

Army Technology Transfer Program 2021 Annual Report

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Science and technology collaborations in support of Army modernization

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Contents

4	Science and Technology Collaborations in Support of Army Modernization
5	Army Leadership Welcome
6	Army Technology Transfer (T2) Enterprise
8	T2-Designated Laboratories and Centers Available for Partnership
10	2021 Army Technology Transfer Metrics
11	Cooperative Research and Development Agreements (CRADA)
12	Educational Partnership Agreements (EPA)
13	Partnership Intermediary Agreements (PIA)
14	Commercial Test Agreements (CTA)
15	Intellectual Property (IP) and Patent License Agreements (PLA)
16	FY21 Army Technology Transfer Program Success Stories
29	Our Federal Partners
31	FY21 T2 Awards – Army Winners

38 Acronyms



Science and Technology Collaborations in Support of Army Modernization

Technology transfer (T2) uses a variety of agreement mechanisms for partnering with commercial, academic, or other private entities. These agreements leverage technologies created or used in laboratories and technical centers, and include cooperative research and development agreements (CRADAs), patent license agreements, testing agreements, educational partnership agreements, and other agreements. T2 collaborations enhance Army's research, development, test, and engineering capabilities by leveraging the private capital of the partner, including but not limited to, personnel, services, facilities, equipment, intellectual property, or resources. T2 is vital to the Army's mission of developing new technologies and promoting technology commercialization as the Army seeks to modernize and maintain its technological advantage. Public-Private collaborations offer an innovative approach to modernization.

The Army science and technology (S&T) program is guided by and aligned to higher level Army, Department of Defense (DoD) and National strategies and policies. The Army executes an investment strategy that delivers technology enabling force modernization. To support this effort, the Army is aligning its research centers and laboratories to priority modernization efforts and emphasizing public-private collaborations. The Army's six modernization priorities (i.e., Long Range Precision Fires (LRPF); Next Generation Combat Vehicle (NGCV); Future Vertical Lift (FVL); Network; Air and Missile Defense (AMD); and Soldier Lethality) will drive materiel development for the Multi-Domain Operations (MDO) capable force. Eight Army priority research areas advance Army modernization through discovering, developing, and proving state of the art technologies. These priority research areas include: disruptive energetics; Radio Frequency (RF) electronic materials; quantum; hypersonic flight; artificial intelligence (AI); autonomy; synthetic biology; material by design; and science of additive manufacturing. S&T collaborations allow Army laboratories to leverage private research investments in these game changing technologies.

Technological advantage is achieved not only by procuring the most advanced or sophisticated weapons systems, but also by investing in development of promising technologies for the Warfighter, aiding in exploration of emerging capabilities through experimentation and prototyping, and adaptation of relatively mature foundational technologies to improve current system capabilities. These efforts are all enhanced by engaging private partners in research, development, testing, and engineering partnerships and collaborative activities, which adds expertise, augments capabilities, enhances facilities, and provides resources for the exploration of emerging technologies. Additionally, T2 collaborations can leverage commercial interest in technologies developed in Army laboratories through patent license agreements, which include business plans to mature the patented invention into a manufactured commercial product that can be used or adapted for military purposes.



Science and Technology Collaborations in Support of Army Modernization



Army Leadership Welcome

"By leveraging the national investment in research and development (R&D) through collaboration, technology transfer enhances the Army's R&D capabilities, and speeds up the process toward the development of a product, a capability or an operational upgrade."

- Honorable Douglas Bush,

Assistant Secretary of the Army (Acquisition, Logistics, and Technology)

"The Army science and technology (S&T) enterprise identifies, develops, and demonstrates technology options that inform and enable effective and affordable capabilities for the Warfighter. Technology transfer enhances the Army research, development, test, and evaluation ecosystem through collaborative agreements with industry and academic partners."

– **Mr. William Nelson**, Deputy Assistant Secretary of the Army (Research and Technology)

"The Army Technology Transfer Program (ATTP) supports the Army in achieving its mission by combining the Army's research, development, test, and evaluation resources, capabilities, and knowledge with those of our academic and industry partners in order to deliver technologies through various partnership mechanisms like cooperative research and development agreements (CRADAs). These partnerships are essential to ensuring that the Army is positioned for discovery and maturation of critical technologies. The ATTP also promotes and supports the transfer of intellectual property (IP) from the laboratory to the private sector for the benefit of both the Army and the nation by offering Army's IP to industry through patent or software licensing agreements."

> – **Dr. Ellen Holthoff,** Army Director for Technology Transfer







Army T2 Enterprise

The Assistant Secretary of the Army (Acquisition, Logistics, and Technology) (ASA(ALT)) is the Office of Primary Responsibility (OPR) for the Army Technology Transfer Program (ATTP) and is responsible for Department of the Army policy and guidance regarding all technology transfer activities. These responsibilities have been delegated to the Deputy Assistant Secretary of the Army (Research and Technology) (DASA(R&T)).

The Army Director for Technology Transfer (ADTT) resides in the office of the DASA(R&T) and serves as the Army agency representative in all matters concerning T2. The ADTT monitors the ATTP to ensure compliance with DoD T2 policy and law, provides policy guidance on T2, and presides over the Army Laboratory Quality Enhancement Program (A-LQEP) T2 subpanel. The A-LQEP T2 subpanel is chartered to improve the productivity, effectiveness, and impact of the ATTP. This subpanel enhances Army T2 through policy input and feedback, providing legal clarifications, resolving business questions, and sharing best practices to optimize the impacts of S&T collaborations on Army modernization. The A-LQEP T2 subpanel leverages the various Army and DoD T2 partnership authorities in order to most efficiently meet the needs of the modernization enterprise.

The laboratory commanders or directors have the responsibility and the authority to enter into cooperative research and development agreements (CRADAs) and to license, assign, or waive rights to intellectual property developed by the organization. Each Army T2-designated laboratory has an Office of Research and Technology Applications (ORTA). ORTAs participate in the A-LQEP T2 subpanel. ORTAs are the essential focal point for collaborations between federal laboratories and external partners.



POLICY, BUDGET AND OVERSIGHT



OPERATIONAL AND S&T PROGRAM EXECUTION



T2-Designated Laboratories and Centers Available for Partnership

U.S. ARMY MEDICAL RESEARCH AND DEVELOPMENT COMMAND (MRDC)

Headquarters	Maryland
U.S. Army Aeromedical Research Laboratory (USAARL)	Alabama
U.S. Army Institute of Surgical Research (USAISR)	Texas
U.S. Army Medical Materiel Development Activity (USAMMDA)	Maryland
U.S. Army Medical Research Institute of Chemical Defense (USAMICD)	Maryland
U.S. Army Medical Research Institute of Infectious Diseases (USARIID)	Maryland
U.S. Army Research Institute of Environmental Medicine (USARIEM)	Massachusetts
Telemedicine and Advanced Technology Research Center (TATRC)	Maryland
Walter Reed Army Institute of Research (WRAIR)	Maryland
U.S. Army Medical Research Directorate (USAMRD)	Washington



U.S. ARMY ENGINEER RESEARCH AND DEVELOPMENT CENTER (ERDC)

Headquarters	Mississippi
Coastal and Hydraulics Laboratory (CHL)	Mississippi
CHL Field Research Facility	North Carolina
CHL Joint Airborne Lidar Bathymetry	Mississippi
Technical Center of Expertise Research and Engineering Laboratory CRREL)	Cold Regions New Hampshire
CRREL Alaska Research Office	Alaska
Construction Engineering Research	Illinois
Laboratory (CERL) Environmental Laboratory (EL)	Mississippi
EL Lewisville Aquatic Ecosystem	Texas
Research Facility Geospatial Research Laboratory (GRL)	Virginia
Geotechnical and Structures Laboratory (GSL)	Mississippi
GSL Treat Island Natural Weather Station	Maine
Information Technology Laboratory (ITL)	Mississippi

U.S. ARMY SPACE AND MISSILE DEVELOPMENT COMMAND TECHNICAL CENTER (SMDTC)

Alabama

U.S. ARMY RESEARCH INSTITUTE FOR THE BEHAVIORAL AND SOCIAL SCIENCES (ARI)

ARI Fort Benning Research Unit (Institutional Training)	Georgia
ARI Fort Leavenworth Research Unit (Leader Development)	Georgia
ARI Fort Hood Research Unit (Unit Training)	Texas

ARMY ANALYTICS GROUP (AAG) California



U.S. ARMY MEDICAL CENTER Texas OF EXCELLENCE (MEDCoE)



U.S. ARMY COMBAT CAPABILITIES DEVELOPMENT COMMAND (DEVCOM)

Headquarters	Maryland
Armaments Center (AC)	New Jersey
AC Watervliet Arsenal	New York
AC Benét Laboratories	New York
AC Firing Tables and Ballistics Division	Maryland
AC Rock Island Arsenal	Illinois
Army Research Laboratory (ARL)	Maryland
ARL Army Research Office	North Carolina
ARL White Sands Missile Range	New Mexico
ARL Central	Illinois
ARL Northeast	Massachusetts
ARL South	Texas
ARL West	California
Aviation and Missile Center (AvMC)	Alabama
AvMC Aeroflightdynamics Directorate	California
AvMC Aviation Applied Technology Directorate	Virginia
AvMC Joint Research Program Office	Virginia
AvMC Maintenance Engineering Division	Texas
AvMC Aviation Engineering Directorate	Texas
AvMC Systems Simulation, Software & Integration Directorate	Colorado
Chemical Biological Center (CBC)	Maryland
CBC Pine Bluff Arsenal	Arkansas
CBC Rock Island Arsenal	Illinois
CBC Dugway Proving Ground	Utah
Command, Control, Computers, Communications, Cyber, Intelligence, Surveillance, and Reconnaissance Center (C5ISR)	Maryland
Data and Analysis Center (DAC)	Maryland
Ground Vehicle Systems Center (GVSC)	Michigan
GVSC Occupant Protection Laboratory	Michigan
GVSC Bridging Simulation Laboratory	Michigan
GVSC Freshwater Treatment and Test Facility	Michigan
GVSC Army Petroleum Laboratory	Pennsylvania
GVSC Fuels and Lubricants Research Facility at Southwest Research Institute	Texas
GVSC Rapid Evaluation Capability	Michigan
Soldier Center (SC)	Massachusetts
SC Simulation and Training Technology Center (STTC)	Florida

Army T2 Enterprise

2021 Army Technology Transfer Metrics

Technology transfer facilitates the practical application of Army research directly through the transfer of laboratory results and by providing non-federal entities opportunities to establish strategic partnerships with Army laboratories for sharing information, resources, and personnel. Industry and academic partners can engage with the Army in many ways, including CRADAs, Educational Partnership Agreements (EPAs), Partnership Intermediary Agreements (PIAs), Intellectual Property/Patent License Agreements (IP/PLAs), and Commercial Test Agreements (CTAs). The Army engages in the following Army T2 mechanisms with a variety of partners.



Cooperative Research and Development Agreements (CRADAs)

A Cooperative Research and Development Agreement (CRADA) allows the laboratory and the partner to provide personnel, services, facilities, equipment, intellectual property, or other resources with or without reimbursement (funds are not paid to the non-federal party) toward the conduct of specified research or development efforts consistent with the mission of the laboratory. CRADAs may not include a procurement contract or cooperative agreement. CRADAs provide an easy way for private partners to collaborate with Army laboratories. Both the Army and the partner may benefit from a CRADA in a variety of ways. In FY21, Army laboratories reported 1,904 active CRADAs, including 413 newly executed CRADAs. Army laboratories reported over \$100M in CRADA revenue over the past three years.

BENEFITS TO THE ARMY AND PARTNERS:

- Accelerate technology maturation;
- Solve specific technical challenges;
- Access to Army laboratory facilities and equipment;
- Mutually beneficial discovery and innovation;
- Create new teams and professional connections;
- Reduce technical risk of new technology development;
- Leverage external expertise, ideas, investment and resources;
- Protects IP for patenting;
- Expands the defense industrial base to include non-traditional defense contractors;
- Leverage commercialization potential of inventions developed under the CRADA;
- Access to partner's means of advanced development, manufacturing, and commercialization; and
- Share resources and capabilities to accelerate technology development and defray R&D costs.





Educational Partnership Agreements (EPAs) allow Army laboratories to partner with educational institutions and academic researchers. In FY21, Army laboratories reported over 250 active EPAs.

BENEFITS TO THE ARMY:

- Loan or allow students and faculty to the use of laboratory equipment and facilities
- Cultivate educational and research opportunities in STEM programs relevant to Army S&T programs;
- Involve faculty and students as an extension of resources to Army laboratories to solve essential Army challenges; and
- Provide academic teaching opportunities for Army scientists and engineers to recruit talent and to leverage academic research methods to solve Army challenges.

USE CASES FOR ACADEMIC PARTNERS:

- Provide technical assistance to academic institutions which can enhance teaching and research;
- Involve students and faculty in research projects side by side with Army scientists and engineers;
- Receive loaned or transferred surplus Army scientific equipment for student and faculty for academic research; and
- Aid in the educational experience of students of all levels by providing a mechanism by which those can benefit from the staff expertise and unique facilities and equipment at Army laboratories.





A Partnership Intermediary Agreement (PIA) is an agreement between an Army laboratory and an agency or entity funded or chartered by state or local government. A partnership intermediary engages in activities to increase the likelihood of successful partnering between Army laboratories and non-government organizations. In FY21, Army laboratories reported seven active PIAs.

BENEFITS TO THE ARMY:

- Market Army technologies and capabilities;
- Conduct outreach events;
- Perform market research for Army-developed technologies;
- Find licensees and assist them with business plans;
- Increase technology transfer to commercial partners and technology transition to Army customers; and
- Advocate, connect, inform, and facilitate linkage to manufactures, small businesses, apprentice programs, etc.

USE CASES FOR NON-FEDERAL ENTITIES:

- Facilitate an understanding of Army needs and interests;
- Find partners to leverage Army technologies and promote technology licensing and CRADA opportunities;
- Research and evaluate markets, help create opportunities for designs and prototypes of Army technology and promote manufacturing capabilities; and
- Facilitate the brokering of license agreements between the Army laboratories and industry, academia, and non-profits.





Commercial Test Agreements (CTAs) allow Army laboratories to provide testing services for a fee to a private partner. CTAs provide access to unique, world-class Army laboratories and test capabilities and facilities. The Army averages over 500 CTAs a year and averaged \$18M in CTA revenue in the last three years.

BENEFITS TO THE ARMY:

- Reduces costs by providing facilities or services for a fee;
- May transfer test materials, equipment, models, computer software, data and other technologies;
- Increased return from equipment and facilities investments; and
- Government purpose use of the testing data.

USE CASES FOR NON-FEDERAL ENTITIES:

- Access to unique test facilities and equipment;
- Access to Army expertise through test feasibility; developing test requirements; conducting test planning, scheduling, and budgeting; designing, building, and installing test hardware and equipment; and acquiring, processing, and analyzing test data;
- Army laboratory may provide samples, drawings, information, equipment, materials;
- Results of tests performed under a CTA are confidential and will not be disclosed to third parties without the consent of the customer; and
- Use of resources is on a noninterference basis of the laboratory supporting its mission and must not constitute undue competition with the private sector.





Intellectual Property (IP) and Patent License Agreements (PLAs)

Army laboratories generate intellectual property (IP) by recognizing, identifying, reporting, and filing for patent protection for government use or to license to commercial partners where possible. IP plays an important role in the Army's ability to modernize its weapons systems, maintain technological overmatch, and support long-term sustainment. The Army laboratories have established policies for the creation, protection, use, maintenance, and licensing of IP. Patent License Agreements (PLAs) are an important mechanism for commercializing inventions developed in Army laboratories. Each Army laboratory maintains a collection of patents covering inventions by its scientists and engineers. When licensed and commercialized, the inventions benefit consumers with new or improved products. Royalties are shared by the inventors and the Army laboratory. In FY21, Army laboratories reported 131 new invention disclosures, 153 patent applications filed, 135 patents issued, and 1,595 active patents. In FY21, Army laboratories reported 233 active licenses, 22 new licenses, and over \$3M in total income on all active licenses.

BENEFITS TO THE ARMY:

- Leverage commercial interest in Army technologies resulting in private investment for further development and commercialization;
- Benefit from products made by industry from technology licensed by the Army–a sizable number of Army license agreement result in military sales;
- Contribute to U.S. economic growth and impact new job creation. For example, a recent economic impact study reported sales from Army license agreements exceeding \$6 billion; and
- Royalties are shared between the inventor and the laboratory.

USE CASES FOR LICENSEES:

FISCAL

- Profits and sales of new products and services, including both commercial and U.S. military sales;
- Potential for outside investment funding directly related to the licensed Army technology; and
- Potential royalties from sublicensing the licensed Army technology.





New Invention Patent Applications



Patents



Total Active



Active	License
Agree	ments

YEAR	Disclosures	Filed	Issued	Patents	Agreements
FY19	179	193	148	1,584	119 / \$2.1M Income
FY20	178	196	166	1,709	204 / \$2.5M Income
FY21	131	153	135	1,595	233 / \$3.1M Income



FY21 Army Technology Transfer Program Success Stories

T2 agreements help to leverage shared research interests, capabilities, expertise and identify research products (e.g., inventions, innovations, knowledge) which may have commercial or public value. The success stories that follow in this report provide examples of how T2 is supporting Army modernization.

Army Experts Help DHS Develop Standoff Chemical Detection Capability

by Richard Arndt, CBC DEVCOM, Public Affairs

March 3, 2021

Researchers at the U.S. Army's Combat Capabilities Development Command Chemical Biological Center (DEVCOM CBC) have lent their expertise to the Department of Homeland Security (DHS) in a new standoff chemical detection effort.

Electrical engineer Dr. Phillip Wilcox and research chemist Dr. Jason Guicheteau, from the Center's physical science division, were charged with the task of helping DHS expand their threat target library for a device that DHS will be using in their handheld standoff chemical detection (HSCD) pilot program. To achieve the mission, Guicheteau and Wilcox added chemicals that they have done extensive research on over the years to the DHS library, allowing HSCD devices to recognize hazardous chemicals from a





distance which, separates users from potential chemical threats in the field. In this case, that instrument is the Pendar X10 device, a HSCD device. The goal of standoff detection is to identify hazardous chemicals from a safe distance. For example, a HAZMAT team enters a location where they suspect a threat. The team uses a HSCD, which is reminiscent of a cordless drill. In a swift motion, they simply point and shoot. The device emits a laser beam which indicates what chemicals are in the area. The technology can be used to detect illicit drugs or chemical threats and can be used by an operator in a handheld fashion or mounted on an unmanned ground vehicle.

Wilcox and Guicheteau's reputation in the field of standoff chemical detection precedes them. In addition to DHS, Wilcox and Guicheteau have collaborated with Special Operations Command and the Joint Program Office for Chemical, Biological, Radiological and Nuclear Defense. Together they have many years of experience and a broad knowledge of general spectroscopy, making them the obvious choice to collaborate with DHS on this project. "Multiple DHS operational customers participating in our pilot effort will benefit from the work of Dr. Guicheteau and Dr. Wilcox. Their efforts, and those of the CBC in general, are much appreciated," said Scott W. Jansson, DHS's deputy assistant secretary for systems support.

Guicheteau noted that it's rewarding to be involved in the development of technologies that help to protect Soldiers. "As part of the spectroscopy branch in the Center's physical science division, we have a long history in optical spectroscopy detection work," he said. "A lot of technologies have come through our door with collaborative partnerships with academia, small and large business, as well as other government agencies. We see early prototypes of these technologies and we get to be on the front lines of helping them develop so that they become solutions that deliver a capability to first responders or warfighters."

In December, DHS received one of the prototype systems for their pilot program. They validated the system to ensure that the library data collected works and can detect the materials. Later this year, full acceptance testing will be performed to ensure that the 20 units delivered by the commercial vendor under the pilot program are functional and meet DHS's requirements.

According to Wilcox, one of the main takeaways that the team gathered from this collaborative experience is the significance of working closely with users in the field. They were able to directly consult with users to assess their needs and potential hazards they might encounter. "We're able to take user requirements and translate them into what is scientifically possible," he said. "It's very easy to be a lab person and get stuck in the science mindset of a project, so it's nice to have feedback from the user to understand that we are using our abilities to solve their problems."

Original Article: <u>https://www.cbc.devcom.army.mil/newspost/army-experts-help-dhs-develop-standoff-chemical-detection-capability/</u>



Mortar Systems Keep Pace with Modernization Efforts

by Ed Lopez, Picatinny Arsenal Public Affairs

February 16, 2021

PICATINNY ARSENAL, N.J. -- While much attention has focused on the U.S. Army's ability to achieve greater distances with artillery and missiles, mortar systems are also keeping pace with technology advances.

When it comes to a relatively close fight with the enemy, mortars have a variety of advantages that over the years have made them a warhorse of warfare, with capabilities that have inspired the name "infantryman's artillery."

Improving mortars involves several areas: greater responsiveness, survivability, range and accuracy. This is accomplished through increased automation of fires and adding Soldier protection when possible. The use of



digital fire-control helps to both reduce human error and increase accuracy.

As part of the Army's ongoing drive to improve mortar systems, the Armaments Center has signed a Cooperative Research and Development Agreement, or CRADA, with Finnish company Patria Land Oy to determine the feasibility of incorporating its new mortar (NEMO) technology into U.S. systems.

Under the agreement, the Army will assess the Patria NEMO's compatibility with U.S. mortar fire control systems, as well as evaluate the use of, and potential range increase, of the current U.S. 120mm mortar ammunition in the longer, breech-loaded NEMO barrel.

The assessment continues the Army's effort to provide Armored and Stryker Brigade Combat Teams with rapid, precise indirect and direct fire capability, along with protecting the operating crew and greatly reducing its physical burdens.

"The agreement between the U.S. Army and Patria exemplifies the capability leap that modern turreted mortar systems can introduce to armed forces and illustrates Patria's leading role in this technology area," said Jussi Järvinen, President of Patria's Land Business Unit. "It is also logical continuation to the cooperation between Patria and the U.S. government that began with Patria NEMO sales to a third country through a Foreign Military Sales program."

Original Article: <u>https://www.army.mil/article/243395/mortar_systems_keep_pace_with_modernization_efforts</u>



Research Agreement Propels US Army's Push to Extend Artillery Range

by Ed Lopez, Picatinny Arsenal Public Affairs

March 23, 2021

PICATINNY ARSENAL, N.J. -- As part of the ongoing drive to increase the range of cannon artillery, the U.S. Army has signed a Cooperative Research and Development Agreement, or CRADA, with a German defense company that, along with several objectives, may inform the Army's development path for the XM654 "supercharge" propellant.

The agreement is between Rheinmetall Waffe Munition GMBH, a subsidiary firm of the leading European defense company Rheinmetall, and the U.S. Army Combat Capabilities Development Command, known as DEVCOM, Armaments Center, located at Picatinny Arsenal, New Jersey.

The Armaments Center is the Army's primary researcher, developer and sustainer of current and future armament and munitions systems. The center is part of the Army Futures Command and plays a role in seve



part of the Army Futures Command and plays a role in several ongoing Army modernization initiatives.

"With this agreement, we expect to leverage the knowledge and expertise of both parties to evaluate other technology options that may potentially aid in achieving our goals and lay the groundwork for other future collaboration," said Anthony Sebasto, Executive Director, Enterprise and Systems Integration Center, which is part of the Armaments Center.

The objective of this CRADA is to evaluate the interior ballistics and resulting range performance of the Rheinmetall Nitrochemie 19L Extended Range Top Charge, or ERTC, and the 23L ERTC when fired from a U.S. weapon system with U.S. projectiles, with the goal to achieve or exceed existing range requirements. The 19L and 23L ERTCs are designed for 155mm artillery, 39 caliber and 52 caliber systems, respectively.

Through this CRADA, the Armaments Center continues to investigate and forecast technological advancements and impacts of emerging technologies. The goal is to provide future commanders with a wide range of long-range options, part of the Army's goal to stay ahead of emerging challenges to national security

Original Article: <u>https://www.army.mil/article/244523/research agreement propels us armys push to extend artillery</u> range



DEVCOM Decontaminant Thrives after Patent License Agreement

by DEVCOM CBC Public Affairs

June 3, 2021

ABERDEEN PROVING GROUND, MD -- The U.S. Army Combat Capabilities Development Command Chemical Biological Center (DEVCOM CBC) recently marked two years since the original patent license agreement of a decontamination innovation that has proven beneficial to both the warfighter and first responders.

In February 2019, the CBC Technology Transfer Office, Center scientists and their commercial partner, MQM Solutions Inc., successfully received a patent license, signed a cooperative research and development agreement (CRADA) followed



by laboratory testing and commercialized the Solid Decontamination (DECON) Blend. Originally patented by the late George Wagner, research chemist with the Center's filtration team, the unique DECON Blend can be transported as a dry concentrate, saving space and weight. It can be mixed with water at the time of use to provide an effective decontamination solution for use against chemical and biological agents. The DECON Blend can be prepared using a wide range of water types including drinking water, river/lake water or sea water and is an effective decontaminant for use against harmful chemical and biological agents.

According to Kevin Morrissey, supervisory chemist in the Center's decontamination sciences branch, the DECON Blend can be used after personnel have entered a contaminated area knowingly or inadvertently. It can be used to decontaminate personal protective equipment and contaminated surfaces. "It also demonstrates the value of working with industrial partners to bring a product to market," Morrissey said.

In the past two years, while the chemical formula hasn't changed, researchers have found that the DECON Blend can be used by a wide variety of operators. In August 2020, the Center received an award from the Federal Laboratory Consortium for its work with this invention and its benefits not only to the warfighter but to first responders as well. "If a fire and rescue team needed to decontaminate something, they could use a lake, pump the water out of that source and mix it with the DECON Blend," said Matt Jones, Center technology transfer specialist.

The commercialized product is currently available as MQM's Decon PLUS product line and it has been partnered with other decontaminants to create the Contaminant Mitigation Decontamination (COMIT) kit. The COMIT combines the Decon PLUS with multi-purpose wipes, a sprayer so that it can be easily mixed and a microfiber mitt with a chemical barrier built into it, which has an added layer of protection for the user. "It's been a long road to go from concepts to beginning ideas, to getting where we are today," said Tim Meilander, President of M2DCON, the parent company of MQM Solutions. "There's a wealth of knowledge available at CBC through the various technical teams that they have throughout the Center. The nice part is that everyone that we have worked with, we've had an excellent collaboration and there's been frank and open discussions regarding possibilities."

Original Article: <u>https://www.cbc.devcom.army.mil/newspost/devcom-decontaminant-thrives-after-patent-license-agreement/</u>



US Army Scientist Models Vortex Muffler for Quieting Noisy Engines

by Troy Carter, TechLink Staff Writer

June 10, 2021

"And the Army goes rolling along," their own song says, but how far away can you hear it?

On June 10, a patent application filed by the DEVCOM Army Research Laboratory was published that seeks intellectual property protections for an <u>"Overlapping Vane Muffler"</u> developed by Michael Scanlon, Sr.

A radial region of vorticity is established; a gradient with higher pressure and lower angular velocity radially outward at the interior of the wall and lower pressure with higher angular velocity



radially inward along the exterior of the overlapped vane-wall formed with six duplicates of vane and gap. (ARL drawing via USPTO)

By breaking up an engine exhaust's flow with vanes positioned in a two-part spherical pattern the new design can "create vortices and/or cause exhaust to flow in counter flowing channels" that extend the duration of the pulsations and "substantially" quiet the engine.

The spherical muffler, which looks similar to a turbocharger, can "prolong vorticity and circulation within one or more muffler chambers (vortex chambers) to create elongated flow paths, variable expansion regions, radial pressure gradients, varying angular velocity related to the radial extent of vortex motion, and resistance to uniform expansion due to diffraction within velocity gradients. The vortex chambers can be designed to keep noisy flows longer at the periphery of a circulation region due to centripetal acceleration and create pressure and flow gradients that inhibit transmission of sound through a vortex sink, i.e., the center of vortex motion or the eye of the vortex," the newly published <u>patent application</u> states.

Original Article: https://techlinkcenter.org/news/us-army-scientist-models-vortex-muffler-for-quieting-noisy-engines



US Army Micro-atomizer Contributes to COVID-19 Research

by Richard M Arndt

January 14, 2021

ABERDEEN PROVING GROUND, MD – A device patented by researchers at the U.S. Army Combat Capabilities Development Command Chemical Biological Center (DEVCOM CBC) is being commercialized as a tool in the study of COVID-19.

The micro-atomizer, U.S. Patent 8,882,085, is a device that produces an aerosol spray on a very small scale for studying aerosolized particles inhaled by humans. The micro-atomizer has a .005 in diameter sample pass through -- slightly larger than a human hair. This invention allows scientists to scale things down into a much smaller space to model what would happen on a larger scale.



DEVCOM CBC biologist Michael Horsmon, senior engineering technician Richard Kreis, and retired Army scientist Charles Crouse are the inventors behind the micro-atomizer. This product was developed to enable detection, protection and decontamination technology development geared toward protecting the warfighter from toxic chemical agents by simulating those agents on a micro level using aerosol spray.

While the micro-atomizer was developed as a research tool in chemical agent protection, it can also be used to simulate human sneezing, hacking or coughing. This will enable researchers to model the COVID-19 flow that would be expelled by someone who already has it. According to Kreis, "by allowing the molecules to get down to the same size as you would with COVID-19, it is easy to replicate continuously, repeatedly and accurately."

Techlink, the DoD's national partnership intermediary for technology transfer typically reviews all government patents and publicizes technologies that are ripe for commercialization. "We were notified by our partner, Techlink who's in Montana, that there was interest in this patent. Our office investigates the status of patents and if there are existing prototypes. When we investigated, we learned that there were no more prototypes, so we went to the Research and Technology Directorate and asked them if they were willing to fund a few more prototypes because of the commercial interest and they agreed," said Matt Jones of the Center's Technology Transfer Office.

The test was a success and the company signed a patent license agreement this year. The inventors are currently focusing on reproducing the micro-atomizer and building the product consistently. The goal is to commercialize it so that it is available worldwide. "Universities, industry and other government agencies can use the micro-atomizer and it can be used in fields ranging from aerobiology, toxicology, and maybe even generating aerosols of coding materials for protection of surfaces. It has a wide range of uses," Horsmon said.

Original Article: https://www.army.mil/article/242439/u s army micro atomizer contributes to covid 19 research



Army Leverages Innovative Industry Partnerships for Next-Gen Satcom Capabilities

by DEVCOM C5ISR Public Affairs Office

August 4, 2021

ABERDEEN PROVING GROUND, Md. — Army Futures Command (AFC) is developing next-generation satellite communications (SATCOM) capabilities through the use of innovative partnerships known as cooperative research and development agreements (CRADAs).

The Army uses SATCOM capabilities to provide beyond line-of-sight (BLOS) communications that allow Soldiers to maintain consistent communications in all environments and situations, even when there is great distance between military personnel, or the terrain is dense.

The Command, Control, Communications, Computers,



Cyber, Intelligence, Surveillance and Reconnaissance (C5ISR) Center – a component of AFC's Combat Capabilities Development Command – is using SATCOM-centric CRADAs with multiple industry partners to learn how the Army's tactical network can enhance BLOS capabilities through current and emerging commercial satellite constellations, explained Rich Hoffmann, an electronics engineer within the C5ISR Center.

The Army relies heavily on geosynchronous-earth orbit satellites, which are fixed in the sky and easy to track. Yet the high orbit distance delays communications and requires significant power when transmitting data from the ground to the satellite. Incorporating other satellite constellations – such as low-earth orbit and mid-earth orbit – with their different ranges and capabilities, allows the Army to obtain the resiliency and diversity it needs to ensure consistent beyond-line-of-sight communications in a variety of battlefield environments, according to Hoffmann, who said the ability to communicate over long distances can be the key to winning on the tactical battlefield.

"Our resilient satellite communication capabilities also enable other key technologies, such as long-range precision fires," Hoffmann said. "Reliably connecting the sensor to the shooter, even when the enemy is trying to take your long range links down with jamming, is essential."

Enhancing the resiliency of the Army's network is a vital component of Capability Set 23 – a collection of network capability enhancements informed by experimentation, demonstration, and direct Soldier feedback, scheduled to be fielded in 2023.

Hoffmann noted that military communications requirements are very different than typical commercial communications, so engineers aren't always certain whether an emerging commercial system will work for the military; thus, the ability to freely share information with potential vendors is essential.

The C5ISR Center currently has 5 active SATCOM CRADAs and more than 100 active CRADAs across all of its mission areas, according to Hoffmann, who noted these partnerships shorten the timeline from identifying a capability gap to developing solutions.



"There are a lot of technologies that are really out of the box, that are really game changers. So now more than ever, we're really excited to be working with these companies and understanding their technologies because they're bringing a tremendous amount of capability for the battlefield," he said.

The C5ISR SATCOM-related CRADAs are focusing on resiliency and diversity, explained Martin Ortiz, a C5ISR Center electronics engineer who oversees the Center's CRADAs. "We get resiliency and diversity through the use of the different constellations: low-earth orbit, medium-earth orbit, and geosynchronous-earth orbit. Each one has a different potential," he added.

Many of the technologies being developed under the C5ISR Center's current CRADAs were tested at the Network Modernization Experiment (NetModX) 2020, allowing the Army to test and better understand the potential of emerging commercial satellite constellations and technologies, and how they can potentially be incorporated into the Soldier's communications toolbox. New SATCOM technologies will also be tested at Project Convergence 2021.

"The best thing about the CRADAs [...] is the relationships that form. These can be relationships that last for years and are so useful when looking at a new technology or looking at new projects," said Ortiz.

Original Article: https://www.army.mil/article/249066

Army Study Evaluates Use of Dogs in COVID-19 Detection

by Jerilyn Coleman

August 27, 2021

Scientists at the Army Combat Capabilities Development Command Chemical Biological Center are partnering with the University of Pennsylvania and various canine training facilities to continue research on how canines can aid in the fight against COVID-19 and other chemical biological threats.

A team of researchers led by Dr. Patricia Buckley, supervisory biologist and chief of the Center's Biochemistry Branch, recently began phase two of this proof-of-concept study to determine if dogs can be trained to detect the odor of COVID-19 from human sweat.



Center scientists say these dogs are able to detect a COVID-positive person days before a rapid test can. "We're harnessing that scent-detection capability and figuring out how far we can take their limits of detection," said Jenna Gadberry, a research scientist at the center. "So far, the levels they have been able to detect have been astounding."



Funded by the Defense Department's Domestic Preparedness Support Initiative, this research is a collaborative effort that includes the center, University of Pennsylvania's Penn Vet Working Dog Center and Tactical Directional Canine (TDK9) Systems. Scientists at the center work together to take on research compliance, communicate with dog trainers, crunch data, and create test plans. The University of Pennsylvania serves as the sample collection hub to set up the clinical trial. The university obtains institutional review board approval to collect the clinical human samples and TDK9 and Penn Vet Working Dog Center conduct the canine detection training.

The center's team is excited about the major impact that this research could have in the fight against COVID-19, but they're also hopeful that it will positively impact the warfighter by detecting biological threats beyond the pandemic. "The way that we've been posing this capability to folks is not necessarily a COVID-19 detection capability; it's a biological threat detection capability," said Gadberry. "We know that this isn't going to be the last time we see some sort of a virus or pandemic, but we're demonstrating the ability for dogs to be able to find a positive person or threat. We can take what we learn from the dogs to actually apply it to some of our handheld detectors or laboratory detection systems. They're able to detect far different elements at this point in time than our laboratory equipment can."

Scientists at the center hope to use the canine capability in settings where large groups of people gather, including large ships, training environments and events such as the U.S. Military Academy graduation. "Utilizing this capability would be good for the Army in many ways, especially whenever they have large-area exercises or a large number of people who have to be congregated in one place. We're looking to see if we could have a way to promote the safety of warfighters in large gatherings by screening while they're in that element," Buckley said.

Original Article: <u>https://www.defense.gov/News/News-Stories/Article/Article/2752729/army-study-evaluates-use-of-dogs-in-covid-19-detection/</u>

ERDC's Patented Asphalt Repair Composition Offers Long-Lasting Pothole Solutions

by Patrice Creel, ERDC Office of Research and Technology Transfer

Published June 4, 2021

VICKSBURG, Miss. - Dodging damaging road and runway potholes challenges military and civilian pilots and drivers daily. This issue led researchers at the U.S. Army Engineer Research and Development Center's (ERDC) Geotechnical and Structures Laboratory (GSL) to develop materials for quicker and longer-lasting repairs.

Funded by the Air Force Civil Engineer Center and patented in March 2021, the "Performance Grade Asphalt Repair Composition" — commonly known as the Army's induction hot mix asphalt, or iHMA — resulted from research efforts utilizing ERDC's extensive testing facilities to support fighter jet traffic.





"Personnel responsible for pavement maintenance will benefit from this pothole fill invented for year-round use," said Dr. John Rushing, research civil engineer and product lead inventor with GSL's Engineering Systems and Materials Division Research Group.

"iHMA is an asphalt repair material packaged in five-gallon containers that is heated on-demand at the repair site using an induction heating system," he explained. "The mixture is heated to around 300 degrees in three to five minutes, offering a hot repair solution similar to plant-produced asphalt mixtures."

The main advantage of the composition is the lack of limits on ambient temperatures, says Rushing. "The invention offers a 'do it right and do it once' solution that has not been available," he said. "This new formulation offers superior quality in a product that can be used any time of year, any place in the world, and it doesn't have a limited shelf life."

The lack of structurally-adequate commercially available repair materials for maintaining airfield pavements led to the iHMA invention.

"Multiple studies at ERDC showed that these commercially available repair methods survived fewer than 10 repetitions of a military aircraft load before they failed, as defined by rutting or inability to support the load," Rushing explained. "All of the efforts for conductive heating failed to meet the time requirement for a rapid solution. It was in a brainstorming session that the idea of induction heating was discussed."

"Commercial products are applied cold, so the team desired materials like those produced in a hot mix asphalt plant, but heating the material was the most significant challenge," he continued. "The concept is similar to how a microwave works. This method is used in many industrial processes to rapidly generate very high temperatures with no physical contact of materials. High-energy electromagnetic radiation energizes certain particles from a distance."

"This innovation allows engineers to generate small patches that withstand the high tire pressures of today's fighter aircraft in a short amount of time in a wide variety of environments and in the most remote locations," said Rutland, the pavements subject matter expert for the sponsoring AFCEC. "In addition, it points to the potential of this technology in a wide variety of applications and potentially doing so with renewable energy."

"With the commercialization strategy developed and licensing agreement signed in 2020, we hope to make this solution available to the public as well as the military in the near future," added Rushing, advancing a welcomed, longer-lasting outlook for pothole repairs.

Original Article: <u>https://www.erdc.usace.army.mil/Media/News-Stories/Article/2646930/erdcs-patented-asphalt-repair-composition-offers-long-lasting-pothole-solutions/</u>



US Army Testing Helmet Tech That Dramatically Increases Safety In Military, Sports

by William Parsons/Army

September 21, 2021

The U.S. Army is testing a new helmet suspension technology that promises to drastically improve the protective capability of helmets used by football players and soldiers.

The invention, created by scientists at the <u>U.S. Army Research</u> <u>Laboratory</u>, uses a special shock-absorbing webbing to offer far greater protection than conventional foam pads.



The key to improved performance, according to Eric Wetzel, the technology's lead inventor, is the <u>rate-activated tether</u>, or RAT, used to create the webbing that suspends the helmet on the head.

"When you pull it slowly, it stretches and relaxes easily, like a rubber band," Wetzel said. "When you pull the RAT faster, however, it requires significantly more force to pull. The result is that a RAT-based suspension is forgiving under low-energy impacts, highly dissipative under high-energy impacts, and very efficiently uses the limited space between the head and the helmet shell."

The suspension technology has shown to be more effective than current football helmet padding. Recent Army tests using NOCSAE standards — the standard for football helmet safety — using a helmet retrofitted with the RAT system showed the new invention could reduce the likelihood of concussion from 0.66 percent to 0.11 percent.

"We have built prototypes in the lab that provide protection for rear impacts, crown impacts, and front impacts," he said. "Our current priority is getting industry excited about this technology, attracting experts in product design and assembly to partner with us to accelerate the transition of this technology into a useful product."

The Army reported that the helmet was undergoing actual parachute jump tests at Fort Bragg <u>on September</u> <u>10</u>. Matthieu Dumont, senior licensing manager at TechLink, is working in collaboration with Army technology transfer professionals to help companies understand how government inventions can quickly become new products.

Through technology transfer agreements, such as cooperative research and development agreements (CRADA) or <u>patent license agreements</u>, private businesses can leverage the Army's R&D, using it to develop new products for military or non-military customers.

The new helmet technology developed by Wetzel and his teammates is the perfect example of a fully fleshedout invention that only needs the backing of a business in order to take off, he said.

"Whether for sports, or worker safety, this <u>RAT-based helmet technology</u> has strong potential for successful commercialization," Dumont said. "We've contacted a number of companies about a license agreement, but there's still an opportunity for others to get involved now."

Original Article: <u>https://techlinkcenter.org/news/us-army-testing-helmet-technology-dramatically-increases-safety-</u> in-sports-military?utm_term=&utm_campaign=Branded+Campaign&utm_source=adwords&utm_medium=ppc&hsa_ acc=9779327819&hsa_cam=1673365196&hsa_grp=89457151845&hsa_ad=413371945395&hsa_src=g&hsa_tgt=dsa-19959388920&hsa_kw=&hsa_mt=&hsa_net=adwords&hsa_ver=3&gclid=EAIaIQobChMIjZCLnqbS9QIVCrfICh2b5wHrEA MYASAAEgL-rfD_BwE



Barrow Green Seals Deal with Army Research Lab on Elastocaloric Cooling Tech

November 17, 2021

Barrow Green, a one-year-old, Bethesda, Maryland company, is developing an energy-efficient ecofriendly cooling technology that leverages R&D from the U.S. Army Research Laboratory. Barrow Green recently signed a patent license agreement which clears a path to commercialization of the technology.

The cooling of personal protective equipment (PPE) appears to be a particularly promising application for ARL's cooling technology. Other cooling alternatives suffer from significant limitations including inadequate battery life, prohibitive weight, and excessive size.



Wearable PPE, think HazMat suits, is hot which degrades human performance and can lead to deadly mistakes. Soldiers and Marines learn this almost immediately when instructed to don their military-issued PPE, which protects them from nuclear, biological, and chemical weapons. Their performance degrades with the heat in as little as 10 minutes depending on the activity.

But industry deals with this issue too. The CDC advises plenty of rest breaks because current cooling systems "are too heavy or too cumbersome to be practical in a work environment." Barrow Green has received strong interest in ARL's cooling technology from the CDC as well as from PPE manufacturers.

On October 8, the Army lab signed a patent license agreement with Barrow Green that allows the startup to commercialize ARL's unique elastocaloric cooling technology that uses nickel-titanium alloys as the cooling mechanism. ARL filed the now licensed patent (technically it's still a patent application and the license is partially exclusive) with the U.S. Patent and Trademark Office on July 2, 2019. Titled "Continuous Bending-Mode Elastocaloric Cooling/Heating Flow Loop," the patent lists ARL's Darin Sharar and Brendan Hanrahan as the inventors.

Greg Stroud, CEO of Barrow Green, said the startup has serious tailwinds coming off the COVID-19 pandemic's focus on PPE, and that the tech has other applications like cooling high power electronics. "The verdict is in, and PPE is a market that needs this technology. That excites us and is aligned with our vision of redefining how people cool themselves," Stroud told TechLink. "PPE is a fast-growing sector, commercially, and this supports our interest in supplying the military with a new tech that enables warfighters to do their work and not taking off their gear, having a heat stroke, or system failure."

The patent license agreement went through ARL's Strategic Partnerships Office where Jason Craley, Michael D'Onofrio, and contractor Julio Suarez make meaningful industry partnerships happen. Helping facilitate the license application process was Brian Metzger, senior tech manager at TechLink, the DOD's national partnership intermediary for technology transfer. And Barrow Green is getting advice and mentorship through FedTech.

Original Article: <u>https://techlinkcenter.org/news/barrow-green-seals-deal-with-army-research-lab-on-elastocaloric-cooling-tech</u>



Our Federal Partners



DoD PIA – TECHLINK

TechLink was established in 1996 within Montana State University's Office of Research and Economic Development. In 1999, TechLink became the Department of Defense's first national Partnership Intermediary for Technology Transfer. TechLink's core activities occur between where laboratory intellectual property enters the public domain and where technology transfer agreements are executed between laboratories and businesses. TechLink's primary activity is marketing new inventions from the DoD and navigating businesses and entrepreneurs through the licensing process. TechLink has facilitated partnerships with DoD laboratories, connecting them with companies nationwide for technology licensing, transfer, and joint R&D activities. In FY 2021, TechLink assisted Army laboratories with 31 technology transfer agreements, including 13 license agreements, 17 CRADAs, and 1 commercial test agreement.



DoD PIA – MILTECH

MilTech, located at Montana State University, was established as a DoD national Partnership Intermediary in 2004. The mission of MilTech is to accelerate the transition of new technology to the U.S. Government. MilTech has a broad network of industry partners and provides hands-on, industry experienced product design, prototyping and manufacturing expertise to help the DoD accelerate the transition of technology to the U.S. warfighter. MilTech has completed projects for over 150 customers from all DoD Services, the Office of the Secretary of Defense (OSD), and Joint and Special Programs. In FY21, MilTech managed 57 projects for DoD customers.





FEDERAL LABORATORY CONSORTIUM FOR TECHNOLOGY TRANSFER (FLC)

The FLC was organized in 1974 and formally chartered by the Federal Technology Transfer Act of 1986 to promote and strengthen technology transfer nationwide. The FLC is now a nationwide network of more than 300 federal laboratories, agencies and research centers that fosters commercialization best practice strategies and opportunities for accelerating federal technologies from out of the laboratories and into the marketplace.

The FLC's mission is to promote, educate, and facilitate federal T2 among its member laboratories and institutions so they can easily reach their commercialization goals, and create social and economic impacts with new innovative technologies. The FLC provides various resources, education and training, tools, and services to ensure federal laboratories are better able to create partnerships, navigate the commercialization process, and achieve market success.



FY21 T2 Awards – Army Winners

DoD T2 Advocate of the Quarter Award

The DoD Technology Transfer (T2) Advocate of the Quarter Award recognizes a military or civilian employee who goes above and beyond their expected roles and responsibilities by making significant contributions to the Department's T2 programs and policies.

The following individuals competed against nominees from all three Services and DoD laboratories for going above and beyond to demonstrate the value and impact of T2 to the DoD. Three Army T2 nominees were selected as the winners by a DoD panel in the Fall, Spring, and Summer quarters of FY21.

MR. DAVID LEE, a T2 Associate in the T2 Office within the U.S. Army Combat Capabilities Development Command Armaments Center (DEVCOM AC), received the award for his accomplishments in establishing multiple CRADAs with international companies, resulting in partnerships that provide critical engineering knowledge to DEVCOM AC. Mr. Lee's trailblazing efforts in executing these international CRADAs can be shared across the DoD, leading to the development of armaments solutions applicable to future weapons systems for other military services, international military markets, and commercial spin-off applications.

MR. MATTHEW JONES, a T2 Specialist at the U.S. Army Combat Capabilities Development Command Chemical Biological Center (DEVCOM CBC), received the award for his accomplishments in recognizing and prioritizing COVID-19 related requests, establishing many T2 Agreements (e.g., CRADAs, patent license agreements, material transfer agreements) collaborating with a Fortune 500 company and several small businesses, resulting in improved personal protective equipment, detection capabilities, and effective decontamination of equipment and spaces. Along with achieving the technology objectives (e.g., Canine COVID Detection), these efforts brought in thousands of dollars in revenue by leveraging technology created in the laboratory-partner collaborations and the advanced development and manufacturing capabilities of external partners.



MR. LYNN ZANOW, a T2 Officer with the U.S. Army Corps of Engineers (USACE) Engineer Research and Development Center (ERDC), received the award for numerous T2 efforts including: establishing a partnership intermediary (ERDCWERX) providing tools for rapid prototyping, state-of-the-art capability, and market assessments; hosting ERDC's first annual Innovation Summit and Broad Other Transaction Authority Announcements (BOTAAs) connecting ERDC technology to over 10,000 companies, including many non-traditional defense contractors, academic institutions, and government agencies; establishing a new invention evaluation and marketing system in collaboration with several Mississippi state universities; and providing training and mentoring within the Office of Research and Technology Transfer (ORTT). Mr. Zanow's efforts have resulted in a culture shift and a 33 percent increase in patent license agreements with expectations to double the rate of licensing in the next 5 years.

FLC Awards

The FLC recognizes outstanding work in accomplishing technology transfer from the national laboratories to the public and private sectors with several prestigious awards. The FLC Awards Program annually recognizes federal laboratories and their industry partners for outstanding technology transfer achievements. The FLC's 30 plus years of advancing technology transfer would not have been possible without the creativity and dedication of the federal scientists and inventors recognized through the FLC Awards Program.

Each year, the FLC presents numerous awards to federal laboratory employees, including Technology Transfer Innovation, Impact, Excellence in Technology Transfer, Interagency Partnership, State and Local Economic Development Award, Rookie of the Year, Outstanding Technology Transfer Professional, Technology Focus, and Laboratory Director of the Year. The FLC awards are ranked as some of the most prestigious honors in the technology transfer field.

In FY 2021, the Army received four FLC Awards, including two Excellence in Technology Transfer Awards, a Technology Transfer Innovation Award, and a Laboratory Director of the Year Award, and special recognition for COVID-19 Response Distinction.



Excellence in Technology Transfer Award



DOD COLLABORATIONS DRIVE RAPID DEVELOPMENT AND DEPLOYMENT OF COVID-19 ISOLATION CHAMBER



Walter Reed National Military Medical Center U.S. Department of Defense – U.S. Army U.S. Army Medical Research & Development Command



Collaboration across the Department of Defense (DoD), including an innovative five-way Cooperative Research and Development Agreement (CRADA) involving four DoD labs and a commercial licensee,

led to the rapid deployment of a low-cost isolation chamber to protect health care workers from COVID-19 exposure.

By summer 2020, the COVID-19 Airway Management Isolation Chamber (CAMIC) had been used in more than 100 surgical procedures in the military health system. Within seven months of initial conceptualization, 150 CAMIC devices had been commercially manufactured and were awaiting final approval for distribution.

CAMIC is a clear isolation chamber that drapes around the head, neck and shoulders of a patient, creating a portable negative pressure environment that captures and removes viral particles using vacuum lines.

TEAM MEMBERS

Mai. (Dr.) Steven Hong, Nathan Fisher, Maj. (Dr.) Douglas Ruhl, Maj. (Dr.) Charles Riley, 2nd Lt. Joseph Krivda, Capt. (Dr.) Timothy Blood, Capt. (Dr.) Jonathan Perkins, Maj. (Dr.) Paul Wistermayer, Leigh Callander, Stephen Johnson, PhD, Blake Sajonia, Quinton King, PhD, Dr. Paul Michaels, Don Townsend. Freda Krosnick, Dr. Mark Paxton. Jelena Gvozdenovic-Jeremic, Maj. Scott Baker, Martin Hindel

CAMIC was conceived in the spring of 2020 by physicians at Walter Reed National Military Medical Center (WRNMMC) and refined in just three weeks with the support of three Army labs: the Telemedicine & Advanced Technology Research Center (TATRC), U.S. Army Medical Materiel Development Activity (USAMMDA) and the Clinical and Translational Research Program Office (CTRPO). CAMIC's simple construction from readily available materials allowed rapid fabrication of the chambers by military treatment facilities after the Food and Drug Administration (FDA) granted an emergency use authorization in June.

Technology transfer efforts reflected the same sense of urgency and collaboration, with T2 staff across multiple chains of command working nights and weekends to accelerate processes and forestall intellectual property (IP) issues that could have slowed — or outright halted commercialization.

"In 25 years of technology transfer, I have never seen more moving parts," one member of the T2 team said.

An emergency use license was granted to Prep Tech Healthcare Technologies, a Louisiana health care



Above: In just four months, CAMIC progressed from ideation to initial commercialization efforts. As one member of the technology transfer team put it, "Everyone worked together. We cut through the red tape to directly impact everyone working to save lives."

technology developer. Prep Tech, which had also begun rapidly prototyping its own self-contained isolation chambers for use against COVID-19, worked with technology transfer officials at the U.S. Army Medical Research and Development Command (USAMRDC) and TechLink to secure an emergency use license in June, followed by a CRADA several months later, to further the testing, development and commercial manufacture of the CAMIC device.

A second emergency use license was granted in October to Atrix International, a manufacturer of ultrafine filtration vacuums for the health care industry. The combination of a portable isolation chamber with an Atrix cordless vacuum offers a mobile solution for the DoD as well as civilian medical transport applications.

While other isolation chambers are now commercially available, the CAMIC satisfied an urgent, high-priority need for the DoD's military facilities, including those overseas in remote locations, and opens the door for further collaboration with industry partners in this important and rapidly developing technology area.

Excellence in Technology Transfer Award

THREE DECADES OF ARMY PERSISTENCE PAYS OFF WITH FDA APPROVAL OF IV THERAPY FOR SEVERE MALARIA

U.S. Department of Defense – U.S. Army U.S. Army Medical Research & Development Command

The Food and Drug Administration (FDA) approval of Artesunate for Injection in May 2020 marked the culmination of three decades of collaboration by physicians, scientists and technology transfer (T2) staff in the U.S. Army to address a critical global shortage of treatment options for severe malaria.

Malaria, which is transmitted through the bite of an infected mosquito, remains one of the top infectious disease threats to U.S. military personnel deployed overseas. Although rare in the United States, malaria threatens about half of the world's population. There are an estimated 216 million clinical cases annually, and without appropriate treatment, about 15% become severe, resulting in 445,000 deaths each year.

Artesunate, derived from a natural plant source, has curative qualities discovered by Chinese physicians thousands of years ago. Researchers, clinicians and T2 professionals from the Walter Reed Army Institute of Research (WRAIR) and the U.S. Army Medical Materiel Development Activity (USAMMDA) — both subordinate commands of the U.S. Army Medical Research & Development Command (USAMRDC) — developed, tested, produced and ultimately commercialized artesunate as a treatment for severe malaria.

Finding a commercial partner capable of manufacturing IV artesunate in compliance with FDA regulations was challenging, in large part because of the changing economics of the pharmaceutical industry and the limited potential profitability of treatments for rare conditions in much of the developed world. Army T2 staff remained persistent and nimble in the face of those strong economic headwinds.

Those efforts paid off in a partnership with Amivas USA LLC, a health care company that was founded by veterans of the U.S. and Australian military in 2016 expressly for manufacturing IV artesunate as the initial product in a pipeline of low-volume but critical treatments for severe malaria and rare or neglected tropical diseases.

Amivas and USAMMDA signed a Cooperative Research and Development Agreement (CRADA) in 2017, then collaborated on the FDA's New Drug Application Above: Malaria, which is transmitted through the bite of an infected mosquito, is rare in the United States but occurs in more than 100 countries and territories, threatening about half of the world's population.

preparation, filing and review processes, culminating in FDA approval of the technology in May 2020. The approval also came with the potential to receive a priority review voucher, an FDA incentive to invest in tropical disease treatments, which entitles its holder to one FDA priority review for any future drug or vaccine.

Amivas will now manufacture, distribute and commercialize IV artesunate as Artesunate for Injection, and is setting up a nationwide product distribution network for launch in early 2021. Artesunate for Injection is now the first-line drug for treatment of severe malaria in the United States and on the World Health Organization Model List of Essential Medicines.

The global potential is even greater. In an era of shrinking new-drug research and development pipelines, particularly for diseases that are rare in developed nations, USAMMDA's sustained efforts will have wideranging impact far beyond the core goal of protecting the warfighter.®

TEAM MEMBERS: Col. Peter Weina, Bill Ellis, Judy Holian (PMP), Maj. Victor Zottig, Col. Lisa Thomas Read, Col. Bryan Smith (retired), Bob Charles, David Humphrey, Maj. Katherine Carr

MEDICAL TECHNOLOG

Technology Transfer Innovation Award

U.S. ARMY DEVCOM T2 TOOL SUITE CAN HELP FEDERAL LABORATORIES ASSESS POTENTIAL OF NEW DISCOVERIES

U.S. Department of Defense – U.S. Armu U.S. Army Combat Capabilities Development Command (DEVCOM) DEVCOM Army Research Laboratory, DEVCOM Soldier Center

Government scientists and engineers can now more easily determine the practical viability of a new technology using assessment tools similar to those used in industry, thanks to the Very Early Product Realization (VEPR) technology transfer tool suite developed by the U.S. Army Combat Capabilities Development Command (DEVCOM) Army Research Laboratory (ARL) and Soldier Center (SC).

The problem the Army and other federal research laboratories often face is not generating new, worldclass scientific knowledge, but demonstrating the value proposition and competitive product potential of these new discoveries early on.

The VEPR tool suite modified and synchronized the following familiar tools and approaches to address the gap between new laboratory discoveries and potential product relevance:

- Team of Teams approach to collaboration
- Mission Model Canvas
- Minimum viable product (MVP)
- Technology Readiness Pathway Matrix
- Early user touchpoints

As a case study, DEVCOM ARL and SC, Worcester Polytechnic Institute, Sherpa 6 and Creative Engineering used the VEPR tool suite to reveal and assess the "unknown unknowns" associated with transforming a "nanogalvanic alloy" discovery into a potential product: Soldier Nanogalvanic Alloy Power, or SNAP.

The nanogalvanic alloy can safely generate hydrogen from water, snow and ice without any environmentally unfriendly catalysts or toxic byproducts. The hydrogen produced by the nanogalvanic alloy's reaction with water can be converted into electricity by means of a fuel cell.

Hypothetically, this could enable new ways to provide "on-demand" power for soldiers in the field to keep critical

Above: Graphic illustrates a highly integrated "Team of Teams" network of diverse and synchronized expertise, created using the VEPR tool suite.

mission devices and systems operational longer. It could also potentially enable a new and safer emergency power source for people affected by floods, hurricanes and other crises.

Use of the VEPR tool suite resulted in three generations of MVPs. The first demonstrated the novel ability to rapidly and safely generate hydrogen from the new nanogalvanic alloy using a manually operated system for initiating the nanogalvanic reaction. The second- and third-generation MVPs included much more complex, electronically controlled and automated devices that could be assessed by soldiers.

Based on the use of VEPR tools, the original product design criteria and recommendations were significantly revised to better exploit the hypothesized nanogalvanic alloy potential. After the assessment, the use of the nanogalvanic alloy revealed a much narrower field of potential soldier-portable applications than originally hypothesized, but could provide significant competitive benefits in the target applications.

TEAM MEMBERS: Dr. David Darkow, DEVCOM SC, Dr. Kristopher Darling, DEVCOM ARL, Paul Dowd, Creative Engineering, Dr. Anit Giri, DEVCOM ARL, Lt. Col. Adam Heppe, Military Science - Worcester Polytechnic Institute (WPI), Al LeCounte, Sherpa 6, Wendy Leonard, DEVCOM ARL, Anthony Roberts, DEVCOM ARL, Spencer Tess, Army ROTC Cadet and WPI student, Dr. Shawn Walsh, DEVCOM ARL

DR. DAVID PITTMAN: FOUNDATIONAL LEADERSHIP HELPS ERDC THRIVE DESPITE COVID-19 CHALLENGES

Department of Defense - U.S. Army Corps of Engineers Engineer Research and Development Center

Of the three years that Dr. David Pittman has served as director of the U.S. Army Corps of Engineers (USACE) Engineer Research and Development Center (ERDC), 2020 perhaps best illustrates his profound impact on the lab, the agency and technology transfer (T2). Despite numerous challenges created by the COVID-19 pandemic, Pittman and his team did much more than survive 2020 — they thrived.

Pittman oversaw the formation of an enormous new teleworking initiative that kept researchers working on crucial projects, even as the number of on-site

staff dropped to 6% of its standard workforce. As the year drew to a close and 65% of the workforce was still working remotely, ERDC continued to deliver numerous lifesaving solutions as part of its COVID-19 response.

Of the many technologies employed in ERDC's COVID-19 response, the rapid development of alternate care facilities (ACFs) for coronavirus patients is a prime example of a particularly successful T2 effort, one that Pittman actively oversaw. ERDC's work on ACFs transforming convention centers and other buildings into temporary hospitals — allowed the Federal Emergency Management Agency (FEMA) to provide 15,000 additional hospital beds in 17 states as well as Puerto Rico and the U.S. Virgin Islands.

Successes like these would not be possible without the firm foundation that Pittman has established by personally investing in his team and making effective technology transfer a top priority for the organization. During his tenure as director, ERDC has greatly extended its reach and paved the way for its innovations to make an even greater impact on the military and the world.

Pittman has taken numerous concrete steps to transform the culture at ERDC, leveraging its dynamic, creative workforce through innovative processes and initiatives that foster communication and collaboration.

He applied his philosophy that "our people are our

greatest source of strength" using a twofold approach. First, he sought new ways for the lab to recruit, retain and invest in the world's most exceptional researchers and engineers. Second, he guided the creation of an infrastructure that promotes open communication and opportunities for cross-pollination.

The rapid development of alternate care facilities (ACFs), which allowed FEMA to provide 15,000 additional hospital beds for coronavirus patients, is a prime example of ERDC's pandemic response efforts—one that Pittman actively oversaw.

The new approaches inside ERDC were mirrored by external initiatives as well. These included adding new types of partner agreements (Partnership Intermediary Agreements in particular) to the lab's portfolio, establishing innovation and enterprise centers, mining academia vigorously for productive partnerships, participating in industry groups, investing in local communities, hosting conferences and other events, and pursuing new avenues for international agreements.

The changes Pittman introduced have led directly to a remarkable increase in engagement and partnerships, with more than 700 partner agreements worldwide. These include 155 Cooperative Research and Development Agreements (CRADAs), 74 Educational Partnership Agreements and 12 international agreements involving seven countries. Since 2017, Pittman has overseen a 33% increase in license agreements and exceeded all small-business contracting goals by an average of 37%.®

COVID-19 Response Distinction

AWARDS SPECIAL RECOGNITION

Federal laboratories' contributions to the ongoing fight against the COVID-19 pandemic extend beyond the official FLC National Award categories. The FLC extends its sincere thanks and appreciation to the following recipients of the 2021 COVID-19 Response Distinction.

DEPARTMENT OF HOMELAND SECURITY

Homeland Security

SCIENCE AND TECHNOLOGY,

CHEMICAL SECURITY ANALYSIS CENTER

DHS SIMULATIONS INFORM RISK MITIGATION STRATEGIES FOR AIR TRAVELERS

Technology developed by the Department of Homeland Security Science and Technology's Chemical Security Analysis Center helped improve air traveler safety during the COVID-19 pandemic.

The technology simulates the flow of airborne droplets — the type that transmit the virus that causes COVID-19 — under various conditions. Simulation variables include the amount of virus that might become airborne because of passengers talking, coughing and sneezing, as well as the size of the resulting droplets.

The Federal Aviation Administration, the Airlines for America trade association and the Department of Defense's Transportation Command are using the technology to better understand how strategies like filtration, air management and masking can help reduce COVID-19 risk.[®]

U.S. ARMY CORPS OF ENGINEERS

ENGINEER RESEARCH AND DEVELOPMENT CENTER

CONTAINERIZED MEDICAL SOLUTIONS (CMS) OFFSET HOSPITAL OVERCROWDING

Makeshift hospital rooms developed by the U.S. Army Engineer Research and Development Center and a multidisciplinary team of public and private sector partners helped accommodate the huge influx of patients needing medical care during the COVID-19 pandemic.

Known as Containerized Medical Solutions (CMS), this technology offers a low-cost, easily manufactured alternative to conventional patient care facilities. The CMS design accommodates locally sourced construction materials and crews, which allows for mass production of the rooms across the U.S. and the world if needed.

After successful demonstration of nine CMS units, the Federal Emergency Management Agency (FEMA) purchased multiple units. Three were delivered to Dallas for storage as a future resource, and six were delivered to the United Medical Center in Washington, D.C.®

DEPARTMENT OF DEFENSE – U.S. ARMY

COMBAT CAPABILITIES DEVELOPMENT COMMAND CHEMICAL BIOLOGICAL CENTER

STREAMLINED T2 FACILITATES 30 COVID-19 USE AGREEMENTS IN 7 MONTHS

The technology transfer (T2) team at the Combat Capabilities Development Command Chemical Biological Center (DEVCOM CBC) implemented an innovative approach to expediting T2 agreements responsive to the COVID-19 pandemic, forming more than 30 such agreements in seven months. The agreements covered access to DEVCOM CBC testing equipment and the transfer of biological material for COVID-19 research.

The T2 efficiencies included:

- Forming overarching or standardized agreements where possible.
- Forming some agreements with industry consortia.
- Streamlining the review process for receipt and use of the
- SARS-CoV-2 biological material samples.
- Identifying high-priority agreements when routed for staff review. The combined effect of the T2 team's handling of COVID-19

agreements resulted in a fourfold time savings in agreement formation while still performing robust reviews for quality control.

Acronyms

CFT	Cross-Functional Teams
CRADA	Cooperative Research and Development Agreement
DoD	Department of Defense
EPA	Educational Partnership Agreement
FAR	Federal Acquisition Regulations
FLC	Federal Laboratory Consortium
FY	Fiscal Year
HQ	Headquarters
HQDA	Headquarters Department of the Army
IP	Intellectual Property
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
NDA	Non-Disclosure Agreement
NIST	National Institute of Standards and Technology
ORTA	Office of Research and Technology Applications
ΟΤΑ	Other Transaction Authority
PEO	Program Executive Office
PIA	Partnership Intermediary Agreement
PLA	Patent License Agreement
PM	Program Manager
PO	Program Office
POC	Point of Contact
R&D	Research and Development
RDT&E	Research, Development, Test, and Evaluation
S&T	Science and Technology
SBIR	Small Business Innovation Research
SME	Subject Matter Expert
STEM	Science, Technology, Engineering, and Mathematics
STTR	Small Business Technology Transfer
T2	Technology Transfer
	57

Acronyms 38

