local area, the accelerator support includes facilities and support much like those provided to incubator clients.

Under the PIA, GI is charged with supporting AFRL/RI in a number of areas, including:

- Cooperative Research and Development Agreements
- Education Partnership Agreements
- Invention Disclosures
- Patent Applications
- Technology Licensing
- Providing Technical Courses
 - Advanced Computer Architectures
 - Software Assurance Awareness
 - Data Fusion and Understanding
 - Exploitation Training
- STEM efforts within two local school districts
 - Summer Camps
 - Grand Challenge Competition
 - Robotics Competitions.

Under the STEM program, The Griffiss Institute oversees a LEGO® robotics program and competitions in local school districts. Additionally, GI initiated a “Grand Challenge” project in which seven teams of high school students and faculty advisers spent a week addressing a challenge problem developed by AFRL/RI Chief Scientist Dr. John Bay. This challenge problem was to explore solutions to maintaining information assurance within government communications systems and computer networks in light of the fact that many components are manufactured outside of the United States—some by potential adversaries. Students on the winning teams were awarded paid summer internships at AFRL and supporting companies.

GRIFFISS
INSTITUTE
 CENTER FOR INFORMATION ASSURANCE



PNNL and University of Oregon Team to Develop Everlasting Battery for Marketplace

At Pacific Northwest National Laboratory (PNNL), skilled researchers and expert technology commercialization staff work with academia, government, and private organizations to bridge the gap between laboratory-developed technologies and marketplace needs.

Since the mid-1990s, PNNL researchers have been developing the raw technology and applications for thermoelectrics—the foundation of the “everlasting battery.” Research staff tested several combinations of materials that would most efficiently produce self-sustaining power for small, wireless devices. By 2004, the technology was ready for commercialization, and PNNL was in search of partners to help make this happen.

That same year, students enrolled in the University of Oregon’s (UO) MBA program were given the opportunity to assess the technology’s commercial potential as part of a PNNL-sponsored Technology Entrepreneurship Program (TEP) at the University.

The TEP provides university students with access to PNNL-developed available technologies. PNNL staff work with the students to select a promising technology for their study. The students then evaluate the technology’s business potential and create a business plan for turning the technology into a commercially viable product or service.

The UO team’s business plan was based on PNNL’s thermoelectric technology, which is essentially a cost-effective and environmentally friendly battery replacement technology that can last as long as the

equipment it is powering. The plan’s potential was positively confirmed when it won awards in four international business plan competitions in 2005 and 2006.

Upon graduation, the students formed the company Perpetua Power Source Technologies (Perpetua) and formally licensed the thermoelectric technology from PNNL. The license allowed Perpetua to reproduce, manufacture, and sell the PNNL-developed technology in its products.

Partnering once again with PNNL through the laboratory’s Technology Assistance Program, Perpetua dove into advanced research and development to create its first product—known as the Perpetua Power Puck™.

Using naturally occurring differences in temperature, the Power Puck generates electricity and is especially useful for replacing or extending the life of hard-to-access batteries in low-power-requirement devices. Examples include systems in the wireless sensor industry for monitoring the structural health of buildings, bridges, and pipelines.

“PNNL laid the foundation and gave Perpetua a great head start,” said Jon Hofmeister, president of Perpetua, who was also a member of the award-winning MBA team at UO. “We had the advantage of building on top of over eight years of advanced research to develop a product specifically tailored to the needs of the marketplace.”

Filling a significant need in the marketplace by providing longer-life, renewable, and highly reliable power source solutions, the Power Puck provides both economic and environmental benefits. These amazing devices alleviate the pain of battery replacements for wireless sensors and can typically save companies over 50 percent compared to existing products.

A black rectangular sign with rounded corners hangs from a silver chain against a light-colored wooden door. The sign features the text "INTERVIEW IN PROGRESS" in white, bold, uppercase letters, arranged in two lines. The chain is attached to the top edge of the sign and loops back to a point above it.

**INTERVIEW
IN PROGRESS**

Federal Agencies, State and Local Governments, Industry, and Private Organizations Host Career Day for Postdoctoral Fellows

During these tough economic times, even postdoctoral fellows entering the job market must compete for fewer openings.

Our national emphasis on science, technology, engineering, and mathematics (STEM) positions relies on the ability to interest students and ensure that hard work pays off. Graduate studies and postdoctoral training demand a long-term investment in time and resources, usually with some level of support from regional, state, or federal funds.

Even in difficult economic times, area organizations and companies must obtain and attract the best talent to maintain a competitive edge.

So what can be done to increase the chances of local postdoctoral fellows finding jobs while helping companies attract new employees from the local talent pool?

Federal agencies, state and local governments, industry, and private organizations in the Washington D.C. area teamed up to tackle this question. They provided postdoctoral fellows working in a STEM field the opportunity to explore career options in the D.C. area.

Rockville Economic Development, Inc. (REDI) hosted a Postdoctoral Conference and Career Fair, joined by sponsors and organizers that included representatives from the Federal Laboratory Consortium for Technology Transfer (FLC) Mid-Atlantic Region, National Aeronautics and Space Administration, National Institutes of Health, National Institute of Standards and Technology, and the U.S. Food and Drug Administration. Lead sponsors of this event included the Ewing Marion Kauffman Foundation, the Montgomery County Department

of Economic Development, and the Maryland Technology Development Corporation (TEDCO).

According to Sally Sternback, executive director of REDI, “The purpose of the partnership is to keep a very talented workforce in the region, to build ever stronger linkages between the federal laboratories and our local companies, and to encourage technology transfer and an entrepreneurial career path by showcasing former postdoctorates who successfully made that transition.”

The conference provided opportunities for postdoctoral fellows to learn about available nonacademic careers in the area and to create a contact network.

The conference was also designed to support Washington area businesses and organizations by providing them with opportunities to recruit local talent from federal and university laboratories.

Robert Burton, Principal Investigator at BAE Systems and a former postdoctorate in the Washington area commented, “Over the past three years, BAE Systems has encountered many high-quality researchers at the Post Doc Career Fair. Each year we have hired at least one attendee and plan to continue to support the Career Fair.”

The July conference drew nearly 500 postdoctoral fellows and over 20 hiring companies and agencies. Some of the activities that took place at the event included a keynote presentation by NASA’s Nobel Laureate, Dr. John Mather; workshops on interviewing skills; appointments with resume doctors and immigration experts; interviews with companies; and presentations on careers in journalism, law, government, and nonprofits.

This event demonstrates how collaboration among federal laboratories, state and local governments, industry, and organizations can benefit the entire community. REDI and conference organizers are already preparing for next year’s event.



tools
for the

frontlines





Throughout the federal laboratory system, various examples exist that demonstrate how new technology being transferred every day enhances the ability of the average worker to perform work that is safer, more effective, or more efficient. The following stories exemplify the commitment by national laboratories in partnership with cities, states and regions to:

- Help first responders nationwide by ensuring that emergency response professionals are prepared, equipped, and trained for any situation.
- Develop tools and upgrade scientific practices that increase the accuracy of forensic evidence, which has helped convict thousands of defendants for nearly a century.
- Generate new knowledge regarding occupational safety and health and to transfer that knowledge into practice for the betterment of workers.
- Work with local and national fire agencies to understand the challenges and issues that arise during management of large-scale wildfires.





SPAWAR System Center Pacific Partners with Counties and Cities for Robotic Advancements

First responder organizations have unique needs in emergency situations in areas such as explosives prevention and countermeasures, visual scene surveillance, suspicious container handling/sampling, and environment detection (gases and radiation), to name a few.

Robotic systems offer the opportunity to address unique operational requirements in these areas and help reduce safety risk and operational hurdles; however, the prohibitive cost of operating and maintaining robotics research programs at the state and local levels can prevent their existence.

SPAWAR System Center Pacific (SSC Pacific) manages and operates the Joint Ground Robotics Enterprise, Robotic Systems Pool (RSP). Through the RSP (via the use of a no-cost Limited Purpose-Cooperative Research and Development Agreement, or LP-CRADA), SSC Pacific makes small robotic systems, payloads, and components available to government agencies at all levels for research and evaluation.

In 2009, via the RSP outreach center in Fort Wayne, Indiana, SSC Pacific executed robotic systems equipment loans with eight city and county government first responder organizations, including explosive ordnance disposal (EOD) and hazardous materials (HAZMAT) divisions of city and county police, fire, and sheriff's departments. The cities and counties included:

- Ashland County, Ohio, Sheriff's Department
- Boston, Massachusetts, Fire Department
- Butler County, Ohio, Sheriff's Department
- Columbus, Ohio, Division of Fire
- Columbus, Ohio, Division of Police
- Dayton, Ohio, Police Department

- Fort Wayne Police Department
- Toledo, Ohio, Police Department.

Through these equipment loans, SSC Pacific was able to make its expertise, capabilities, and information in robotic systems available to these first responder organizations at no cost to help address their unique needs.

The loans provided them the opportunity to evaluate and experiment with mobile robotic systems in their own unique operational domains. Users were able to "test run" robotics equipment, assisting them in their potential acquisition of robotics systems.

Additionally, user evaluation and feedback on robotic systems performance is helping identify system limitations in an operational environment, and will expedite the future development and integration of new capabilities, new technology, different payloads, and improved designs.

SSC Pacific developers can also apply this feedback to military applications that share common challenges. Overall, the evaluation and feedback enables SSC Pacific to understand and ultimately bridge the gap between emerging user needs and current system capabilities in order to field more effective and supportable robotic assets.

Each collaboration has the potential to provide feedback that is critical to the development of product advances in technology and capability, toward robotic systems that are able to meet first responder and U.S. military existing and emerging requirements.

Each collaboration also has the potential to spur the adoption of new technology, accelerating the technological advance among first responders (at a much decreased cost) and U.S. military forces. With a new outreach center set to open soon in Massachusetts, the potential for collaboration (and its inherent benefits to state, local, and federal governments) is growing.



Army Tactical Operations Center Technology Drives Alabama and Other State Homeland Security Command, Communication and Control Systems

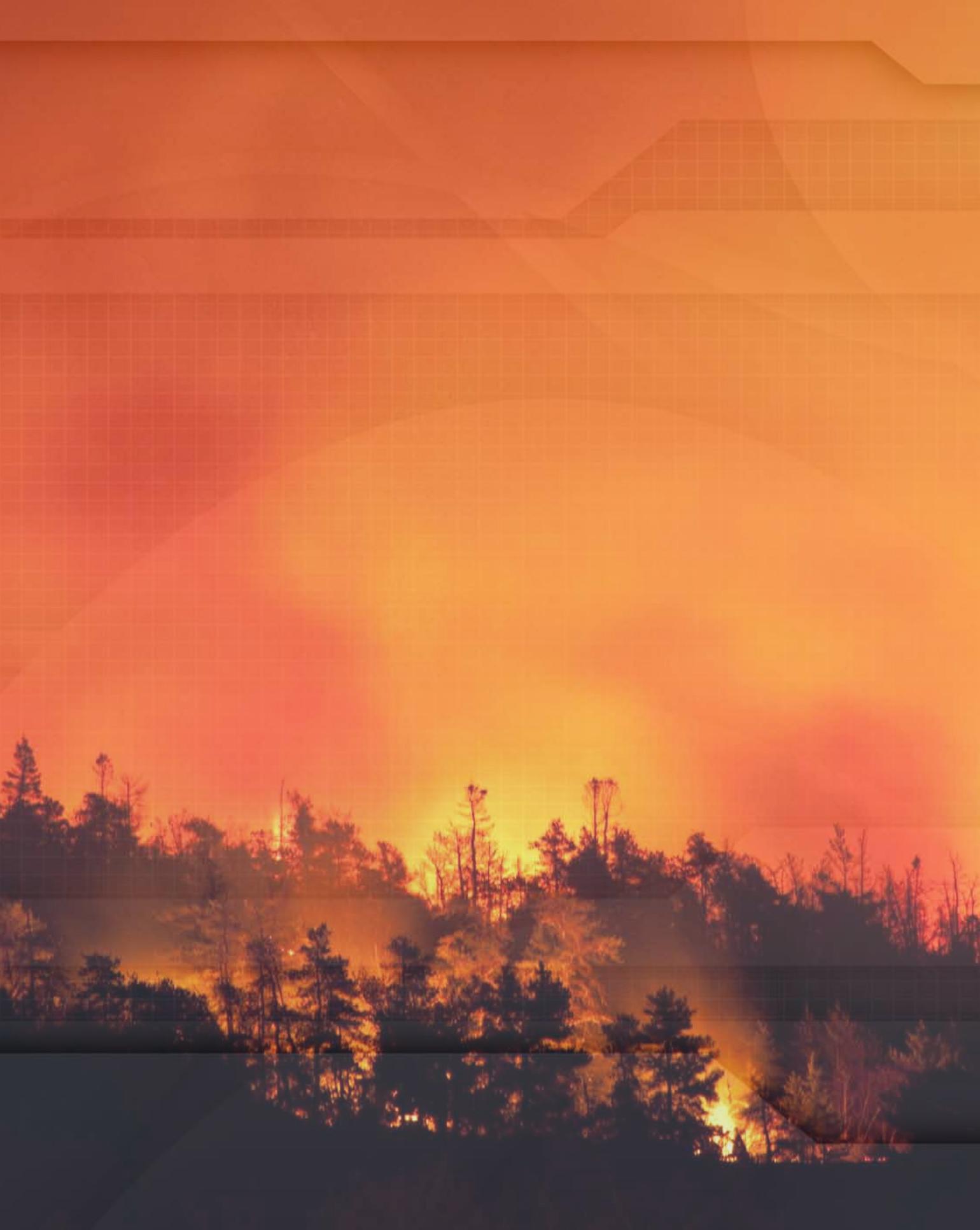
Prior to the events of September 11, 2001, the U.S. Army Space and Missile Defense Command/Army Forces Strategic Command (USASMDC/ARSTRAT) had developed a next-generation mobile tactical operations center (TOC) that would support military operations related to air and missile defense. When Alabama created its own Department of Homeland Security (DHS) in 2003, the Alabama DHS asked the U.S. Army for help with communication issues that existed with first responders at all state and local levels.

The USASMDC/ARSTRAT entered into a Cooperative Research and Development Agreement (CRADA) with Quantum Research International, Inc., to develop a civilian TOC prototype composed of a subset of the military TOC and commercial off-the-shelf (COTS) technologies, with emphasis on interoperability, deployability, and affordability. After this prototype was created and tested, the Alabama DHS procured nine Alabama Regional Incident Response Units (ARISUs) from Quantum.

These ARISUs are located in and operated by the seven state emergency management regions, the state Emergency Operations Center (EOC), and the Alabama Department of Public Health. Each mobile unit consists of full satellite-based Internet connectivity; local interoperable voice communications; voice and data links to regional and state EOCs; live streaming video to any authorized user; and many other operational and technical tools for on-scene first responders.

As technology improvements became available, they were inserted into the ARISUs. As part of the initial CRADA plan, some of these commercial technology upgrades have been inserted into existing military TOCs and other government programs, alleviating funding and time requirements for several government programs. Some of these technologies have been shared with other state homeland security entities. For example, a technology approach for low-cost visualization has been transferred to local police; the Tennessee Valley Authority (TVA); and the states of Hawaii, Texas, Wyoming and California.

An agreement between the governor of Alabama and the commanding general of USASMDC/ARSTRAT ensures that USASMDC/ARSTRAT and the Alabama DHS will continue to seek appropriate partners with which to share their technological improvements.



NASA, Forest Service Team to Fight Wildfires with Imagery Technology

NASA and the U.S. Department of Agriculture's (USDA) Forest Service have partnered to obtain imagery of wildfires in response to requests from the California Department of Forestry and Fire Protection, the California governor's Office of Emergency Services (OES), the Federal Emergency Management Agency (FEMA), and the National Interagency Fire Center.

This partnership demonstrates the effectiveness of interagency (and inter-center) partnerships and the extraordinary utility of tools developed by NASA to help face challenges on Earth.

Agencies involved in this cooperative Wildfire Research and Applications Partnership (WRAP) effort include NASA Ames Research Center, NASA Dryden Research Center, USDA Forest Service Remote Sensing Application Center, National Interagency Fire Center, and the Federal Aviation Administration.

The WRAP efforts originally extended for five years through 2007, but were subsequently continued to demonstrate and transition emerging observation and information technologies to operational utility by wildfire management agencies.

The WRAP partnership group has been highly successful in maturing, demonstrating, and integrating NASA-derived capabilities in sensor system design, telecommunications systems, image-processing algorithm development, intelligent systems design, inter-sensor systems coordination (sensor-web), and data visualization capabilities.

Because of this unique partnership between wildfire personnel and technologists, wildfire management agencies are better poised to reduce wildfire losses and reduce wildfire expenditures.

In the 2007 and 2008 wildfire seasons, the WRAP

team worked with the National Interagency Wildfire Center, the Multi-Agency Coordination Center in Redding, California, and the State Operations Center in Sacramento to distribute fire data to incident commanders in the field so they could rapidly detect and deploy mitigation strategies for events.

During missions in July 2008, a remotely piloted aircraft carrying a NASA sensor flew over much of California, gathering information that was used to help fight more than 300 wildfires burning in the state. The flights by NASA's unmanned Ikhana aircraft used a sophisticated autonomous modular scanner (AMS-Wildfire) developed at NASA's Ames Research Center at Moffett Field, California. The flights originated from NASA's Dryden Flight Research Center at Edwards Air Force Base, California.

The sensor is capable of peering through thick smoke and haze to succinctly record hot spots and the progression of wildfires over a lengthy period.

The team developed satellite communications links to distribute the data from the acquiring sensor on the unmanned aerial vehicle (UAV) to Incident Command Teams and Emergency Operations Centers. The team further developed real-time, onboard processing to derive high spatial accuracy, map-rectified imagery for use in a team-developed Wildfire Collaborative Decision Environment (WCDE), which employs GoogleEarth visualization software. The WCDE was designed so that a large amount of mission information could be shared with various members of the firefighting team to allow for better cooperation and more effective planning.

The team also developed the capability to serve data in a multitude of other geospatial data visualization systems in use by firefighting agencies. To further streamline the detection of hot spots, the team developed a processing algorithm that operates autonomously on the sensor data using a temperature threshold setting to call out the "hot pixels" that indicate the hottest parts of a fire.



Midwest Forensics Resource Center Partners to Fight Crime

Fighting crime involves collaboration on many levels. Ames Laboratory is working with many crime laboratories to transfer crime-fighting technologies through the Midwest Forensics Resource Center (MFRC). The MFRC unites Ames Laboratory and crime laboratories in 13 states.

The partnership also teams with Iowa State University (ISU); the Bureau of Alcohol, Tobacco, Firearms and Explosives (ATF&E); DEA; FBI; Internal Revenue Service (IRS) laboratories; Customs and Border Protection laboratories; the U.S. Secret Service (USSS); Department of Energy (DOE); the National Institutes of Justice (NIJ); and 13 Midwestern colleges and universities with science-based forensic science programs.

The partners determine the MFRC's casework, training, education, research, and management-infrastructure missions and projects. They also actively participate in, and benefit from, these projects.

In response, the MFRC office organizes access to specialized resources for unusual casework; forensic science training and professional development; a collaborative network of forensic science educators; crime-laboratory-centered forensic science research and development; and assistance for innovative management technologies.

Specific examples of collaborative projects and transfers of technology can be seen among the MFRC's crime lab partners over the course of this last year.

The following partners collaborated in pursuit of these forensic research projects:

- Indiana State Police Forensic Science Lab and Indiana University/Purdue University, Indianapolis: "Analysis of Automotive Clear Coat Paints

by Micro Laser Raman Science Lab"

- Minnesota Bureau of Criminal Apprehension: "High Speed Digital Video Analysis of Bloodstain Pattern Formation from Common Bloodletting Mechanisms"
 - Wisconsin State Crime Laboratory and University of Wisconsin-Platteville: "Determination of Heavy Metals in Whole Blood Using Inductively-Coupled Plasma-Mass Spectrometry"
 - Johnson County (Kansas) Police Crime Laboratory, Iowa State University, and Michigan Technological University: "Spectral Analysis of the 3D Fracture Surfaces for Enhanced Matching"
 - Franklin County, Ohio, Coroner's Office: "The Temporal Fate of Drugs in Decomposing Tissues"
 - Minnesota Bureau of Criminal Apprehension: "Evaluation of Portable Raman Analyzer for Testing Drugs"
 - Wisconsin State Crime Laboratory and University of Wisconsin-Platteville: "Fast Gas Chromatography Capabilities in Arson Debris Analysis"
 - Michigan State Police Crime Laboratory and Michigan State University: "Optimization of Headspace-Solid Phase Microextraction (HS-SPME) for Organic Impurity Profiling of Illicit MDMA Tablets"
 - Minnesota Bureau of Criminal Apprehension and University of Minnesota: "Ultra-Fast Gradient Elution HPLC as a High Throughput, High Information Content Screening Tool for Drugs of Abuse"
 - Missouri State Highway Patrol Crime Laboratories and Washington University School of Medicine: "Testing DNA Samples for Population of Origin"
- A similar degree of active collaborations and transfer can be seen in the MFRC's training program. This past fiscal year, three new training programs were developed: "Forensic Applications of Molecular Chemical Imaging," "Symposium on Special Topics in Bloodstain Pattern Analysis," and "Forensic Analysis of Low Explosives."



NIOSH Reduces Injuries for Alaska's Fishermen, Aviators, Loggers, and More

Since 1991, the National Institute for Occupational Safety and Health's (NIOSH) Alaska Pacific Regional Office (APRO) has worked to reduce occupational injuries and fatalities in Alaska. Throughout the 1980s, Alaska's occupational fatality rate was five times higher than the national average. Through targeted research programs and strategic partnerships with local, state, and federal entities focusing on high-risk industries of commercial fishing, aviation and logging, APRO helped to reduce the rate of occupational fatalities in Alaska by 67% by 2005.

The success of APRO's intervention programs relies heavily on collecting and analyzing occupational injury and fatality data in a timely fashion. To facilitate this, APRO developed the Alaska Occupational Injury Surveillance System (AOISS).

AOISS collects data on work-related fatalities across Alaska by using engaged partner organizations to report incidents of worker death. Participating state agencies include the Alaska Department of Labor, the Alaska State Medical Examiner, and the Alaska State Troopers. Data are also collected from municipal and local safety officials statewide and federal agencies such as the U.S. Coast Guard, the Occupational Safety and Health Administration (OSHA), and the National Transportation Safety Board (NTSB).

APRO creates targeted safety interventions based on the data and implements them with the assistance of appropriate partner groups.

This model has produced successful interventions

such as a preseason dockside inspection program for crab fishermen that has reduced fatalities by 60% from 2000-2006 compared to the period from 1990-1999.

It has also encouraged the adoption of safer aviation practices in Alaska, such as the use of enhanced avionics for small aircraft and better weather reporting for mountain passes.

The Commercial Fishing Safety Research and Design Program, in particular, has made progress in Alaska's most hazardous industry; the fatality rate among commercial fishermen in Alaska dropped 42% from 1990 to 2008. APRO has now expanded its research and prevention activities to include commercial fishing fleets throughout the U.S. to assess risk in different fisheries.

In addition to encouraging fishing safety programs and advising on policy changes, NIOSH researchers and engineers worked with purse seine fishermen on the design and testing of an emergency stop (e-stop) switch that stops the deck winch if someone becomes entangled.

The e-stop system allows the winch to be stopped by a worker, even if the worker is caught in the winch. The system was successfully tested on vessels during the 2005-2007 fishing seasons and is now commercially available as a retrofit kit from Go2Marine.

In terms of economic impact, APRO's work has reduced the number of fatalities among Alaska's three most hazardous occupations, which has allowed workers to be more efficient and more profitable. APRO is now expanding its mission to improve conditions in the commercial fishing and oil and gas extraction industries nationwide. It is also looking at duplicating the AOISS surveillance system in other states, such as Wyoming, with high occupational injury and fatality rates.



assisting
small

businesses





Federal laboratories play a vital role in fostering innovation in the scientific community and fueling research and development that creates economic opportunity for the nation's entrepreneurs. Similarly, small enterprises have made and continue to make a critical contribution to transforming this innovation into products, services and industries. For example, without breakthroughs such as the airplane, FM radio, and the personal computer, all of which were introduced by small firms, life in the industrialized world would be very different today.

Many of our laboratories have the ability to loan equipment, provide technical assistance, and supply information regarding procurement opportunities that are targeted at their local small business communities. The following pages are some examples.



NASA Stennis Supports Louisiana Businesses, Academia, and Government Entities

Over the years, successful partnerships with NASA's John C. Stennis Space Center (SSC), located in southern Mississippi, have brought benefits to Louisiana businesses, academia, and government entities.

These stakeholders work in harmony with Mississippi interests beyond "borders" to leverage the assets of NASA and the companies that support the NASA mission, as well as the many other federal labs at Stennis.

Nearly 30% of the more than 5200 employees at the Stennis "Federal City" are residents of Louisiana, providing a sizable return-on-investment economic impact to the state. The 2008 direct economic impact (50-mile radius) of Stennis is estimated at \$691 million.

The Louisiana Technology Transfer Office (LTTO) is designed to foster business relationships between Louisiana industry and federal laboratories.

This mission is accomplished through the Louisiana Business and Technology Center's (LBTC) state-wide activities and offices located on the campus of Louisiana State University in Baton Rouge and an office at NASA's SSC.

The mission of the LTTO includes:

- Matching Louisiana businesses and research universities with resources and expertise in the federal laboratory system.
- Promoting the federal Small Business Innovation Research (SBIR) program and the Small Business Technology Transfer (STTR) program to Louisiana companies.
- Accessing information from a network of technology resources, including NASA, the FLC, and others.
- Facilitating technology transfer between federal agencies and Louisiana industries, with an emphasis on procurement, licensing, and problem-solving.



Many Louisiana-based technology companies have offices at SSC to support their contract work with NASA or other federal labs.

The LTTO has full-time staff at SSC, and they work closely with entities such as NASA, the U.S. Navy, the Office of Higher Learning, and the Mississippi Enterprise for Technology to ensure that these companies have the support they need to grow and succeed, including the SBIR and NASA Dual Use programs.

In addition, several major Louisiana universities have an active presence at SSC supporting ongoing research and development initiatives. As a result of efforts to work with federal labs and the agencies at SSC, the LTTO was awarded the FLC Southeast Regional Partnership Award.

In addition, Roy Keller, Director of Technology Transfer, was given the national FLC's 2007 Outstanding Service Award.

Due to the need for rapid procurement of professional services from Stennis resident agencies to meet the demand of resident scientists, engineers, and others to contract with Louisiana university research faculty, the Louisiana Research Consortium (LRC) was developed.

The LRC has to date facilitated nearly \$2 million in federal R&D monies to Louisiana universities and research institutions.

New Mexico Empowers Small Businesses

Small businesses, particularly in rural counties, often run into technical problems for which no private-sector assistance is available at a reasonable cost.

To help these companies, the New Mexico State Legislature created the Laboratory Partnership with Small Business Tax Credit Act for the purpose of “bringing the technology and expertise of the national laboratories to small businesses in the state, with an emphasis on rural areas.”

This Act established the New Mexico Small Business Assistance (NMSBA) Program in 2000 to help small businesses throughout the state by providing technical support from Los Alamos National Laboratory (LANL) and Sandia National Laboratories (SNL), creating a regional partnership among the State of New Mexico, LANL, SNL, and the private-sector small businesses served.

The NMSBA Program is truly unique within the national/federal laboratory system, but it could be replicated. How it works is this—LANL and SNL provide technical expertise to small businesses in New Mexico in exchange for receiving gross receipts tax credits from the State of New Mexico. LANL and SNL pay less gross receipts tax to the State of New Mexico each year, the small businesses get technical support to solve problems, and the State of New Mexico gets a larger tax base through increased jobs and revenues at the companies.

Since its inception nine years ago, the NMSBA Program has assisted 1,455 small businesses in all corners of the state, for a total value of \$16,398,044.

Since the start of the program, 568 jobs have been created at an annual salary of \$39,406, leading to an increase in revenue of \$12,572,700; a reduction in operating costs of \$7,561,900; and an additional investment in other New Mexico goods and services of \$5,750,870.

In 2008, the NMSBA Program achieved record levels. In just one year, the two laboratories provided \$3.3 million in assistance to 286 companies throughout New Mexico. These projects provided cutting-edge scientific and engineering expertise, helping the businesses bring new products to market, troubleshoot existing processes, maintain or expand their workforces, reduce operating costs, and increase profitability.

NMSBA Program Highlights

- Developing a geothermal heating system—The hot water for the Giggling Springs spa comes at no cost from an underground spring. But the propane for heating the cabins costs too much.

The company asked Rich Jepsen, an SNL specialist in fluid- and thermodynamics, to design a heat exchange system using the geothermal water to heat the cabins without lowering temperatures in the pool. His system shrank winter propane costs by two-thirds, reducing the carbon footprint and allowing the company to direct heat only to the cabins in use.

- Reducing electricity interruptions and costs—In manufacturing bare, tin-plated, and insulated conductors for industries in North and Central America, Ffhoenix Cuivre was facing frequent power outages and high electricity bills because their process often led to spikes in power usage. Loren Toole and his Energy and Infrastructure Analysis team at LANL analyzed the major equipment and daily patterns of power use, then used advanced modeling techniques to spot ways to modify the manufacturing processes to lower peak demand and raise average demand. Implementing the first action item, the company qualified for lower electricity rates, saving \$5,000 a month. As it acts on the other recommendations, the company anticipates potential savings of \$40,000 a month in electricity costs and up to \$5,000 a month on maintenance costs.

The NMSBA Program is clearly a proven successful collaboration between small businesses and the federal laboratory system.



industries
of
the

future





In economic terms, disaster occurs when a country fails to innovate and loses control of vital industries to other nations. The U.S. economy and technology sectors now enjoy an advantageous position thanks to the success and hard work of our scientists, technologists, and entrepreneurs. Federal contribution to R&D has been critical. But with changes ongoing abroad, we are going to have to work aggressively at the local level, within regions, to sustain our leadership in emerging industries.

The following stories exemplify forward-thinking efforts by states and local governments that allow open innovation, field demonstrations, and community dialogue to occur. These activities will help shape the structure and increase the velocity by which we grow new industries in the U.S.



Space
Available

FOR RENT
See Next Page

NREL Helps Vets, Gray Fields Go Green

As U.S. military veterans return home from the Middle East, they face a common struggle—high unemployment rates and tough competition for jobs. As a result of the struggling economy, businesses are shutting down, leaving vacant lots and unoccupied commercial buildings.

These are serious problems, but in Colorado, there is a plan to bolster the economy while helping environmental and energy concerns.

In June 2009, Colorado Governor Bill Ritter announced the establishment of the state's first National Training and Demonstration Center in Energy Efficiency, a collaborative effort between the National Renewable Energy Laboratory (NREL) and the Colorado-based Veterans Green Jobs (VGJ) Academy.

"This initiative will retrofit unused commercial property, for example, a big-box store now standing vacant on acres of empty parking lots," Ritter said. "These 'gray fields' would become 'green fields' of opportunity, retraining not only veterans, but other people who otherwise might not have access to training in green jobs."

One gray field under consideration is a vacant Walmart in Lafayette, Colorado. The Walmart Foundation has awarded nearly \$750,000 to VGJ to support the development of such training centers.

The Colorado site could become a potential pilot project that can serve as a model for other regional training facilities.

These training centers, while focusing on immediate workforce development, could also be used as public demonstration and education centers for reuse, energy efficiency, and conservation.

"NREL Education Programs has placed workforce development as a high priority and an important focus throughout our work," said NREL Education Programs Manager Cynthia Howell.

"We could not be more pleased to join forces with VGJ in developing energy efficiency training and outreach programs for Colorado and the nation."

VGJ recently saw its first class of veterans graduate from its tough eight-week training program in energy efficiency and weatherization. "Transitioning from Humvees to PVs, from infrared rifle scopes to infrared energy cameras, from Striker Brigades to weatherization teams, these 15 men came from all over the U.S. and from many different personal circumstances because they believed in this new mission and pledged themselves to learn these new tools," said VGJ Executive Director Brett KenCairn.

The VGJ training program includes time in the classroom as well as the field, and lasts about a long as basic training—only the VGJ program is a green "boot camp" where students deploy to work as energy auditors and new home energy rating professionals.

"What I'm doing now is environmental stewardship," said graduate Joe Stepzinski. "Thanks to this program, I was able to get a great job—this concept needs to be expanded and more people need to get involved."

In the end, through the National Training and Demonstration Center in Energy Efficiency, VGJ and NREL together will be able to expand the green job training concept. "NREL will extend its reach locally and nationally as veterans and other intern ambassadors apply energy efficiency and conservation technologies promoted and developed here at our lab," Howell said.



Colorado Governor Bill Ritter congratulates Veterans Green Jobs graduate Joe Stepzinski.

Seed Fund Enables Lunar Analog Field Testing of Human Robotics and In-Situ Utilization

A 2007 Innovative Partnership Program (IPP) Partnership Seed Fund award to NASA's Kennedy Space Center (KSC) enabled researchers to conduct lunar analog tests of in-situ resource utilization (ISRU) and human robotics systems (HRS) technologies and methods.

Conducted in November 2008 on the big island of Hawaii, a volcanic island where the terrain and soil closely resemble those of the Moon, this collaboration involved the ISRU and HRS project teams at KSC, the Johnson Space Center (with expertise from Glenn Research Center), and the Pacific International Space Center for Exploration Systems (PISCES) at the University of Hawaii–Hilo.

Cost and risk factors preclude transporting all of the necessary oxygen, water, food, and other resources from Earth for long-term or permanent live/work outposts on the Moon. Therefore, ISRU systems—resource prospecting and capabilities such as lunar outpost site preparation and protection, oxygen production from regolith (or soil), and in-situ water production using HRS mobility platforms—will be essential.

ISRU has been written about conceptually for more than 40 years. But demonstrations of ISRU technologies were restricted to laboratory tests.

The recent field demonstrations enabled by the Seed Fund helped researchers understand how the robotics systems behave outside of the lab. “The IPP Office was integral to us being able to get to the field,” said Dr. Jackie Quinn, an environmental engineer and project manager of the Regolith and Environment Science and Oxygen and Lunar Volatile Extraction (RESOLVE) system, one of the innovations that were field-tested. “Without their advocacy and instrumental role in helping us to acquire these augmenting funds, our success in the field certainly would not have come to fruition.”

Seed Fund support enabled testing of ISRU and HRS technologies in an analog lunar environment. The PISCES site, located on the lower slopes of Mauna Kea, a 13,700-foot dormant volcano, was ideal because of its abrasive soil, which has a mineral composition similar to lunar regolith,

as well as subsurface permafrost for testing lunar water prospecting systems.

One of the technologies tested was the RESOLVE system for extracting usable oxygen from volcanic rock. For the first time ever, researchers validated RESOLVE's use, proving to the world that oxygen can be derived from materials already located on the Moon. Researchers also field-tested the surface capabilities of an ISRU excavator (blade/scoop) and an HRS surface mobility platform (prospecting rover).

The demonstrations validated surface system capabilities under simulated mission conditions, helping researchers understand how these technologies may function (or fail to function) on the Moon. “You always learn things when you move out into nature that you don't learn in a controlled environment like a lab because nature always throws you a curve,” said Bill Larson, chief of the Applied Science Division and Space Resource Utilization program manager at KSC. “We were met with all kinds of challenges, but we were able to achieve all the test objectives we set out for ourselves.”

In addition to NASA's technological benefits, this collaborative agreement also has contributed to Hawaiian economic development.

The creation of PISCES and its lunar analog test site, spurred by NASA and the research conducted thus far, is expected to encourage many space exploration organizations to make significant research agreements with PISCES, generating continued employment opportunities in the field of space exploration.

This will enhance the state's economy and job market. “Education and public outreach are central to the mission of PISCES,” said Dr. Frank Schowengerdt, director of PISCES.

“NASA does a great job of spreading the word to the public,” added Dr. Robert Fox, deputy director

of PISCES. “They went into every corner of the public to promote the science and make sure people understood the value of what they were doing with us.” Schowengerdt and Fox noted that the educational outreach, combined with the increased exposure of PISCES to space-faring countries on the Pacific Rim, has the potential to improve educational and economic opportunities for Hawaii.

These field demonstrations also involved collaborations with the Canadian Space Agency (CSA) via a separate agreement with NASA Headquarters and an agreement between the German Aerospace Center (Deutsches Zentrum für Luft und Raumfahrt, or DLR) and PISCES.

All of the organizations coordinated their efforts to be at the PISCES test site in November 2008 to maximize collaborative opportunities among their respective demonstrations.

Looking ahead, CSA has proposed further field testing, now planned for January 2010, with the involvement of NASA, DLR, and the Japan Aerospace Exploration Agency. CSA will begin testing its lunar rover testbeds, and NASA plans to continue testing more advanced and upgraded ISRU hardware. One of NASA’s goals is to extract 14 percent oxygen from the soil, a higher amount than achieved in November 2008. Now that researchers know they can extract oxygen from volcanic rock, they intend to improve the process and make it viable in actual lunar conditions.





ORNL to Host Tennessee Solar Initiative

Tennessee Governor Phil Bredesen recently proposed the Volunteer State Solar Initiative, a comprehensive solar energy and economic development program that will use up to \$62.5 million in federal American Recovery and Reinvestment Act funds to advance job creation, education, research, and renewable-power production in Tennessee.

In announcing the new initiative, Bredesen was joined by legislative leaders and key partners, including Oak Ridge National Laboratory (ORNL), the Tennessee Valley Authority (TVA), and the University of Tennessee (UT).

Support was registered from Washington, D.C., by members of Tennessee's congressional delegation, including U.S. House Science and Technology Committee Chairman Bart Gordon and Congressman John Tanner, a member of the House Ways and Means Committee.

The proposed initiative consists of two closely related projects:

- The Tennessee Solar Institute at UT and ORNL, which will focus on basic science and industry partnerships to improve the affordability and efficiency of solar products
- The West Tennessee Solar Farm near Brownsville, a five-megawatt, 20-acre power generation facility at the Haywood County industrial megasite that will be one of the largest installations in the Southeast and serve as a demonstration tool for educational, research, and economic development purposes.

"Our success over the past few months in recruiting solar-industry manufacturers to Tennessee shows we have bright economic prospects for

additional job growth in this area," Bredesen said. "Now, it's time to build on our strengths and position Tennessee for the next wave of investment in the renewable-energy sector. This approach fits within our state's broader job creation strategy, and addresses President Obama's short- and long-term goals in economic stimulus and renewable energy."

Congressman Gordon, an original supporter of the federal Energy Independence and Security Act, which will make renewable energy more accessible and affordable for consumers, lauded the project as a forward-looking investment in Tennessee's future.

"This statewide initiative puts Tennessee in a leading role nationally to promote and capitalize on the solar industry,

and in turn curb our nation's dependence on foreign oil," Gordon said. "It also will bring us closer to eventually developing a regional high-tech corridor, connecting Oak Ridge and UT with Tennessee Tech, MTSU, Vanderbilt, and the Marshall Space Flight Center in Huntsville, Alabama."



Tennessee Governor Phil Bredesen (left) and ORNL Director Thom Mason (right) at the announcement of the \$62 million Solar Initiative.

Congressman Tanner, a longtime advocate for rural economic development, said the investment makes sense given the solar-related economic activity already underway in Tennessee.

"The solar farm represents a near-term economic boost in West Tennessee with manufacturing and installation jobs, and a long-range economic asset to help market the Haywood County megasite," Tanner said. "The broader initiative is another step toward meeting our larger goal of energy independence."



protecting our
environment





State and local governments use federal laboratories' innovations to foster an environment of economic stimulus, job creation, and enhanced lifestyles for their citizens.

Since 1970, the Environmental Protection Agency (EPA) has been working for a cleaner, healthier environment for the American people by leading the nation's environmental science, research, education, and assessment efforts.

The following stories are just two examples of how the EPA uses technology transfer to meet its mission of protecting human health and the environment.





EPA Scientist Develops Rapid Methods to Assess New England Wetlands

Environmental Protection Agency (EPA) research is helping states and tribes across New England get a clearer picture of the condition of their coastal wetlands. Office of Research and Development Atlantic Ecology Division scientists, in collaboration with state agencies and universities, are conducting research at 60 coastal wetlands areas to create a cost-effective, rapid assessment tool to identify and report on impaired wetlands and to support the development of tiered aquatic life use support criteria.

“This type of assessment provides important inventories of wetlands resources, information on the overall quality and quantity of wetlands, and data on what sites need immediate attention,” explained Cathleen Wigand, a wetlands ecologist at the EPA’s Atlantic Ecology Division.

The New England coastal wetlands assessment study is one of a few national case studies using a three-tiered iterative approach to assess wetlands conditions. The three-tiered approach is rapid, and includes both office-based and onsite field assessments of the wetlands.

In the first tier, researchers used a big-picture approach to looking at wetlands: inventory maps, aerial photography, and satellite images. This view allowed the scientists to assess overall landscape con-

ditions and to gather data that are calibrated and verified in assessments that follow.

In the second tier, the team took a closer look, conducting onsite field assessments to determine the effects of ditching, draining, and tidal flushing. They also evaluated plant types and coverage, as well as the conditions and content of the soil.

Finally, data from the first two tiers were used to inform the final tier evaluation—a detailed field assessment.

The team reviewed a targeted subset of reference sites with varying watershed disturbances—ten Narragansett Bay coastal fringe marshes (i.e., Jenny Pond, Fox Hill Salt Marsh, Fogland Marsh, Mary Donovan Marsh, Passeonkquis Cove, Brush Neck Cove, Bissell Cove, Old Mill Creek, Watchemoket Cove, and Apponaug Cove). They focused on measures of plants, infauna, and some bacterial transformations such as denitrification and soil respiration.

Their preliminary findings reveal significant relationships between the rapid assessment plant data and the more intensive plant field measurements.

“The third tier data verified the accuracy of our rapid assessment plant methods,” explained Wigand. “We are continuing with the research and the statistical analyses of the data to ensure that we develop and calibrate an evaluation scheme that is scientifically sound, rapid, and cost-effective for our customers.”



EPA Teams with Maryland Department of Natural Resources to Get the Most Green for the Green

Real estate speculation is a high stakes business. Developers and venture capitalists risk hundreds of millions of dollars deciding where to invest: build apartments and a retail complex here, high-end residential housing over there. High risks, high rewards.

It's largely the same for landscape planners and ecologists. Although their real estate decisions aren't measured in profit margins, they are measured in healthy watersheds; clean air; and stable, diverse ecosystems.

Scientists at the Environmental Protection Agency's (EPA) Office of Research and Development are working with the Maryland Department of Natural Resources (DNR) to help the state make the best investments when it comes to landscape protection.

Bill Jenkins, a DNR landscape planner temporarily working for EPA's mid-Atlantic headquarters in Philadelphia said, "EPA's Office of Research and Development greatly assisted us in applying high-tech mapping and land assessment tools with the latest science of how ecosystems function over large areas. This became the foundation of a rigorous, scientifically sound strategy that state officials could use to assess land in terms of its ecological value."

That strategy is now the Maryland Green Infrastructure Program. Christine Conn, DNR's Director of Landscape and Watershed Analysis, explained that the overall strategy is to identify and protect a network of large, intact natural areas across the state. These conservation "hubs" are then linked together by "corridors" of natural habitat, such as a buffer of green space left surrounding rivers that meander from one hub to another.

The Green Infrastructure Assessment helps Maryland legislators know where the state should concentrate its land conservation efforts—ensuring that its citizens are getting the most green for their green. "At the click of a button, we can assess the ecological value of a land parcel and make that information readily accessible to decision-makers at the highest levels of state government. It helps them know where money should be targeted for effective conservation. It's been a tremendous benefit," said Conn.

The EPA is now working with other states that are considering similar programs, as well as continuing to work with DNR to update and improve the Green Infrastructure Assessment. The next steps include applying a similar approach at the local level in Baltimore County, developing more site-specific tools, keeping up-to-date information in the face of rapid urban and suburban land development, and adding to the suite of decision support tools.



leading

transportation





The John A. Volpe National Transportation Systems Center in Cambridge, Massachusetts, is an internationally recognized center of transportation and logistics expertise. Through research and development, engineering and analysis, the Volpe Center helps decision-makers define problems and pursue solutions to lead transportation into the 21st century. Their work includes a broad mix of projects that cut across traditional transportation modes and technical disciplines.

The Center assists federal, state, and local governments; industry; and academia in a number of areas, including human factors research, system design, implementation, assessment, global tracking, strategic investment and resource allocation, environmental preservation, and organizational effectiveness. In these and other areas, the Center provides its customers with valued policy support and strategic planning and analysis.

The Volpe Center is part of the U.S. Department of Transportation's Research and Innovative Technology Administration.



SAFETrip 21

from 20
Demo Vehicle

6749

 **SafeTrip-21**
Innovation for a Nation on the Move

NEW YORK
M-13662



SafeTrip-21 Transportation Safety Technologies Hit the Streets of Manhattan

The John A. Volpe National Transportation Systems Center has launched a bold new intelligent transportation systems (ITS) initiative dubbed SafeTrip-21 (Safe and Efficient Travel Through Innovation and Partnerships for the 21st Century).

SafeTrip-21 builds on U.S. Department of Transportation (DOT) Intel-lidriveSM research and leverages technologies currently in wide use, such as cellular phones, GPS, Wifi, Bluetooth, and the Internet, to accelerate the advance of safety and mobility applications. Volpe Center will assess applications to improve automobile travel and public transit convenience, as well as commercial vehicle safety and productivity.

In June 2008, the Volpe Center entered into a cooperative agreement with the California Department of Transportation (Caltrans), establishing the inaugural SafeTrip-21 field test site in the San Francisco Bay area. In this 12-month field test that began December 2008, travelers receive transportation information and transmit their own transportation data, creating a real-time, dynamic, wireless data mesh of mobile information—a virtual “web on wheels.”

SafeTrip-21 technologies were unveiled at the 15th ITS World Congress in New York City in November 2008. A New York Metropolitan Transportation Authority (MTA) bus and two rental vehicles were equipped to demonstrate applications for both drivers and transit riders on the streets of Manhattan. Also, key driver and pedestrian applications were showcased at a special “integrated show,” which included technologies developed worldwide.

Three 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.
- 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.
- I-95 Corridor Coalition uses vehicle probe data to make it much easier for I-95 travelers to get information about traffic backups, construction information, and other delays.

The Volpe Center is excited about SafeTrip-21 and the future development of these technologies.



DOT Submits Plan for Surface Transportation Security Cooperation and Emergency Operations for the Port Authority of New York and New Jersey

On July 9, 2009, the U.S. Department of Transportation's (DOT) Research and Innovative Technology Administration Volpe National Transportation Systems Center submitted the final Security Cooperation and Emergency Operations Plan (SCEOP) draft to the Port Authority of New York and New Jersey (PANYNJ).

The SCEOP provides strategies for how each of the stakeholder agencies (Metropolitan Transportation Authority [MTA], New Jersey Transit [NJT], ConnDOT, and PANYNJ) should share information and resources during times of crisis.

The final product includes a Basic Plan, Technical Assessment, Best Practices, Water Transportation Assessment, and an Annex for each of the stakeholders.

Broad-based and multidisciplinary technical support for this effort was provided by more than 20 Volpe Center staff members from 10 different divisions in 6 different Centers of Innovation (COIs), as well as from several in-house contractors.

Assessing Management of the New York Thruway Authority

The New York State Thruway Authority (NYTA) asked the U.S. Department of Transportation's Research and Innovative Technology Administration Volpe National Transportation Systems Center to perform a top-to-bottom review of its policies and operation in order to improve organizational and process efficiencies. NYTA sought an independent assessment of its organizational policies, processes, and operations so as to improve public accountability and facilitate operational decision-making through a high-level scan of the organization.

Review objectives set by NYTA's Board of Directors and Executives were:

- Conduct a scan of similar organizations to benchmark the NYTA's performance against industry standards and identify best practices in critical management functions.
- Assess NYTA's capital needs and financial planning practices.
- Provide a strategic evaluation to identify potential improvements in high priority business functions.
- Examine how NYTA sets standards, assesses conditions, measures system performance, and operates and maintains its assets.
- Review current and potential non-toll revenue streams.



Chicago Metropolitan Agency for Planning Advances Regional Vision Through Strategic Guidance on Transportation

Since 2008, the Volpe Center of the U.S. Department of Transportation's Research and Innovative Technology Administration has been providing strategic advice to the Chicago Metropolitan Agency for Planning (CMAP) in its comprehensive planning campaign for metropolitan Chicago, GO TO 2040. The GO TO 2040 campaign is intended to enhance regional decision making about quality-of-life issues, including transportation, jobs, and education, among others.

Initially, Volpe's team assisted with designing scenarios for stakeholders to use in evaluating alternative futures for the Chicago region. During the last 12 months, Volpe has delivered six "action strategy" papers based on best practices of peer organizations: climate change and energy, goods movement, security/energy management, public-private partnerships, alternative fuels and advanced vehicle technologies, and inter-regional transportation.

The recommendations in the papers have served CMAP in refining the alternative future scenarios. The Volpe team has also advised CMAP about developing evaluation measures for major capital projects and summarized innovative applications for transportation performance indicators.

Four complementary strategic documents created for GO TO 2040 highlight the breadth and depth of this project:

- **Development of Evaluation Measures for Major Capital Projects:** Volpe detailed evaluation measures that CMAP can employ to evaluate major capital projects, including consideration of eligibility for federal transportation funding. CMAP has incorporated Volpe's recommendations into its method for assessing potential capital projects. The

agency will evaluate proposed capital projects in late 2010 as part of its current long-range, comprehensive planning cycle.

- **Climate Change and Energy Strategy Paper:** As CMAP develops its approach to climate change and energy issues, it can build on the innovative approaches utilized by peer metropolitan planning organizations, states, and multi-state regions. In this paper, Volpe staff compiled and recommended a synthesis of other organizations' best practices to aid CMAP in designing effective climate- and energy-related initiatives.

- **Innovative Applications for Transportation Performance Measures by Peer Agencies:** Volpe presented case studies that highlight translatable practices for employing data to track achievement of performance goals. As an example, CMAP might review "transportation expenditures as a percentage of household income" to evaluate competitiveness of multi-modal options, as does Metro, a peer agency in Portland, Oregon.

- **Inter-regional Transportation Planning Action Strategy Paper:** Volpe presented best practices that CMAP might adopt in order to strategically and effectively assume a key role in inter-regional transportation partnerships. Carefully designing CMAP's role will streamline cross-regional collaboration. This, in turn, will accelerate and improve the region's capacity to engage in inter-regional projects that improve interconnectivity while driving and sustaining economic growth.

CMAP seeks innovative, multidisciplinary approaches to identify and implement transportation solutions that reflect the full range of factors affecting success, a directive well-aligned with the Volpe Center's expertise. Joint projects cover a broad range of topics, and the technical and organizational support Volpe provides advances the missions of CMAP and the U.S. Department of Transportation.

FEDERAL LABORATORY CONSORTIUM
FLC
FOR TECHNOLOGY TRANSFER



about the FLC

advancing federal research and technology



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advancing federal research and technology

The Federal Laboratory Consortium for Technology Transfer (FLC), a nationwide network of over 250 federal laboratories, is the only government-wide forum for technology transfer (T2). Organized in 1974 and formally chartered by the Federal Technology Transfer Act of 1986, the FLC provides the framework for developing T2 strategies and opportunities by promoting and facilitating technical cooperation among federal laboratories, industry, academia, and state and local governments.

As the recognized leader in maximizing collaborative research for the transfer of technologies, the FLC enhances the socioeconomic well-being of the nation in the global marketplace.

Industry, government, and academic personnel looking to strengthen their T2 capabilities to capitalize on the nation's investment, better their position in the marketplace, or research technology can look to the FLC to foster the rapid movement of federal laboratory research results into the mainstream of the U.S. economy. The FLC advances T2 by expanding communication among industry, government, and academia. The FLC's website, Technology Locator, *T2 Desk Reference*, *FLC NewsLink*, trade show exhibits, awards program, education and training publications, and network of experts are only a few of the tools it provides for successful T2.

The FLC is a consortium driven by the dedicated people of the federal laboratory system.

These people are the scientists, agency representatives, and T2 professionals who transfer federally funded technology and expertise to the marketplace. Serving as a gateway for industry, government, and academia to access research and development, the FLC also serves as a resource for T2 education and training, news, programming, awards, and initiatives.

[flc technology locator]

For industry and other technology seekers, the FLC Technology Locator network serves as a point of entry to federal laboratory expertise and technology. In meeting this need, the network also handles requests from other organizations working with the private sector. These organizations include NASA's Regional Technology Transfer Centers, the National Technology Transfer Center, and state-funded economic development centers.

Through its network of representatives, the FLC puts a potential partner in contact with a federal laboratory with expertise and capability in a specific area of interest. Once the FLC identifies the contact, the arrangements for the technical exchange are between the user and the laboratory. The network does best when the user makes the request as specific as possible and identifies considerations such as technical need, constraints, and intended use. A central FLC Technology Locator helps the network match user technical requests for expertise and facilities with appropriate federal laboratory capabilities.

How It Works

- Identifies laboratory technical resources that can respond to specific requests
- Provides referrals to other federal resources
- Uses an FLC Technical Specialist System to complement information sources and network expertise
- Publishes directories that focus on special needs such as automotive materials or defense conversion partnerships
- The unique network structure of the FLC, the person-to-person technical linkages, and the central FLC Technology Locator are vital factors in linking user needs to a federal laboratory person with a special expertise or capability.

More Information

Frank Koos
856-667-7727
fkoos@utrs.com
www.federallabs.org/locator

Sample Successes of the FLC Technology Locator

In cooperation with federal laboratories and the private sector, the FLC Technology Locator Service helps potential collaborators take advantage of the vast reservoir of technology and expertise located within federal laboratories.



Harlyn Thompson, RN, President, Harlyn Medical, LLC, developed a non-pharmaceutical option (LVIS™) to support and comfort the lower back of patients undergoing diagnostic procedures for which a flat, supine position is mandatory for long periods. Information about the LVIS can be viewed at www.harlynmedical.com.

"Since the introduction of the LVIS™ at the FLC meeting in Portland, Oregon, the LVIS™ is being used at Baylor Hospitals, VA Hospital, Dallas, TX, and Madigan Army Medical Center. The LVIS™ is also being evaluated at the Cooper University Hospital, Camden, NJ." - Harlyn Thompson



John Kane and Glenn Carroll represented Canada's Federal Partnership in Technology Transfer (FPTT) at the FLC meeting. The FPTT is very interested in partnering with the FLC and was particularly interested in the FLC Technology Locator Program. *"The information we gathered at the FLC conference and the details provided by the FLC Technology Locator regarding the FLC Technology Service was helpful to the FPTT in developing a similar locator service in Canada. Canada's federal science-based department and agencies face numerous challenges in establishing a point of entry for the federal laboratories." - John A. Kane, Senior Consultant, FPTT*



Marie D. Zeller, CEO, Cabin Air Technologies, contacted the Technology Locator seeking the assistance of federal laboratories to test prototype systems that provide protection against lethal chemical, biological and radiological agents, and other air contaminants. The portable system offers protection for personnel in small enclosures, mobile facilities and passenger cabins of motor vehicles. The system can be viewed at www.cabinairtech.com.

"As a result of the FLC Technology Locator referral, Cabin Air Technologies is currently in contact with the Department of Energy, Kansas City Plant for potential collaboration to test the device to support national security goals." — Marie D. Zeller



Douglas Naimo, President of Triggerfinger Software, Inc., develops software that enables any handheld device to replicate the QWERTY keyboard and mouse assembly. This allows the user to communicate effectively in a mobile environment without compromising situational awareness or interfering with mobility. The system can be viewed at www.triggerfingersoftware.com.

"As a result of the Technology Locator's efforts, we have initiated contracts with the military and military contractors. Our invitation to join the Intel Software Developers Partner Program is a direct result of the work initiated by the FLC. Triggerfinger-enabled technologies for military applications will be demonstrated at the Paris Air Show '09." - Douglas Naimo



A global materials company requested assistance from the FLC Technology Locator to identify federal laboratories that conduct research in specialty materials that could be used in the manufacture of a wide variety of consumer products.

"As a result of the FLC Technology Locator referrals, we are investigating the potential use of several new materials that may have significant beneficial impact on new product development. — Technology Director

[flc tools for technology transfer professionals]

www.federallabs.org

The FLC website makes it easy to find people, capabilities, and applications within the FLC's network of federal labs and centers. The site publicizes T2 news and technology trends, and provides a gateway to FLC products and services.

Technology Locator

The Technology Locator is a free service that provides 1:1 personalized assistance locating federal laboratories ready to transfer their technologies to the marketplace and bringing these laboratories together for collaborative R&D. Call the Locator at 1-856-667-7727.

Education & Training

The FLC provides education and training on all aspects of T2 to laboratory personnel. This service includes fundamentals, intermediate, and advanced training courses offering continuing education units (CEUs); a wide range of publications and resources; a training resources database; and an online T2 curriculum.

FLC Awards Program

The FLC honors technology transfer excellence through its awards program. Each year, the FLC recognizes those who advance federal technology and expertise to the marketplace.



FLC NewsLink

A free monthly newsletter reporting on a host of technologies and training events, and highlighting the technological advances of federal laboratories, industry, and academia.



Technology for Today

An annual publication showcasing the recent successes of the federal laboratory system.



Technology Transfer Desk Reference

The desktop essential for laboratory representatives, Office of Research & Technology Applications personnel, business development managers, and any and all T2 pros!



Technology Transfer Training DVD

21-hour, 11-DVD set containing 14 video courses covering a variety of technology transfer topics.



Washington, DC Representative

To keep the technology transfer community informed of changes in relevant legislation and policy, the FLC monitors congressional studies, proposals, and announcements via the Washington, DC Representative. For more information about technology transfer legislation and policy, contact Gary Jones at 202-296-7201 or at gkjones@federallabs.org.



[flc regions]

Far West

<http://www.zyn.com/flcfw>
Regional Coordinator: Ida Shum
Lawrence Livermore National Laboratory
925-423-9724
shum3@llnl.gov

Midwest

<http://www.flcmidwest.org>
Regional Coordinator: Kristen Schario
AFRL, Propulsion Directorate
937-255-3428
kristen.schario@wpafb.af.mil

Mid-Atlantic

<http://www.flcmidatlantic.org>
Regional Coordinator: Mojdeh Bahar
National Institutes of Health
301-435-2950
baharm@mail.nih.gov

Northeast

<http://www.flcnortheast.org>
Regional Coordinator: Lewis Meixler
Princeton Plasma Physics Laboratory
609-243-3009
lmeixler@pppl.gov

Mid-Continent

<http://www.zyn.com/flcmc>
Regional Coordinator: J. Susan Sprake
Los Alamos National Laboratory
505-665-3613
sprake@lanl.gov

Southeast

<http://www.southeastflc.org>
Regional Coordinator: Andrew Watkins
Centers for Disease Control and Prevention
770-488-8610
awatkins@cdc.gov

FEDERAL LABORATORY CONSORTIUM
FLC
FOR TECHNOLOGY TRANSFER



FLC member laboratories

Department of Agriculture

Agricultural Research Service

www.ars.usda.gov

Animal and Plant Health Inspection Service

www.aphis.usda.gov

Forest Service

www.fs.fed.us

APHIS - National Wildlife Research Center

www.aphis.usda.gov/ws/nwrc

ARS - Beltsville Area

www.ba.ars.usda.gov

ARS - Children's Nutrition Research Center

www.ars.usda.gov/main/site_main.htm?modecode=62-50-00-00

ARS - Cropping Systems Research Laboratory

www.lbk.ars.usda.gov

ARS - Grassland, Soil & Water Research Laboratory

www.ars.usda.gov/spa/gswrl

ARS - Grand Forks Human Nutrition Research Center

www.gfhnrc.ars.usda.gov

ARS - Grazinglands Research Laboratory

http://ars.usda.gov/main/site_main.htm?modecode=62180000

ARS - Lincoln Location

www.ianr.unl.edu/arlincoln/swcru/home.htm

ARS - Mid South Area

<http://msa.ars.usda.gov>

ARS - Midwest Area

www.mwa.ars.usda.gov

ARS - National Animal Disease Center

http://ars.usda.gov/main/site_main.htm?modecode=36-25-30-00

ARS - National Center for Agricultural Utilization Research
www.ncaur.usda.gov

ARS - National Seed Storage Laboratory

www.ars.usda.gov/main/site_main.htm?modecode=54-02-05-00

ARS - North Atlantic Area

www.naa.ars.usda.gov

ARS - Northern Great Plains Research Laboratory

www.mandan.ars.usda.gov

ARS - Northern Plains Agricultural Research Laboratory

www.ars.usda.gov/npa/nparl

ARS - Northern Plains Area

www.ars.usda.gov/main/site_main.htm?modecode=54-00-00-00

ARS - Pacific West Area

www.ars.usda.gov/main/site_main.htm?modecode=53-00-00-00

ARS - Plant Genetic Research Unit

www.ars.usda.gov/mwa/columbia/pg

ARS - Plant Science & Water Conservation Research Laboratory

www.pswcrl.ars.usda.gov

ARS - Roman L. Hruska U.S. Meat Animal Research Ctr.

www.ars.usda.gov/Main/docs.htm?docid=2340

ARS - South Atlantic Area

www.ars.usda.gov/Main/site_main.htm?modecode=66-00-00-00

ARS - South Central Agricultural Research Laboratory

www.lane-ag.org

ARS - Southern Plains Area

www.ars.usda.gov/main/site_main.htm?modecode=62-00-00-00

ARS - Southern Regional Research Center

www.ars.usda.gov/msa/srrc

ARS - Southwestern Cotton Ginning
Research Laboratory
www.ars.usda.gov/Main/docs.htm?docid=17426

FS - Forest Products Laboratory
www.fpl.fs.fed.us

FS - Missoula Technology & Development Center
www.fs.fed.us/eng/techdev/mtdc.htm

FS - Northeastern Area
www.na.fs.fed.us

FS - Northern Research Station
www.nrs.fs.fed.us

FS - Pacific Northwest Research Station
www.fs.fed.us/pnw

FS - Rocky Mountain Research Station
www.fs.fed.us/rm

FS - San Dimas Technology & Development Center
www.fs.fed.us/eng/techdev/sdtcd.htm

FS - Southern Research Station
www.srs.fs.fed.us

Department of Commerce

National Institute of Standards and Technology
www.nist.gov

National Oceanic and Atmospheric Administration
www.noaa.gov

National Telecommunications and
Information Administration
www.ntia.doc.gov

NIST - Boulder Laboratories
www.boulder.nist.gov

NIST - Center for Advanced Cement-Based Materials
<http://acbm.northwestern.edu>

NOAA - Earth System Research Laboratory
www.esrl.noaa.gov

NOAA - Geophysical Fluid Dynamics Laboratory
www.gfdl.noaa.gov

NOAA - National Geophysical Data Center
www.ngdc.noaa.gov

NOAA - National Marine Fisheries Service -
Galveston Lab
<http://galveston.ssp.nmfs.gov>

NOAA - National Marine Fisheries Service -
Northeast Fisheries Science Center
www.nefsc.noaa.gov

NOAA - National Severe Storms Laboratory
www.nssl.noaa.gov

NOAA - Space Weather Prediction Center
www.swpc.noaa.gov

NTIA - Institute for Telecommunication Sciences
www.its.blrdoc.gov

Department of Defense

Air Force - 30th Space Wing
www.vandenberg.af.mil

Air Force - 311th Human Systems Wing
www.brooks.af.mil

Air Force - Aeronautical Systems Center
www.wpafb.af.mil

Air Force - Air Armament Center
www.eglin.af.mil

Air Force - Air Combat Command
www.acc.af.mil

Air Force - Air Mobility Battlelab
www.mcguire.af.mil/library/factsheets/factsheet.asp?id=4066

Air Force - Arnold Engineering
Development Center
www.arnold.af.mil

Air Force - Ogden Air Logistics Center
www.hill.af.mil

Air Force - Oklahoma City Air Logistics Center
www.tinker.af.mil/units/

Air Force - Space and Missile Systems Center
www.losangeles.af.mil

Air Force - Warner Robins Air Logistics Center
www.robins.af.mil

Air Force Academy
www.usafa.af.mil

Air Force Center for Environmental Excellence
www.afcee.af.mil

Air Force Civil Engineer Support Agency
www.afcesa.af.mil

Air Force Electronic Systems Center
<http://hanscom.af.mil>

Air Force Flight Test Center
www.edwards.af.mil

Air Force Information Operations Center
[www.8af.acc.af.mil/units/airforceinformationoperationscenter/
index.asp](http://www.8af.acc.af.mil/units/airforceinformationoperationscenter/index.asp)

Air Force Institute of Technology
www.afit.edu

Air Force Intelligence, Surveillance and
Reconnaissance Agency
www.afisr.af.mil

Air Force Logistics Management Agency
www.afhma.hq.af.mil

Air Force Office of Scientific Research
www.wpafb.af.mil/AFRL/afosr

Air Force Packaging Technology & Engineering Facility
www.wpafb.af.mil/units/afptef/index.asp

Air Force Research Laboratory
www.afrl.af.mil

Air Force Research Laboratory - Air Vehicles Directorate
www.wpafb.af.mil/afrl/rb

Air Force Research Laboratory - Directed Energy Directorate
www.kirtland.af.mil/afrl_de/

Air Force Research Laboratory - Human Effectiveness
Directorate
www.wpafb.af.mil/afrl/he

Air Force Research Laboratory–Information Directorate
www.rl.afrl.af.mil

Air Force Research Laboratory - Materials and
Manufacturing Directorate
www.wpafb.af.mil/afrl/rx

Air Force Research Laboratory - Munitions Directorate
www.eglin.af.mil/afrl_mn

Air Force Research Laboratory - Propulsion Directorate
www.wpafb.af.mil/afrl/rz

Air Force Research Laboratory - Sensors Directorate
www.wpafb.af.mil/afrl/sn

Air Force Research Laboratory - Space Vehicles Dir.
www.kirtland.af.mil/afrl_vs/

Air Force Research Laboratory - Space Vehicles
Directorate – Hanscom AFB
www.kirtland.af.mil/afrl_vs/

Air Force Weather Agency
www.afweather.af.mil

Army - Aberdeen Test Center
www.atc.army.mil

Army - Aeromedical Research Laboratory
www.usaarl.army.mil

Army - AMC - Aviation & Missile Command
http://ams15.redstone.army.mil:7443/pls/apws/apwsdba.apws_home

Army - AMRDEC - Aeroflightdynamics Directorate
www.redstone.army.mil/amrdec/RD&E/AFDD.html

Army - AMRDEC - Aviation Applied
 Technology Directorate
www.redstone.army.mil/amrdec/RD&E/AATD.html

Army - ARL - Aberdeen Proving Ground Site
www.arl.army.mil

Army - ARL - Adelphi Site
www.arl.army.mil

Army - ARL - Army Research Office
www.arl.army.mil/aro

Army - ARL - Vehicle Technology Directorate -
 Propulsion Program
www.arl.army.mil/vtd/vtcindex.html

Army - ARL - Vehicle Technology Directorate -
 Structures Program
www.arl.army.mil/vtd/vtcindex.html

Army - ARL - Weapons & Materials Directorate
www.arl.army.mil/wmrd

Army - Armament Research, Development, and
 Engineering Command
www.pica.army.mil/PicatinyPublic/organizations/ardec/index.asp

Army - Benet Laboratories
www.benet.wva.army.mil

Army - Center for AMEDD Strategic Studies
<https://cass.amedd.army.mil>

Army - Center for Environmental Health Research
<http://usacehr.amedd.army.mil>

Army - Clinical Investigation Regulatory Office
www.cs.amedd.army.mil/ciro

Army - Developmental Test Command
www.dtc.army.mil

Army - Dugway Proving Ground
www.dugway.army.mil

Army - Edgewood Chemical Biological Center
www.ecbc.army.mil

Army - Electronic Proving Ground
www.epg.army.mil

Army - Institute of Surgical Research
www.usaisr.amedd.army.mil

Army - Natick Soldier Research, Development
 & Engineering Ctr.
www.natick.army.mil/soldier/index.htm

Army - Redstone Technical Test Center
www.rttc.army.mil

Army - RDECOM - CERDEC - Night Vision and
 Electronic Sensors Directorate
www.nvl.army.mil

Army - Space & Missile Defense Command
www.smhc.army.mil

Army - Tank Automotive Research, Development
 & Engineering Center
<http://tardec.army.mil>

Army - Technology Integration Center
www.hqisec.army.mil/isec/directorates/tic/tic.asp

Army - TRADOC Analysis Center
www.trac.army.mil

Army - USACE - Engineer Research and Development Ctr.
www.erdc.usace.army.mil

Army - USACE - ERDC - Construction Engineering
 Research Laboratory
www.cecer.army.mil

Army - USACE - ERDC - Cold Regions Research and
 Engineering Laboratory
www.crrel.usace.army.mil

Army - USACE - ERDC - Information Technology Laboratory
<http://itl.erdc.usace.army.mil>

Army - USACE - ERDC - Coastal and Hydraulics
 Laboratory
<http://chl.erdc.usace.army.mil>

Army - USACE - ERDC - Environmental Laboratory
<http://el.erdc.usace.army.mil>

Army - USACE - ERDC - Geotechnical and Structures
 Laboratory
<http://gsl.erdc.usace.army.mil>

Army - USACE - Hydrologic Engineering Center
www.hec.usace.army.mil

Army - USACE - Institute for Water Resources
www.iwr.usace.army.mil

Army - USAMRMC - Telemedicine and Advanced
 Technology Research Center
www.tatrc.org

Army - Walter Reed Army Institute of Research
<http://wrair-www.army.mil>

Army - White Sands Missile Range
www.wsmr.army.mil/wsmr.asp

Army - Yuma Proving Ground
www.yuma.army.mil

Army Battle Command Battle Lab, Experimentation
 Division – Gordon
www.gordon.army.mil/bcblg

Army Communications-Electronics Command
www.monmouth.army.mil/CELCMC

Army Geospatial Center
www.agc.army.mil

Army Medical Materiel Development Activity
www.usammda.army.mil

Army Medical Research and Materiel Command
<https://mrmc.detrick.army.mil>

Army Research Institute for the Behavioral
 and Social Sciences
www.hqda.army.mil/ari

Army Medical Research Institute of Chemical Defense
<https://ccc.apgea.army.mil>

Army Medical Research Institute of Infectious Diseases
www.usamriid.army.mil

Army Research Institute of Environmental Medicine
www.usariem.army.mil

Army Tank-Automotive and Armaments Command
www.tacom.army.mil

Army Test & Evaluation Command
www.atec.army.mil

Defense Advanced Research Projects Agency
www.darpa.mil

Defense Information Systems Agency
www.disa.mil

DISA - Joint Interoperability Test Command
<http://jitc.fhu.disa.mil>

Defense Language Institute Foreign Language Center
www.dliflc.edu

Defense Microelectronics Activity
www.dmea.osd.mil

Defense Technical Information Center
www.dtic.mil

Marine Corps Installations West
www.mciwest.usmc.mil

Marine Corps Systems Command
www.marcorsyscom.usmc.mil

Missile Defense Agency
www.mda.mil

National Geospatial-Intelligence Agency
www.nga.mil

Naval Aerospace Medical Research Laboratory
www.namrl.navy.mil

Naval Air Systems Command
www.navair.navy.mil

Naval Air Warfare Center Aircraft Division - Lakehurst
www.navair.navy.mil/lakehurst/nlweb/index-non-flash.asp

Naval Air Warfare Center Aircraft Division -
Patuxent River
www.navair.navy.mil/nawcad

Naval Air Warfare Center Training Systems Division
<http://nawctsd.navair.navy.mil>

Naval Air Warfare Center Weapons Division -
China Lake and Pt. Mugu
www.navair.navy.mil/nawcwg

Naval Explosive Ordnance Disposal Technology Division
<http://eodtechdiv.nswc.navy.mil>

Naval Facilities Engineering Command
<https://portal.navfac.navy.mil>

Naval Facilities Engineering Service Center
<https://portal.navfac.navy.mil/NFESC>

Naval Health Research Center
www.med.navy.mil/sites/nhrc/Pages/default.aspx

Naval Medical Center - Portsmouth
www-nmcp.med.navy.mil

Naval Medical Center - San Diego
www.med.navy.mil/sites/nmcsd/Pages/default.aspx

Naval Medical Research Center
www.nmrc.navy.mil

Naval Postgraduate School
www.nps.edu

Naval Research Laboratory
www.nrl.navy.mil

Naval Safety Center
www.safetycenter.navy.mil

Naval Sea Systems Command
www.navsea.navy.mil

Naval Submarine Medical Research Laboratory
www.nhrc.navy.mil/nsmrl

Naval Surface Warfare Center - Carderock Division
www.dt.navy.mil

Naval Surface Warfare Center - Crane Division
www.crane.navy.mil

Naval Surface Warfare Center - Dahlgren Division
www.nswc.navy.mil

Naval Surface Warfare Center - Indian Head Division
www.ih.navy.mil

Naval Surface Warfare Center - Panama City Division
<http://nswcpc.navsea.navy.mil>

Naval Surface Warfare Center - Port Hueneme Division
www.phdnswc.navy.mil

Naval Undersea Warfare Center - Division Keyport
www-keyport.kpt.nuwc.navy.mil

Naval Undersea Warfare Center - Division Newport
www.nuwc.navy.mil/npt

Naval War College
www.nwc.navy.mil

Navy - National Naval Medical Center
www.bethesda.med.navy.mil

Navy - Naval Meteorology and Oceanographic
Command
www.navmetocom.navy.mil

Navy - Office of Naval Research
www.onr.navy.mil

Navy - Portsmouth Naval Shipyard
www.ports.navy.mil

Navy - Space and Naval Warfare Systems Center Atlantic
- Charleston
<http://enterprise.spawar.navy.mil/body.cfm?type=c&category=32&subcat=72>

Navy - Space and Naval Warfare Systems Ctr. Atlantic – New Orleans
<http://enterprise.spawar.navy.mil/body.cfm?type=c&category=31&subcat=115>

Navy - Space and Naval Warfare Systems Center Atlantic – Norfolk
<http://enterprise.spawar.navy.mil/body.cfm?type=c&category=30&subcat=64>

Navy - Space and Naval Warfare Systems Center Pacific
<http://enterprise.spawar.navy.mil/body.cfm?type=c&category=29&subcat=105>

Navy - U.S. Naval Academy
www.usna.edu

Navy - U.S. Naval Observatory
www.usno.navy.mil

Navy Clothing and Textile Research Facility
www.navy-nex.com/command/nctrf/nctrf-index.html

Uniformed Services University of the Health Sciences
www.usuhs.mil

U.S. Joint Forces Command
www.jfcom.mil

U.S. Transportation Command
www.transcom.mil

Department of Energy

Ames Laboratory
www.ameslab.gov

Argonne National Laboratory
www.anl.gov

Brookhaven National Laboratory
www.bnl.gov

Chicago Operations Office
www.ch.doe.gov

Fermi National Accelerator Laboratory
www.fnal.gov

Hanford Site
www.hanford.gov

Idaho National Laboratory
www.inl.gov

Kansas City Plant
www.kcp.com

Laboratory of Structural Biology and Molecular Medicine
www.doe-mpi.ucla.edu

Lawrence Berkeley National Laboratory
www.lbl.gov

Lawrence Livermore National Laboratory
www.llnl.gov

Los Alamos National Laboratory
www.lanl.gov

National Energy Technology Laboratory
www.netl.doe.gov

National High Magnetic Field Laboratory
www.nhmfl.gov

National Renewable Energy Laboratory
www.nrel.gov

Nevada Site Office
www.nv.doe.gov

New Brunswick Laboratory
www.nbl.doe.gov

Oak Ridge National Laboratory
www.ornl.gov

Oak Ridge Operations Office
www.oakridge.doe.gov

Office of Scientific & Technical Information
www.osti.gov

Pacific Northwest National Laboratory
www.pnl.gov

Pantex Plant
www.doeal.gov/pxso

Princeton Plasma Physics Laboratory
www.pppl.gov

Rocky Mountain Oilfield Testing Center
www.rmotc.doe.gov

Sandia National Laboratories
www.sandia.gov

Sandia National Laboratories – California
www.ca.sandia.gov

Savannah River National Laboratory
<http://srnl.doe.gov>

Stanford Linear Accelerator Center
www.slac.stanford.edu

Thomas Jefferson National Accelerator Facility
www.jlab.org

Y-12 National Security Complex
www.y12.doe.gov

Department of Health and Human Services
Centers for Disease Control and Prevention
www.cdc.gov

Food and Drug Administration
www.fda.gov

National Institutes of Health
www.nih.gov

CDC - National Center for HIV/AIDS, Viral Hepatitis,
STD, and TB Prevention
www.cdc.gov/nchhstp

CDC - Nat. Ctr. for Immunization and Respiratory Diseases
www.cdc.gov/ncird

CDC - National Center for Preparedness, Detection, and
Control of Infectious Diseases
www.cdc.gov/ncpcid

CDC - National Center for Zoonotic, Vector-Borne, and Enteric Diseases (ZVED)
www.cdc.gov/nczved

CDC - National Institute for Occupational Safety and Health
www.cdc.gov/niosh

CDC - NIOSH - National Personal Protective Technology Laboratory
www.cdc.gov/niosh/npptl

CDC - NIOSH - Pittsburgh Research Laboratory
www.cdc.gov/niosh/im-prl.html

CDC - NIOSH - Spokane Research Laboratory
www.cdc.gov/niosh/im-srl.html

CDC - NIOSH - Health Effects Laboratory Division
www.cdc.gov/niosh/im-held.html

FDA - Center for Biologics Evaluation and Research
www.fda.gov/cber

FDA - Center for Devices and Radiological Health
www.fda.gov/cdrh

FDA - Center for Drug Evaluation and Research
www.fda.gov/cder

FDA - Center for Veterinary Medicine
www.fda.gov/cvm

FDA - Center for Food Safety and Applied Nutrition
www.cfsan.fda.gov/list.html

FDA - National Center for Toxicological Research
www.fda.gov/nctr

NIH - Center for Information Technology
www.cit.nih.gov

NIH - Clinical Center
www.cc.nih.gov

NIH - Fogarty International Center
www.fic.nih.gov

NIH - National Cancer Institute
www.cancer.gov

NIH - National Center for Complementary and Alternative Medicine
<http://nccam.nih.gov>

NIH - National Center for Research Resources
www.ncrr.nih.gov

NIH - National Eye Institute
www.nei.nih.gov

NIH - National Heart, Lung, and Blood Institute
www.nhlbi.nih.gov

NIH - National Human Genome Research Institute
www.genome.gov

NIH - National Institute of Allergy and Infectious Diseases
www.niaid.nih.gov

NIH - National Institute of Arthritis and Musculoskeletal and Skin Diseases
www.niams.nih.gov

NIH - National Institute of Biomedical Imaging and Bioengineering
www.nibib.nih.gov

NIH - National Institute of Child Health and Human Development
www.nichd.nih.gov

NIH - Nat. Institute of Dental and Craniofacial Research
www.nidcr.nih.gov

NIH - Nat. Institute of Diabetes, Digestive and Kidney Diseases
www.niddk.nih.gov

NIH - National Institute of Environmental Health Sciences
www.niehs.nih.gov

NIH - National Institute of General Medical Sciences
www.nigms.nih.gov

NIH - National Institute of Mental Health
www.nimh.nih.gov

NIH - National Institute of Neurological Disorders and Stroke
www.ninds.nih.gov

NIH - National Institute of Nursing Research
www.ninr.nih.gov

NIH - National Institute on Aging
www.nia.nih.gov

NIH - Nat. Institute on Alcohol Abuse and Alcoholism
www.niaaa.nih.gov

NIH - National Institute on Deafness and Other Communication Disorders
www.nidcd.nih.gov

NIH - National Institute on Drug Abuse
www.nida.nih.gov

NIH - National Library of Medicine
www.nlm.nih.gov

NIH - Office of Research Services
www.ors.od.nih.gov

NIH - Rocky Mountain Laboratories
<http://www3.niaid.nih.gov/about/organization/dir/rml>

Department of Homeland Security
 Coast Guard R&D Center
www.uscg.mil/hq/cg9/rdc/default.asp

Environmental Measurements Laboratory
www.eml.st.dhs.gov

National Biodefense Analysis and Countermeasures Center
www.dhs.gov/xres/labs/gc_1166211221830.shtm

Plum Island Animal Disease Center
www.dhs.gov/xres/labs/editorial_0901.shtm

Transportation Security Laboratory
www.dhs.gov/xres/labs/editorial_0903.shtm

Department of the Interior

Bureau of Reclamation
www.usbr.gov

U.S. Geological Survey
www.usgs.gov

BR - Water Quality Improvement Center
www.usbr.gov/lc/yuma/facilities/wqic/yao_facilities_wqic.html

USGS - Alabama Water Science Center
<http://al.water.usgs.gov>

USGS - Alaska Science Center
<http://alaska.usgs.gov>

USGS - Arizona Water Science Center
<http://az.water.usgs.gov>

USGS - Arkansas Water Science Center
<http://ar.water.usgs.gov>

USGS - Astrogeology Research Program
<http://astrogeology.usgs.gov>

USGS - Biological Resources Discipline - Central Regional Office
<http://biology.usgs.gov/cro/>

USGS - Biological Resources Discipline -
Western Regional Office
<http://biology.usgs.gov/wro>

USGS - California Water Science Center
<http://ca.water.usgs.gov>

USGS - Caribbean Water Science Center
<http://pr.water.usgs.gov>

USGS - Colorado Water Science Center
<http://co.water.usgs.gov>

USGS - Columbia Environmental Research Center
www.cerc.usgs.gov

USGS - Florida Integrated Science Center
<http://fisc.er.usgs.gov>

USGS - FISC - Center for Coastal and Watershed Studies
<http://coastal.er.usgs.gov>

USGS - FISC - Water Resources of Florida - Tallahassee
<http://fl.water.usgs.gov>

USGS - Forest and Rangeland Ecosystem Science Center
<http://fresc.usgs.gov>

USGS - Georgia Water Science Center
<http://ga.water.usgs.gov>

USGS - Great Lakes Science Center
www.glsc.usgs.gov

USGS - Idaho Water Science Center
<http://id.water.usgs.gov>

USGS - Illinois Water Science Center
<http://il.water.usgs.gov>

USGS - Indiana Water Science Center
<http://in.water.usgs.gov>

USGS - Iowa Water Science Center
<http://ia.water.usgs.gov>

USGS - Kansas Water Science Center
<http://ks.water.usgs.gov>

USGS - Kentucky Water Science Center
<http://ky.water.usgs.gov>

USGS - Louisiana Water Science Center
<http://la.water.usgs.gov>

USGS - Maine Water Science Center
<http://me.water.usgs.gov>

USGS - Maryland-Delaware-District of Columbia Water
Science Center
<http://md.water.usgs.gov>

USGS - Massachusetts/Rhode Island Water Science
Center
<http://ma.water.usgs.gov>

USGS - Michigan Water Science Center
<http://mi.water.usgs.gov>

USGS - Minnesota Water Science Center
<http://mn.water.usgs.gov>

USGS - Mid-Continent Ecological Science Center
www.mesc.usgs.gov

USGS - Mississippi Water Science Center
<http://ms.water.usgs.gov>

USGS - Missouri Water Science Center
<http://mo.water.usgs.gov>

USGS - Montana Water Science Center
<http://mt.water.usgs.gov>

USGS - National Wetlands Research Center
www.nwrc.usgs.gov

USGS - National Wildlife Health Center
www.nwhc.usgs.gov

USGS - Nebraska Water Science Center
<http://ne.water.usgs.gov>

USGS - Nevada Water Science Center
<http://nevada.usgs.gov/water>

USGS - New Hampshire/Vermont Water Science Center
<http://nh.water.usgs.gov>

USGS - New Jersey Water Science Center
<http://nj.usgs.gov>

USGS - New Mexico Water Science Center
<http://nm.water.usgs.gov>

USGS - New York Water Science Center
<http://ny.water.usgs.gov>

USGS - North Carolina Water Science Center
<http://nc.water.usgs.gov>

USGS - North Dakota Water Science Center
<http://nd.water.usgs.gov>

USGS - Northern Prairie Wildlife Research Center
www.npwrc.usgs.gov

USGS - NWHC - Honolulu Field Station
www.nwhc.usgs.gov/hfs/Homepage.htm

USGS - Ohio Water Science Center
<http://oh.water.usgs.gov>

USGS - Oklahoma Water Science Center
<http://ok.water.usgs.gov>

USGS - Oregon Water Science Center
<http://or.water.usgs.gov>

USGS - Pennsylvania Water Science Center
<http://pa.water.usgs.gov>

USGS - South Carolina Water Science Center
<http://sc.water.usgs.gov>

USGS - Tennessee Water Science Center
<http://tn.water.usgs.gov>

USGS - Texas Water Science Center
<http://tx.usgs.gov>

USGS - Utah Water Science Center
<http://ut.water.usgs.gov>

USGS - Virginia Water Science Center
<http://va.water.usgs.gov>

USGS - Upper Midwest Environmental Science Center
www.umesc.usgs.gov

USGS - Wisconsin Water Science Center
<http://wi.water.usgs.gov>

USGS - Cascades Volcano Observatory
<http://vulcan.wr.usgs.gov>

USGS - Washington Water Science Center
<http://wa.water.usgs.gov>

USGS - Western Fisheries Research Center
<http://wfrc.usgs.gov>

USGS - West Virginia Water Science Center
<http://wv.usgs.gov>

USGS - Wyoming Water Science Center
<http://wy.water.usgs.gov>

Department of Justice
Federal Bureau of Investigation
www.fbi.gov



Department of Labor

Mine Safety and Health Administration
www.msha.gov

Department of Transportation

Civil Aerospace Medical Institute
www.faa.gov/about/office_org/headquarters_offices/avs/offices/aam/cami/

Transportation Technology Center
www.fra.dot.gov

Turner-Fairbanks Highway Research Center
www.tfhrc.gov

Volpe National Transportation Systems Center
www.volpe.dot.gov

William J. Hughes Technical Center
www.faa.gov/about/office_org/headquarters_offices/ato/tc/

Department of Veterans Affairs

Atlanta VA Rehabilitation Research and Development Center
http://www.research.va.gov/programs/tech_transfer

Rehabilitation Research & Development Service
http://www.research.va.gov/programs/tech_transfer

Environmental Protection Agency

National Center for Computational Toxicology
www.epa.gov/comptox/

National Center for Environmental Research
<http://es.epa.gov/ncer>

National Exposure Research Laboratory
www.epa.gov/nerl

National Health and Environmental Effects Research Lab
www.epa.gov/nheerl

National Homeland Security Research Center
www.epa.gov/nhsrc

National Risk Management Research Laboratory
www.epa.gov/ord/nrmrl

Office of Science and Policy
www.epa.gov/osp

NASA

Ames Research Center
www.arc.nasa.gov

Dryden Flight Research Center
www.nasa.gov/centers/dryden/home/index.html

Glenn Research Center
www.nasa.gov/centers/glenn/home/index.html

Goddard Space Flight Center
www.nasa.gov/centers/goddard/home/index.html

Jet Propulsion Laboratory
www.jpl.nasa.gov

Johnson Space Center
www.nasa.gov/centers/johnson/home/index.html

Kennedy Space Center
www.nasa.gov/centers/kennedy/home/index.html

Langley Research Center
www.larc.nasa.gov

Marshall Space Flight Center
www.nasa.gov/centers/marshall/home/index.html

Stennis Space Center
www.nasa.gov/centers/stennis/home/index.html

National Science Foundation

Advanced Technology for Large Structural Systems Center
www.atlss.lehigh.edu

Brigham Young University
www.byu.edu

Institute for Systems Research
www.isr.umd.edu

National Center for Atmospheric Research
www.ncar.ucar.edu

National Science Foundation
www.nsf.gov

National Security Agency
National Information Assurance Research Laboratory
www.nsa.gov/research/ia_research/index.shtml

National Security Agency
www.nsa.gov

Tennessee Valley Authority
Tennessee Valley Authority
www.tva.gov

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