

July 2015

NSSC This Month



U.S. Army Garrison Natick Public Affairs Office

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Commander's Corner

Lt. Col. Ryan Raymond
USAG Natick Garrison Commander



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People Come First

I am Ryan Raymond, and it is truly an honor to be the new garrison commander at Natick.

First, I want to thank everyone who participated in the change of command ceremony. It was a great day, and everyone did a fantastic job. I really appreciate the effort that went into a flawless ceremony.



On my second day here, I sat down with the garrison directors and shared my command philosophy. I wanted to take a moment and share the highlights with you.

People are our number one asset and the key to any success we have. I will treat everyone with dignity and respect, and I firmly believe in the Golden Rule. One thing I fully believe is we are who we are, not what we do. I have the responsibility as the garrison commander to support the tenants, adhere to policies and keep the installation running. That is my job, and I will do it to the best of my ability. Who I AM is Ryan Raymond, and that is something I never lose sight of.

Our folks will not do anything illegal, unethical or immoral.

Over the next few weeks, I will be meeting the leadership of the installation. I am looking forward to learning about the great things done here at Natick on behalf of the Soldier.

I value you, your opinion and your time. I will advocate on your behalf and highlight the accomplishments of the garrison, tenants and the installation as a whole.

Again, I want to thank everyone for the warm welcome to Natick, and I am looking forward to the great things we will do together in the next two years.

Lt. Col. Ryan Raymond
USAG Natick Garrison Commander

NSSC This Month

NSSC

Senior Commander

[Brig. Gen. William E. Cole](#)

Garrison Commander

[Lt. Col. Ryan Raymond](#)

Command Sergeant Major

[Command Sgt. Maj. Erika M. Gholar](#)

Public Affairs Officer

[John Harlow](#)

About this newsletter

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Natick welcomes new garrison commander

By Bob Reinert, USAG Natick Public Affairs / NATICK, Mass. (June 16, 2015)

Lt. Col. Ryan Raymond assumed command of U.S. Army Garrison Natick in a June 16 ceremony at Hunter Auditorium.

Brig. Gen. William Cole, Natick Soldier Systems Center senior commander, welcomed Raymond to Natick.

“You’ll learn fast that you have an outstanding staff that is committed to Natick,” Cole said. “I know you’ll enjoy your time in command.”

Davis D. Tindoll Jr., director of the Atlantic Region, U.S. Army Installation Management Command, added his own welcome to Raymond.

“Colonel Raymond brings extensive experience to his new position,” Tindoll said. “He has served combat tours in Kuwait, Kosovo and Iraq and comes to us from Headquarters, Department of the Army, as the director of Education and Training for the Soldier for Life program — (an) important job.”

Raymond took over from Lt. Col. Brian Greata. Tindoll praised Greata’s work at Natick over the past two years.

“Colonel Greata has excelled as a consummate professional leader directing and coordinating the efforts of the Natick garrison during a time of immense challenges,” Tindoll

said. “He postured the garrison for continued success in its path to be a most efficient, responsive and flexible organization capable of accomplishing its mission, now and in the future.”

Cole said he relied on Greata when his duties as Research Development and Engineering Command deputy commander took him away from Natick.

“As a senior commander who spends a lot of time on the road like I do ... it is a comfort to have such a strong garrison leadership team,” Cole said. “I’ve been fortunate, especially, to be able to depend on your leadership, Brian.”

As Greata pointed out, his tenure included two furloughs, the government shutdown, sequestration, budget and manpower cuts, and historic snowfalls.

“But despite these challenges, the garrison has continued to plug away at the problems we face in order to make this installation the best we can,” said Greata, “so that you all continue to benefit the entire Army with the research and development conducted here.”



Photo: Anita Tobin, NSRDEC Strategic Communications

Lt. Col. Ryan Raymond, left, receives the colors from Mr. Davis D. Tindoll Jr., Atlantic Region director of the U.S. Army Installation Management Command, during the June 16 change-of-command ceremony at U.S. Army Garrison Natick.

Prior to the change-of-command ceremony, Raymond took a moment to reflect on how grateful he was to inherit a seasoned garrison team.

“I think there’s always a new set of challenges,” Raymond said. “There seems to be a trend of constrained resources that require innovation to solve. That’s why the staff is so critically important, that we encourage critical thinking, and we let people who are professionals — experienced professionals in their business — do what they do best and just clear the way.

“People first: They’re our greatest asset. We thrive through relationships.”

Raymond, a Maine native, is married and has a daughter. His family was unable to attend the change-of-command ceremony.

“My family and I couldn’t be happier to be here,” Raymond said. “The welcome that I’ve received so far has been just incredible, and I’m really looking forward to the next couple of years.”

PM FSS changes hands at Natick

By Bob Reinert, USAG Natick Public Affairs / NATICK, Mass. (June 24, 2015)

Lt. Col. Frank Moore took charge of Product Manager Force Sustainment Systems in a June 23 change-of-charter ceremony at Natick Soldier Systems Center.

Moore comes to PM FSS from the Office of the Assistant Secretary of the Army for Acquisition, Logistics and Technology. He replaces Lt. Col. Ross Poppenberger at Natick.

“The Product Manager mission is to enhance the combat effectiveness and quality of life for our warfighters by providing equipment, systems and technical support to sustain and improve the environment in which Soldiers live, train and operate,” said Col. Maurice Stewart, Project Manager Expeditionary Energy and Sustainment Systems, who presided over the ceremony in the Grant Conference Room.

This is a homecoming of sorts for Moore, a Maine native who studied mechanical engineering at Worcester Polytechnic Institute.

“I was really excited when I found out I was coming here,” Moore said. “I just couldn’t believe what positive comments everyone had about this whole Natick team. You all should be very proud of the work you do here at Natick.”

Stewart expressed great confidence in Moore.

“Frank is an air defender by trade and an Acquisition Corps officer by choice,”

Stewart said. “I am convinced that Lt. Col. Moore has the skill set required to achieve even greater things at PM FSS.”

Poppenberger had managed 43 acquisition programs in such areas as aerial delivery, field feeding, field services and shelter systems. During his three years at PM FSS, more than 2,400 pieces of equipment valued in excess of \$97 million were fielded.

“Thank you, Ross, for your untiring efforts, and thank you for managing a high-performing team,” Stewart said. “Job well done.”

Poppenberger said his time at Natick had passed quickly, and he gave credit to the PM FSS team.

“FSS, you’re held in such high regard around the world,” Poppenberger said. “At the end of the day, FSS provides an incredible capability.

“The sun never sets on FSS equipment and FSS mission.”



Lt. Col. Frank Moore, left, receives the Product Manager Force Sustainment Systems charter from Col. Maurice Stewart in a June 23 ceremony at Natick Soldier Systems Center.

Moore also talked of the important PM FSS mission.

“Great people, great mission, focused on the Soldier,” said Moore, “providing quality life support that’s safe, effective, reliable for our Soldiers while they’re deployed. It really doesn’t get (any) better than that.

“That’s a great mission, so I’m happy to be here and be part of that mission with you all.”



New Natick MWR website

Your Family and MWR team has a new, easy-to-use, mobile-friendly website -- natick.armymwr.com. This new hub will inform you about Army Community Service and Civilian Welfare Fund programs, installation and community events, resources from our partner organizations, and much, much more. Visit our new website today, and feel free to give us any feedback you think might make our site better.

natick.armymwr.com



Governor visits

Massachusetts Governor Charlie Baker, left, listens as Capt. Matt Porter, Force Provider assistant product manager, describes the base camp system during Baker’s July 14 visit to Natick Soldier Systems Center. Looking on are Mike Hope, combat field service equipment team leader for Product Manager Force Sustainment Systems; and Brig. Gen. William Cole, NSSC senior commander. In his first visit to NSSC, Baker learned about technologies being develop for U.S. warfighters.



Photo: Sgt. 1st Class Andy Yoshimura



Army scientists test fabric for new warfighter uniforms

By ECBC Public Affairs / ABERDEEN PROVING GROUND, Md. (June 24, 2015)

The [Defense Threat Reduction Agency](#) is leading an effort to design a new warfighter uniform - with added protection against chemical warfare agents.

Army scientists are using both standard and new methods to test fabrics, which will be used in the new suit.

The new uniform is designed to decrease thermal burden to the warfighter while maintaining the same or better protection against chemical agents. Different fabrics may be used in the uniform based on where heat is more common, like the chest and groin area; but a greater protection factor is needed for places where the warfighter is likely to come in contact with agent.

The effort is part of a joint U.S. Army and Air Force program called the Integrated Protective Fabric System program. It is led by the U.S. Army [Natick Soldier Research, Development and Engineering Center](#), or NSRDEC, in Natick, Massachusetts, and the [U.S. Air Force Civil Engineering Center](#). The [Edgewood Chemical Biological Center](#), or ECBC, is supporting the effort.

Industry and academia are also partners in the program including Calgon/Chemviron, Emory University, Enropics and Phasex.

In collaboration with NSRDEC, the ECBC Permeation and Analytical Solutions Branch recently tested agent absorption on different fabrics, which could be used. All testing needed to meet the chemical and biological defense program test and evaluation standards, as well as program requirements.

“Natick brought us on board based on our previous work with them, as well as our unique ability to test using live agents and our understanding of transport phenomenon,” said Brian MacIver, ECBC Permeation and Analytical Solutions branch chief. “The quality of our labs and test methods, and our reach-back support from subject-matter experts in toxicology and decontamination from across the center make us an ideal partner for this type of program.”

To test the fabrics, branch scientists used innovative and effective test methods to identify reactions. Scientists used three test methods - low-volatility agent permeation, air liquid vapor aerosol group and advanced super-shedding efficacy test - the latter being a brand-new capability developed specifically for this program.

ECBC researchers recently developed the low-volatility agent permeation method, which will soon become an official test and

Edgewood Chemical Biological Center researchers are part of a team looking to design a new warfighter uniform, which will decrease thermal burden to the warfighter while maintaining the same or better protection against chemical agents.

evaluation method with the Department of Defense for VX permeation through protective equipment. The deputy undersecretary of the Army-test and evaluation evaluated the test, which permits the experimental evaluation of protective materials against contaminants that were traditionally difficult to analyze.

Scientists used the air liquid vapor aerosol group test cell to evaluate multiple layers of experimental carbon and shell fabrics to measure quantitative permeation of specific agents through the material. From past development efforts, the scientists have been able to “well-characterize” the system and reduce variability in the data through more accurate control over testing variables that are inherent to it or any other test cell or device.

The branch supported the development of “super-shedding” coating capability specifically for this program. A modification of the air liquid vapor aerosol group method, the advanced super-shedding efficacy test method uses a different application of agent to the material. “With this method, we aided NSRDEC in their development of fabric that sheds [repels] liquid contamination,” said Christopher Steinbach, chemist. “The coating reduces agent permeation by allowing agent to run off the fabric.”

To perform the tests, scientists used the same advanced super-shedding efficacy test cells, but placed on a tilt table custom built by the ECBC researchers. The table was tilted at a range of 45 to 75 degrees so the agent could run off the fabric swatches. “The tilting represents a warfighter’s movements, as well as the how the uniform will naturally conform to their body,” Steinbach said.

Then samples of air were pulled from the cells every few minutes to develop a curve for the growth of the concentration of agent on the fabric. Scientists monitored the cells in real time for 24 hours, with 13 to 26 cells being used at a time. “The higher throughput allows for better statistics for evaluation,” Steinbach said.

Testing will continue through fiscal 2015. Any necessary follow-on testing will be conducted at the request of NSRDEC.

Collaboration and ingenuity reigned at the [United States Military Academy’s](#) and [Natick Soldier Research, Development and Engineering Center’s](#) Project Presentation Day.

The NSRDEC-hosted event featured presentations by USMA West Point cadets, demonstrating accomplishments and lessons learned during the 2014 Academic Year Research Collaboration with NSRDEC. The event was part of a larger collaboration effort between NSRDEC and USMA, which have a shared interest in researching innovative technologies for the Soldier.

NSRDEC’s Henry Girolamo developed and implemented the collaboration and continues to manage the effort. Girolamo and USMA’s Lt. Col. Michael Benson are the key points of contact under a Memorandum of Understanding, or MOU. The MOU involves joint research projects and the sharing of training sites, research staff, historical data, field equipment and facilities. Several NSRDEC technologies will also be deployed with cadets during USMA Cadet Leadership Development Training.

“The research being conducted at USMA is viewed as complementary to NSRDEC research and may promote beneficial and innovative improvements to NSRDEC products,” said Girolamo, lead — Emerging Concepts & Technologies, Warfighter Directorate at NSRDEC.

“The partnership between NSRDEC and USMA has allowed our faculty and cadets to engage in real-world problems,” said USMA advisor and assistant professor, Becky Avrin Zifchock, Ph.D. “From a faculty perspective, this ongoing relationship has allowed me to assist in the maturation of some initiatives, while advancing others that are still in early stages of development. The fresh thinking of the cadets brings a new and innovative perspective on both types of projects.”

During the NSRDEC-hosted Project Presentation Day, cadet teams discussed design enhancements to modular extendable rigid wall structures; a torso-load redistribution device to improve Soldier comfort, mobility and usability; a female head shape and helmet fit study related to female hairstyles; micro-climate cooling technology for the individual Soldier; a device that may help improve Soldier performance at the ankle joint; and the Cadet Leadership Develop-



Project Presentation Day highlights NSRDEC and USMA collaboration

By Jane Benson, NSRDEC Public Affairs / NATICK, Mass. (May 7, 2015)

ment Training field exercise. Research presented was conducted through year-long programs in multiple departments.

“The collaboration between USMA and NSRDEC provides great mutual benefit for both organizations,” said Benson, Ph.D., director, Center for Innovation and Engineering, Department of Civil & Mechanical Engineering, USMA. “Cadets have an opportunity to learn about and partner with NSRDEC on relevant challenges that they may soon see firsthand as junior officers. NSRDEC benefits from the innovation and passion of these motivated cadets and faculty with their unique blend of Army experiences and the strong academic program, as well as the long-term investment of increasing awareness across the ranks as to the mission and capabilities of NSRDEC. Strengthened with summer internships, USMA and NSRDEC both have great potential to continue to reinforce a successful partnership in service to the nation.”

“Overall, it was an amazing experience from both a mechanical engineering student and future U.S. Army officer prospective,” said West Point cadet Angela Bapp, who worked on the torso-load redistribution project. “It was inspiring to work so closely with Ms. (Karen) Gregorczyk and her engineering team to see what resources and facilities are available at such a large engineering center. The direct impact these technologies have on the future Soldiers I will soon lead also left me awestruck. I am extremely grateful for the experience of working with the teams at Natick and challenging myself and my team to solve a real-world, complex Soldier design problem. The opportunity to brief Brig. Gen. (William E.) Cole, Brig. Gen. (Timothy) Trainor, Command Sgt. Maj. (James P.) Snyder and other senior leaders at the Natick facilities was also a phenomenal experience.”

In the future, the collaboration may be expanded to include additional areas of research.



Natick employee recipient of 2014 Secretary of the Army award

By Tazanyia L. Mouton, USAG-Natick Public Affairs / July 9, 2015

A [Natick Soldier Systems Center](#) employee received the Diversity and Leadership Programs Award for exceptional service at the annual Secretary of the Army awards ceremony.

Donna Leon, a lead technical writer/editor and team leader for the Aerial Delivery and Soldier Protective Equipment Logistics Support Team at the [Soldier Product Support Integration Directorate](#), said she is honored to have gotten this recognition.

“I feel almost as if I’m living a dream,” said Leon, “because I never would have thought that doing what comes natural, or what means a lot to me, would affect so many people or people would take notice.”

Leon, who also was recognized last year by the [National Association for the Advancement of Colored People](#) as the U.S. Army’s recipient of the 2014 Roy Wilkins Renown Service Award and received the 2015 [Greater Boston Federal Executive Board](#) Outstanding Diversity and Inclusion Award, said she strives to always help others when she can.

“Sometimes, just offering a hand makes all the difference,” said Leon. “It makes people feel good. It lets them know that they are seen.”

Leon, who at a young age had to overcome segregation and racism, said this diversity award is something she stands behind.

“That’s very important to me, especially bringing people together regardless of ethnicity or race or anything like that,” she said.

Leon regularly volunteers with several councils and committees that are managed by the Equal Employment Opportunity office, and she also encourages participation in community events to educate and reinforce knowledge in a diversified environment.

“I think it’s easy to complain about unfair treatment if you don’t make an effort to participate,” said Leon. “So my goal is to strengthen the talents.”

One way Leon said talents can be strengthened is by identifying and working on one’s shortcomings, and she added that it’s impor-

tant for people to work more as a team and help their fellow man.

“When other people see you trying to do the right thing,” said Leon, “they tend to follow suit.”

Leon said her concern for others was instilled in her as a child by her parents. From a young age, she always wanted to help other children and her older relatives.

“Of course, throughout my years, I, too, have been the recipient of someone’s kindness, kind words, (or) acts,” Leon said. “It just further instilled in me that whenever possible, do what you can for somebody else, because it makes a difference.”

Hard work, honesty and integrity are most important to her, Leon said.

“It’s all in order to establish a more open communication, more stable relationships,” said Leon. “Whether they are friends, or co-workers, or acquaintances, they know that what you speak is true.”

Leon said she is humbled by this latest award.

“Whether I had won or not, it meant all the world to me that someone took the time to try to recognize me,” said Leon. “I didn’t ask for recognition for the things that I’ve done, and that I hope to continue to do.

“I did it because I wanted to do it. That’s a part of who I am.”

Leon also spoke about what leadership meant to her.

“There are a lot of upright people who assist, encourage and promote the wellbeing of others. They try to serve with proper morals, be supportive, and do not expect credit,” said Leon.

“They are true leaders.”

According to Leon, true leaders are grateful for the good things that occur, and are able to stand up when the bad things occur.

“Ask yourself these questions,” Leon said. “If no one knew of what I try to do for the good, would I still do it? If my effort leads me to an uncomfortable situation, would I waver?”

“Recognition for certain actions or accomplishments is encouraging and that is OK, but do not do things simply because you want to be noticed.”

Leon added that it is important to recognize and know what your motivation is.

“You can feel good about what is accomplished and good about yourself without being false,” said Leon. “Get involved, get others involved, and do things that are good and have a positive impact.

“Most of all — remain humble and grateful.”

Jerry McCarthy, an engineering technician at the Natick Soldier Research, Development and Engineering Center, or NSRDEC, is committed to Science Technology Engineering and Mathematics, or STEM, outreach. He helps high school students take their robotic designs to the next level by teaching them fabrication skills and how to safely use tools.

Jerry McCarthy’s skills and experience benefit Soldiers, students and even a few robots.

McCarthy is an engineering technician at the [Natick Soldier Research, Development and Engineering Center](#), or NSRDEC, and he is committed to [science, technology, engineering and mathematics](#) outreach at Natick High School. He works extensively with the robotics teams.

“Jerry is a terrific asset to the Fabrication Cell at NSRDEC, where his talents run the gamut from expert operation of a variety of Computer Numerical Control machines, such as lathes and milling machines, to welding and fabrication of new prototypes and equipment for the Soldier,” said Ken Rice, team leader for NSRDEC’s Design Engineering and Fabrication Team. “Jerry has taken a strong interest in STEM outreach, taking considerable personal time to help local students compete in national robotics competitions.”

McCarthy enjoys bringing his knowledge to local students.

“Teaching is something I like doing,” McCarthy said. “I have a passion for what I do, and I like to share it with people.”

McCarthy believes that hands-on learning is essential. By building the robots themselves, the students increase their mechanical understanding of how things operate.

“Participant involvement is a huge part of teaching,” he said.

Doug Scott, 2014 Massachusetts STEM Teacher of the Year, values McCarthy’s help and expertise. Scott is a lead teacher for [ROBONATICK](#). He led the [Natick High School Lemelson-MIT InvenTeam](#) to the [White House Science Fair](#), where the team presented a robotic device used to assist firefighters performing underwater rescues.

“The skills Jerry taught to my students will last a lifetime,” said Scott. “He was generous with his time, patient with the students, and



Building a Future

Natick employee helps students bring robots to life

By Jane Benson, NSRDEC Public Affairs / NATICK, Mass. (July 6, 2015)

made sure each student had an opportunity to learn. I am thankful for the time he was able to spend with my students.”

One Natick High School student believes that by teaching them fabrication skills, McCarthy helped students take their robots to a higher level. Fabrication skills enabled club members to be better able to make custom parts, an important aspect of robot creation.

“Little tricks make a big difference,” said McCarthy. “Typically, you have to work in the trade for years to know these things.”

Another student appreciated the chance to use an arc welder and other tools that would have been difficult for her to learn on her own. McCarthy also taught the team about the drill press and band saw.

“These tools are handy to have,” said McCarthy. “But if you misuse them, they are also

very dangerous. It’s important to teach the students proper techniques and safety.”

“The best and most effective STEM outreach occurs when individuals, such as Jerry, share their time and talents with the young adults in our community,” said Joanna Graham, NSRDEC’s STEM outreach coordinator. “Natick High School’s robotics team not only had the opportunity to learn from one of our subject matter experts in the field of metal fabrication and welding, they got to see firsthand how important science, technology, engineering and mathematics is in creating tangible solutions to real-world problems.”

“These kids are very open to learning,” said McCarthy. “The evolution of their knowledge is amazing. They are doing this on their own time after school. They take it seriously. These kids are brilliant. I’m hoping some will become future (NSRDEC) employees.”

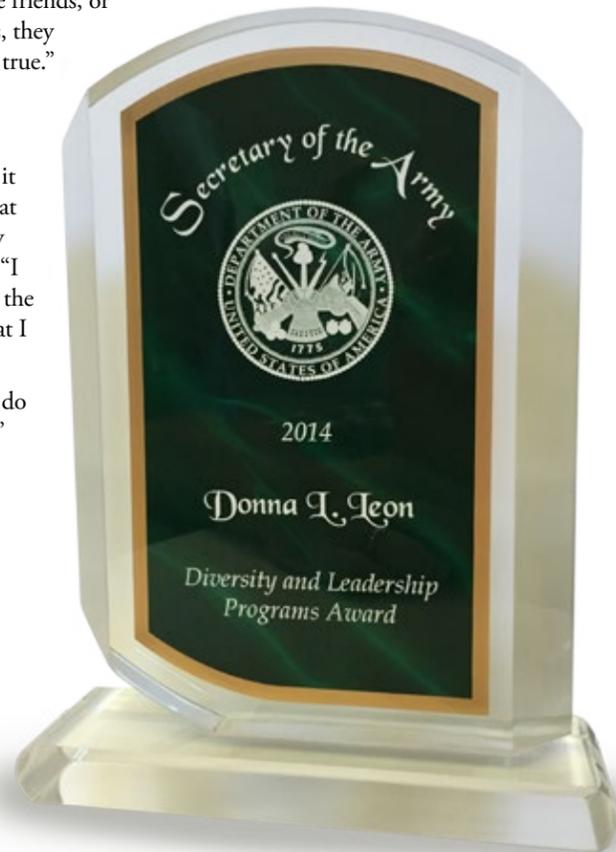




Photo: U.S. Army



Pam Kartachak is the G6 for the U.S. Army Research, Development and Engineering Command and chief information officer for the U.S. Army Edgewood Chemical Biological Center.

Knowledge Management

Key requirement for collaboration, innovation

By ECBC Communications / ABERDEEN PROVING GROUND, Md. (June 18, 2015)

The rapid pace of technology continues to be a catalyst for the way people live, work and play. Network connections have promoted mobile-computing applications, which have increased access to information and knowledge sharing, and as a result, empowered communication on an individual and organizational level. But is the network secure?

The U.S. Army [Edgewood Chemical Biological Center](#), or ECBC, Research and Development, or R&D, Information Technology, or IT, Enterprise uses the Defense Research

Engineering Network, or DREN. Its secure network technology facilitates how scientists and engineers are able to get the right information to the right people at the right time to fulfill their mission to advance chemical and biological defense.

The ECBC Corporate Information Office is the backbone for the center's operations and has recently been established by [Army Materiel Command](#), or AMC, as the Research and Development Center of Excellence for DREN supported SharePoint and data center

consolidation. These Army-directed consolidations create efficiencies meant to reduce costs and minimize the IT services footprint.

The ECBC R&D IT Enterprise provides for Army-directed savings while serving as a mission enabler and business integrator to the R&D community. ECBC chief information officer, or CIO, has worked with AMC to consolidate its customer support to include the Headquarters, Department of the Army Installation Preparedness Program, Office of the Secretary of Defense, Plans Integration and Analysis Office, Program Executive Office, Assembled Chemical Weapons Alternatives, U.S. Army Research, Development and Engineering Command Headquarters, Army Research Laboratory, [Natick Soldier Research, Development and Engineering Center](#), Army Material Systems Analysis Activity and Chemical Materiel Activity, or CMA.

"While managing the risk inherent to a research environment, we are able to respond to the unique requirements of the scientists and engineers that may need certain software to do their jobs," said Pam Kartachak, the G6 for the U.S. Army Research, Development and Engineering Command, and chief information officer for ECBC and CMA. "We feel we are making a difference in our ability to provide for the unique IT requirements needed by the R&D community."

"We use the Defense Research Engineering Network to provide information technology operational support to all three of these organizations and consider them a part of our enterprise," Kartachak said. "The security measures we've put in place allow us to manage the risk of an R&D-based network, like the DREN, while still providing a flexible system that is suitable for the dynamic environment these organizations are in."

One of the ways CIO is able to achieve security in conjunction with ease of user access is through a defense-in-depth strategy, which achieves information assurance in a highly-networked environment. Multiple

layers of network protection are integrated through different ports and protocols across people, technology and operation areas, and ultimately allow for data sharing across the enterprise.

Paul Brozovic, ECBC deputy CIO, said the Department of Defense has put a strong emphasis on cybersecurity in recent years. The Federal Information Security Management Act of 2002 developed outcome-based metrics for information security performance of federal agencies, including security management tools, benchmarking and continuous monitoring, and certifications and accreditations.

By the end of December 2015, RDECOM will have 101 systems for accreditation in the Army Portfolio Management System. These systems are developed by ECBC, where they are built and tested before being handed off to the Army for operational use.

"Technology changes so fast so we continue to look at our infrastructure - the servers, the network switches - all of that is reviewed and updated on a regular basis so we're as modern as we can be within the constraints provided to us," Brozovic said. "When it comes to the R&D world, the best we can do is make sure we've got the greatest network so that the scientists and engineers, who are dreaming up the thing of the future, are not constrained by the ability to develop and test based on the technology we have."

This creates an interesting tension for many government CIOs. On the one hand, there is a need to have cutting-edge technology necessary for effective mission execution. On the other, dwindling budgets and heightened cybersecurity demands are constraints that may limit technology's potential use.

For example, security requirements have prevented government adoption of cloud computing while many federal workers use Blackberry mobile devices despite the increased demand for Apple products. Not to mention, computers will soon be upgraded to Microsoft Office 2013.

"Even when we upgrade to what's new, we're working with what's older," said Ron Ward, chief technology officer for ECBC. "Because all of those things have to be vetted and security features have to be added in and blessed before use. That's where the government has a hard time staying ahead of approved products as they come out."

It presents a complex problem, which ECBC's CIO has embraced with steadfast

simplicity. Instead of getting caught in the whirlwind of what's next, ECBC has centered its focus on working within. Technology is not about a given product, it's about maximizing what employees can do with the product when it is backed by a secure network. One way to do that is using servers to secure data and minimize risk should something happen to a given device. Protecting critical information goes hand-in-hand with how knowledge is managed, whether it is inside the lab or out in the field.

"We are moving from the information age, where it was all about capturing and storing vast amounts of information, to the knowledge age, where the focus has now shifted to how we access, use and share this information to facilitate mission performance and enable better decision-making."

Mike Matejevich, ECBC

ECBC's CIO has a history of providing network access to deployed personnel. Many organizations like ECBC and CMA, which are in the chemical, biological, radiological, nuclear and explosives space, share aspects of a common chemical demilitarization mission to clean up sites located across the country.

Ward said CIO provides IT support for personnel traveling to remote locations and rely on reach back capabilities here at Edgewood.

"We came up with a remote access solution, using encryption and commercially available Mifi devices," Ward said. "The devices have Wifi on one side and cellular service on the other so it allows you to take a network with you wherever you're going. The low bandwidth network service also allows you to emulate a desktop so you can do a lot of work over a small amount of bandwidth."

This kind of mobile-computing capability helps personnel continue to deliver quality customer solutions without interruption in time or schedule, and as a result, keeps costs to a minimum. Facilitating connections with partners and customers has always been at the heart of CIO. In addition to a secure network, CIO has also leveraged informa-

tion sharing tools like SharePoint to develop custom ways for project teams to collaborate across their organization, as well as with external partners in academia and industry.

"That's a huge enabler for collaboration with industry and academia because it allows for a secure way for nongovernment employees to gain access securely to our SharePoint system," Kartachak said. "We've configured our systems to accept electronic certificate authorities, or ECA cards, which allow our scientists to reach out to universities and share information in a very controlled way."

ECAs were the result of an early DOD initiative in 2005 to use two factor identification, such as a PIN and Common Access Card, and according to Brozovic, ECBC CIO was one of the earliest adopters in the Army to implement two factor identification into its systems, regardless of network, whether it is the DREN or the Nonsecure Internet Protocol Router, which is used to exchange sensitive but unclassified information.

With increased knowledge sharing comes the need to manage it effectively. ECBC CIO is leading a knowledge management effort to champion the proactive use of its systems and support the organization in creating, assimilating, disseminating and applying its knowledge, especially as an older generation of federal workers look to retire.

"KM is becoming a very important part of CIO, and I think it's an emerging requirement for succession planning, capturing institutional knowledge and supporting innovation," Kartachak said. "It's about having a legacy and what kind of culture you want to build. We're ultimately the enablers for this institutional knowledge."

"We are moving from the information age, where it was all about capturing and storing vast amounts of information, to the knowledge age, where the focus has now shifted to how we access, use and share this information to facilitate mission performance and enable better decision-making," said Mike Matejevich, knowledge manager for ECBC.

As the pace of technology accelerates, CIO recognizes the critical need to capture the key knowledge of the ECBC workforce, promote innovation and collaboration, and enable information sharing in a secure way. It is no longer about storing and accessing information. It's about streamlining data for easy access and intended use. It's about managing content and encouraging engagement. It's about simplifying the present to embrace the future.



NSSC celebrates 240th Army Birthday

By Bob Reinert, USAG Natick Public Affairs / NATICK, Mass. (June 16, 2015)

The [Natick Soldier Systems Center](#) observed the [240th Army Birthday](#) with a cake-cutting ceremony June 12 in Hunter Auditorium.

Before the cake was cut and served, Col. Mark R. Withers of the [U.S. Army Research Institute of Environmental Medicine](#) addressed the gathering. He noted that the Army was born less than 20 miles away, on Cambridge Common, in 1775.

“We have come a long way in almost two and a half centuries,” Withers said. “In the dire days of the Continental Army, we recall, Washington’s troops faced shortages of food, of supplies, of medicine, of ammunition, and at times, very serious shortages of morale.”

As Withers pointed out, the Army more than overcame that shaky start.

“Today, our Army is more flexible, more innovative, and certainly much better resourced to face the complex challenges that confront us,” Withers said. “Ensuring the nation’s liberty has been the Army’s proud and sacred duty since its earliest days.”

Withers made reference to famous battles in the Army’s history: Bunker Hill, Gettysburg, Normandy, Pusan, Ia Drang and Fallujah. He added that the Army has been on the offensive against “violent extremists” for more than 14 years now.

“In our time, we have served as not only Soldiers, but as diplomats, teachers, social workers — not just warfighters, but as peacekeepers,” Withers said. “In a word, we have been asked to be more professional in our

soldiering than previous generations. And for longer durations.

“Fresh challenges emerge, even in this morning’s headlines. But with every new challenge, and without fail, this Army has risen to the occasion.”

For 60 of those 240 years, said Withers, “Natick has helped ensure that the Soldier has every possible technological advantage on the battlefield. At USARIEM, we are on the forefront of research that continues to change the Army. The ‘physical demands’ study conducted by USARIEM on behalf of TRADOC will set the new standards for all military occupational skills and determine what a Soldier — regardless now of gender — needs to do to perform her or his job.”

[Product Manager Force Sustainment Systems](#) at Natick has also made important contributions, Withers said.

“The PM-FSS has developed a quality living space for Soldiers when deployed,” Withers said. “And not only are the Force Provider kits being used by Soldiers at the FOBs, but the United Nations is purchasing them for use in settings around the world.”

Withers said that the people of NSSC should be proud of the hard work they had done to keep Soldiers safe.

“And everyone here should experience a well-deserved surge of pride seeing a news report of returning Soldiers and being mindful that the work you do here has helped to protect them as they defend us,” Withers said.

He reminded the audience that the Army’s story is truly America’s story.

“We are a place where anyone with a desire to serve, an ability to perform, and a drive to excel can achieve great things,” Withers said.

Withers said the current generation of Soldiers bears the burden — and privilege — of carrying on for past generations extending all the way back to the War for Independence.

“Please take a moment today to remember our Soldiers, and the other service members, who are now serving in harm’s way,” said Withers, “and the families who are supporting them.”



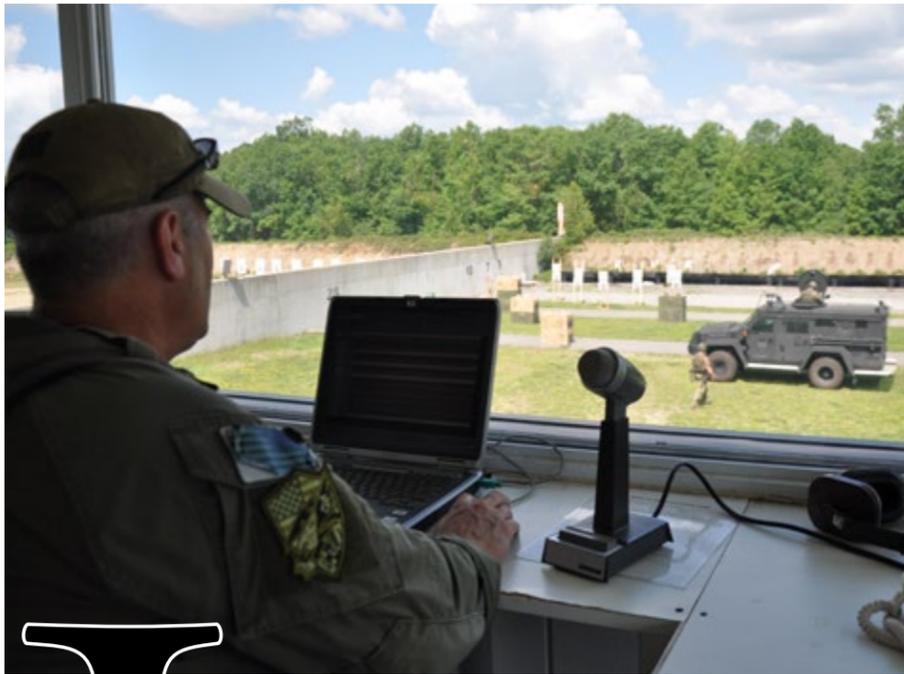
Members of the Massachusetts State Police Special Tactical Operations Team fire on targets at the FBI’s automated range on Fort Devens.

Photo: Bob Reinert, USAG Natick Public Affairs

Straight Shooters

FBI, police benefit from Devens range complex

By Bob Reinert, USAG Natick Public Affairs / NATICK, Mass. (June 16, 2015)



Just over a decade ago, not much more than stationary cardboard targets and a sand berm stood on Tango Range. All that has changed.

In the time since the [FBI](#) occupied a good portion of the range on [Fort Devens](#)' South Post in 2004, a modern three-acre complex has risen from the once-barren site. Today, it bristles with a pair of automated ranges, a shoot house, and a nearly completed permanent classroom building and rappel tower.

"It's a very unique area, especially in New England," said Special Agent Ed Kappler, the [FBI Boston Division](#)'s SWAT team leader and principal firearms instructor. "This is large enough that we can accomplish a lot ... here, especially within the proximity of Boston and larger metro areas. It's a pretty good deal for us to come out here.

"There's other ranges to go to, but ... I could bring a SWAT team in and we could do everything here that you might have to use separate ranges for."

The Fort Devens leadership sees its relationship with the FBI as mutually beneficial.

"We have an excellent partnership with the FBI," said Lt. Col. Steve Egan, U.S. Army Garrison Fort Devens commander. "Because of our range staff and their knowledge, we are able to work with the FBI to ensure they are able to conduct the necessary training exercises for their agency."

Up until recently, Sean Lehane served as deputy to the garrison commander at Fort Devens, whose current mission is to serve as a training resource for thousands of [Army Reserve](#) and [National Guard](#) Soldiers spread throughout the six New England states.

"It's very nice because primarily they're using (the complex) during the week," Lehane

said of the FBI. "Our core customers — and I'm talking the entire range — (come in on) weekends. It kind of complements each other, in terms of using the full facility.

"The FBI ... has done a good job of complying with our regulations. But we're able to fit it and mold it to where they meet their training objectives and we are able to meet our regulatory requirements in the process."

According to Keith Jackson, Fort Devens Range Control chief, the Fort Devens-FBI relationship has grown over the years.

"We have a really good relationship overall," Jackson said. "We're trying to take care of each other."

The FBI had begun firearms training at Fort Devens in the 1980s, but it wasn't until Kappler took over as regional firearms instructor 11 years ago that the Bureau began to establish a permanent physical presence.

"When I took the job, I took it with the caveat that I want to really do some stuff out here," Kappler said. "Our training is different than military or ... Reserve force training."

According to Kappler, FBI agents must shoot and move during weapons qualification.

"We have to qualify quarterly," said Kappler, who has served 18 years with the FBI.

Kappler worked with the Fort Devens Engineering Office on the range concept, and he traveled to other ranges around the country for ideas about how to customize it. The FBI has provided approximately \$3 million over the years to make it a reality.

The complex began with the installation of the automated outdoor ranges and continued with the construction of the shoot house.

"We use the shoot house for live-fire entry training with the SWAT teams," Kappler said. "Our SWAT operations unit down at Quantico (has) this place ... on their radar as a place that we can do some specialty training, bring people in from all over the country."

The complex will become even more valuable once the tower facility is completed.

"That is just a phenomenal ... training resource," Kappler said. "We designed it so that we could do interior training tactics with stairs, which is huge for us. (There are) danger areas going upstairs, downstairs.

"And we also built it so that we could rappel, we could fast rope out of it, use it for vertical-insertion training. We can climb it."

Kappler said that the Fort Devens facility has enhanced the capability of the FBI Boston Division's SWAT team.

"After we got the automated target system and we got the shoot house, then we (could) start getting our training a little more aggressive," Kappler said. "We can do different courses with them to where we're really, really pushing their proficiency. We're really pushing their abilities. As everybody knows, the more you exercise, the better shape you get in.

"Over the years, what we have seen with these ranges and being able to do some of the stuff — especially in the shoot house — our tactical proficiency has increased exponentially. There's not too many places in the country where you can get guys with loaded weapons moving through the woods and ... do a live-fire clear of the (shoot) house."

The complex has benefited other agencies, as well. Kappler has worked extensively with the [Massachusetts State Police](#) and local police departments.

"This range, over the years, has provided a lot of relationships," Kappler said. "It's great for liaison with the local police departments."

Kappler related how the FBI facilities even proved useful to the Army's [10th Mountain Division](#) just before it deployed.

"They were standing up a (Personal Security Detachment)," Kappler recalled. "They had nowhere to train, and they were going overseas. They were going over to Iraq in like four weeks. They couldn't get into training. They gave us a call."

The FBI and Massachusetts State Police combined to offer the Soldiers a comprehensive, weeklong school. Kappler said he will never forget the heartfelt thanks he received from a 10th Mountain senior NCO.

"It meant a lot," said Kappler, who stayed in touch with the Soldiers during their deployment. "It was awesome."

Where the FBI once used Tango Range about 80 days a year, Kappler now estimates that it's closer to 130 days annually.

"We occupy this place a lot more than what we did," Kappler said. "Just since I've been here ... we've shot, just on this range alone, over four million rounds, and we've not had one unsafe act that resulted in an injury.

"We're going to be here for quite a while," Kappler said. "I feel both fortunate and proud of this place."



FBI Special Agent Ed Kappler stands in front of a climbing wall at the Bureau's range complex on Fort Devens.



Medical supplies, such as IV solution bags, will be kept cool on the way to treat heat injuries by the Heat Ailment Recovery Pack, or HARP, developed by the Natick Soldier Research, Development and Engineering Center.

'Cool effort'

NSRDEC helps warfighters with heat injuries

By Bob Reinert, USAG Natick Public Affairs / NATICK, Mass. (June 26, 2015)

In hopes of bringing medical treatment to Soldiers on remote battlefields in warm climates, the folks at [Natick Soldier Research, Development and Engineering Center](#), or NSRDEC, recently put forth a "cool effort."

The Heat Ailment Recovery Pack, or HARP, is being developed by the Joint Foodservice Engineering Team, or JFET, of the [Combat Feeding Directorate](#) at NSRDEC. It will help personnel maintain

medical supplies at the proper temperatures and keep potable water cool until medical attention can be administered to Soldiers with heat-related injuries.

"They don't have this capability at all," said Ben Williams, a mechanical engineer with JFET. "It's never been done before. It's a brand-new concept."

Williams was approached about a year ago by deployed [Joint Special Operations Command U.S. Africa Command](#), or JSOC AFRICOM, personnel about developing something to cool water and medical supplies to treat individuals, who are suffering from heat-induced medical conditions. Together, they approached the Rapid Equipping Force, which approved the funds to produce four of the bags for testing and evaluation.

"I love working directly with people in the field because it makes your job easier," Williams said. "You're not trying to develop products in a vacuum, and you're not making products that people don't want. It makes your life easy."

Williams had already helped Soldiers in the field cool water with the Beverage Cooling Unit and maintain water temperature with the Insulated Container for Bottled water. JSOC AFRICOM wanted Williams to combine the two concepts, providing a means to not only maintain the temperature of medical supplies and bottled water, but to cool them on demand, when necessary.

"Being able to provide Soldiers on the ground with medical supplies and water at the proper temperature after an extended, or even an indefinite, period of time in remote locations is a major challenge," Williams said. "The state-of-the-art technology before the HARP for this application was just your standard portable, plug-in refrigerator. The HARP is a completely new concept, which can either maintain the contents' temperature or drop it to acceptable levels within minutes, depending on what the user requires."

Williams and Brian Grady, an equipment specialist with the NSRDEC [Aerial Delivery Design and Fabrication Team](#), got to work making the concept a reality.

"We have to actually make this from scratch," Grady said. "We're not production; we're prototype. But to build four of these? It's a production process, and we tackle it and get it done."

"Obviously, it's not a parachute, but its fabric. We have a lot of these items that we take in, too. Who else will build this?"

The result was a 23-inch-wide, by 26-inch-long, by 20-inch-high pack, which weighs up to 60 pounds when fully loaded with medical supplies and water. Its micro-refrigeration unit is powered by a BB-2590 lithium-ion battery, which can be run continuously for three hours in 120-degree temperatures.

"You can drag an IV bag or medical supplies down to 50 degrees off of one battery from 120 degrees, if you just let it run," Williams said.

An integrated flexible solar panel can also be used to recharge batteries and extend the HARP's runtime while acting as a solar shade for the system.

"It needs to be a self-sufficient system, capable of running indefinitely," said Williams in explaining the solar panel.

The HARP, coated with a newly developed infrared-reflecting material, can cool its contents down from 120 degrees to a usable temperature of 98 degrees in a mere 15 minutes. Using its remote control and monitoring system, the HARP can keep an IV fluid bag constantly usable (below 98.6 degrees) for 100 hours in 120-degree temperatures, all while being monitored and controlled from a distance of up to 100 feet.

"Remote monitoring and control is an absolute necessity, especially when the system is stored on the outside of the vehicle or in a cargo area," Williams said.

The HARP is also capable of being broken down and configured for man-transportable use within minutes, while still maintaining its cooling capability. [Modular Lightweight Load-carrying Equipment](#), or MOLLE, features with integrated shoulder straps added to its backside allow the bag to be worn like a backpack or attached to and carried on another pack.

"It's actually a two-bag system," Grady said. "The challenge was [working with] the fabric ... and how unforgiving the fabric was. There's no room for error with the fabric."

Most of the work on the HARP was done at NSRDEC, but four other Army agencies and two outside companies ultimately were involved in the process.

Eight months after the need for the HARP was determined, four were sent to the REF, May 20. Another four systems are scheduled to be fielded to the [U.S. Army Medical Materiel Agency](#) for user evaluation aboard MEDEVAC aircraft.

"I think we did a great team effort on this one, because we got everyone involved and leveraged all of the necessary skills to get the job done," Williams said. "We have the capability here at Natick to take a Soldier's need and turn it into a reality. It's a cool effort."

1st Lt. Matthew Greene unveils the sign for "General Greene Avenue," the roadway leading to the gates of the Natick Soldier Systems Center, or NSSC, which was renamed July 10, 2015, in honor of his father and NSSC's former commander, Maj. Gen. Harold J. "Harry" Greene, who was killed in Afghanistan, Aug. 5, 2014.



HONORING A HERO

Town of Natick dedicates 'General Greene Avenue'

By Bob Reinert, USAG Natick Public Affairs / NATICK, Mass. (July 10, 2015)

To honor a former [Natick Soldier Systems Center](#) commander who was killed in [Afghanistan](#), the [Town of Natick](#) renamed the street that leads to the installation's gates, July 10.

"General Greene Avenue" was dedicated in the name of [Maj. Gen. Harold J. "Harry" Greene](#), who died Aug. 5, 2014, at age 55. At the time of his death, he was deputy commander of the Combined Security Transition Command.

Greene became the highest-ranking U.S. officer killed on foreign soil during wartime since the [Vietnam War](#). He had served as Natick's senior commander from 2009 to 2011.

The dedication ceremony was attended by his widow, Dr. Susan Myers, children Army 1st Lt. Matthew Greene and Amelia Greene, daughter-in-law Kasandra Greene, father Harold F. Greene, and brothers Jon Greene and Steve Greene. The ceremony featured the unveiling of the street sign on the corner of North Main Street and the former Kansas Street.

Myers said that Greene loved Natick not just because he was a Massachusetts native and the state was home to his favorite teams, but because the installation's mission was so important.



"I especially loved Harry's gift of translating complex ideas so that everyone could understand what needed to be done and then encouraging us to do and be our best,"

Myers said. "Many of you know how he loved to make this tough work fun but also ensure that we planned for the future, such as getting resources to improve facilities, to recognize people for their excellence, and to thank us for supporting him."

After the dedication, a "Soldier's Cross" - consisting of a bronze helmet, inverted rifle with bayonet, and combat boots - was revealed near the NSSC main gate. The memorial to Greene was funded by Hanscom Federal Credit Union, and the Natick Veterans Relief Fund donated the benches placed near it. The memorial bears a plaque that includes Greene's name, dates of his birth and death, the years of his command at Natick, and this inscription: "A Soldier's Soldier who truly served his Nation with honor."



Left: The Natick police color guard marches by the sign for General Greene Avenue shortly after its unveiling in Natick.

Below: The "Soldier's Cross" memorial to Greene is unveiled near the NSSC front gate.



The dedication of General Greene Avenue marked the end of a year-long, \$2.5 million project to improve the roadway. The collaborative effort involved the Town of Natick, the [Commonwealth of Massachusetts](#) and NSSC.

Josh Ostroff, of the Natick Board of Selectmen, called it a "worthy endeavor," noting that the man for whom the avenue is named "encouraged collaboration and teamwork. He loved his country and he used his unique skills as an engineer, a communicator, a team builder and a leader to serve the nation, and that was the hallmark of his career and of his time leading this base."

Ostroff also read letters from U.S. Sen. Elizabeth Warren of Massachusetts, U.S. Sen. Ed Markey of Massachusetts, and U.S. Rep. Katherine Clark of Massachusetts.

Massachusetts State Senate and House of Representatives resolutions were read by Sen. Richard J. Ross and Sen. Karen E Spilka, and Rep. David Linsky, respectively.

Maj. Gen. Scott Rice, the adjutant general of the Massachusetts National Guard, attended Rensselaer Polytechnic Institute with Greene. He related a piece of advice that Greene was fond of sharing.

"He said, 'Everything you do - everything - is about people,'" Rice recalled. "I thank God for that time that I had with my friend, Harry Greene, and his family."

Brig. Gen. William Cole, current NSSC senior commander, recalled how Greene was once his boss and how he would rise early one day each week for a video teleconference with Cole, who was in Afghanistan.

"I loved working for Gen. Greene," Cole

said. "He always helped me solve problems and meet challenges. Whenever we spoke, he gave me 100 percent of his attention and shared smart advice that came not only from his head, but also from his heart."

"He was a universally admired leader. I thank God for having put Gen. Greene in our lives, and I ask that we all do our best to exemplify his legacy of selfless leadership."

John Harlow, Greene's public affairs officer at NSSC, remembered the fun-loving side of his former boss. He asked those in attendance to adopt some of Greene's zest for life.

"Smile a little more often, laugh a little more often, and truly care about the people around you," Harlow said. "If you do that, there will be a little bit of Gen. Greene in each and every one of you."

Myers said that Greene loved the people of Natick like they were his family.

"Harry loved the challenge of helping find sustainable and effective solutions to tough problems and was not afraid to tell people what he thought they needed to hear," said Myers, "even if it was not popular or something we wanted to hear."

"We can do better like Harry did by taking responsibility, accountability and leading

by example. Thank you for your dedicated service and for helping us carry Harry's legacy forward by actively contributing to the betterment of our families, communities, nation and the world."

Myers joked that Greene was always working on his social skills while at Natick.

"Harry loved to get to know as many of you as possible because he genuinely cared and loved you as he loved his family," Myers said. "He loved the joke about the extrovert engineer being the one who looked at other people's shoes instead of his own."

After the ceremonies, Greene's son spoke about memories of his father.

"I would remember my father as a very intelligent man," Matthew said. "He was someone that was probably one of the Army's leading technological innovators. He liked to shake things up."

"My father was a hard worker, a dedicated Army man. He spent a lot of time on the road, especially as I got older, making sure that he fulfilled his duties to the country. But there was always time and opportunity ... for his family."



"I would remember my father as a very intelligent man. He was someone that was probably one of the Army's leading technological innovators. He liked to shake things up."

1st Lt. Matthew Greene

Test Case

Evaluating protective eyewear and soft-body armor

By Jane Benson, NSRDEC Public Affairs / NATICK, Mass. (June 9, 2015)

Researchers, at the [Natick Soldier Research, Development and Engineering Center](#), or NSRDEC, have devised new, more operationally-relevant ways to evaluate protective eyewear and soft-body armor. These new test methods and apparatus are transitioning to the [Aberdeen Test Center](#), or ATC, and will be incorporated into standardized test operating procedures.

The quick transition to ATC has been enabled by the Science and Technology, or S&T, Objective, or STO, Force Protection Soldier and Small Unit program, formerly TeCD 1b, which focuses on aligning and transitioning science and technology projects to programs of record and various customers.

“STO Force Protection: Soldier and Small Unit comprises 77 projects that are delivering knowledge products, materiel, and test methods - all aimed at understanding and increasing Soldier performance and protection in an operationally relevant environment,” said Jaclyn Fontecchio, STO lead, NSRDEC [Warfighter Directorate](#). “New and relevant test methods are critical to the ability to accurately assess products or systems during their S&T development. As new products emerge through research and development, the use of standard test methods, as is or modified, are not always applicable particularly when dealing with revolutionary or novel products and materials. In many cases, new test methods are required to measure parameters of interest and require an upfront investment. Failure to do so can lead to non-conforming products, shortened product service life, and increased testing costs.”

Natick’s new test methods for protective eyewear and soft-armor protection were needed to evaluate

evolving, state-of-the-art protection and new materials/designs, in situations where previous methods were incapable of testing the new materials/designs accurately.

The new test methods include a soft-armor flexibility test, a soft-armor durability test, an eyewear abrasion test, and an eyewear anti-fog test. The new NSRDEC-developed tests are consistent, accurate, reliable, repeatable, and most important, operationally relevant, to ensure that equipment better meets the needs of Soldiers.

SOFT ARMOR TESTING

Previous test methods, which existed for evaluating soft-armor flexibility and durability were written based on woven fabric constructions.

These methods were inapplicable to new, higher-performance materials, which were not made of woven construction.

NSRDEC developed a flexibility test for soft armor, which consists of a spherical bend procedure that characterizes the flexibility of multilayer, soft armor ballistic panels.

“Previous soft-armor tests didn’t really translate to someone wearing it in a real environment,” said Robert DiLalla, ballistic and blast thrust area manager. “There was no means to say, was this too hard or too soft? So, we came up with a study that took soft armor panels that were comprised of materials of varying stiffness and put them on Soldiers and had them do a set series of tasks. We asked them how the overall comfort was and took goniometer and reach measurements. We then developed a method by which we could take a

Continued on pg. 31

The Big Picture ...

by Jane Benson and Craig Rettie, NSRDEC

Natick looks to nanotechnology to advance future food packaging and textiles, creating new and better ways of wrapping everything from MREs to Soldiers themselves, and potentially creating whole new categories of super products—clothing that rarely or never needs washing, lenses that never fog, and packaging that can keep food nutritious for extended periods.

is Small

Thinking small is the key to developing future food and clothing technologies for the Soldier—such is the conclusion of researchers at the [U.S. Army Natick Soldier Research, Development and Engineering Center](#). Scientists there are using nanotechnology, the engineering or manipulation of materials or systems at an atomic or molecular scale, to improve packaging—both for the food Soldiers eat and their own packaging—i.e., clothing.

NSRDEC's efforts include the development of high-barrier, nonfoil food packaging materials—polymer films that prevent oxygen and water from transporting through them. Nanoparticles within a polymer film make it difficult for gas molecules to get through, improving the barrier to oxygen and moisture, both of which can speed the deterioration of food.

“Single inventors, such as Edison and Einstein, are now much rarer. Our world remains complex, but more and more scientists and engineers are trained in their specialized areas. Therefore, collaboration is a necessity for new inventions and discoveries.”

Quoc Truong, NSRDEC physical scientist

NSRDEC is also working on developing and advancing omniphobic and super-omniphobic textiles and other products, which resist dirt, dust and liquids. Omni means “all,” and, in chemistry, phobic doesn't so much mean fearful as it does a chemical aversion. An omniphobic coating, therefore, is averse to both water (hydrophobic) and oils (oleophobic). Omniphobic coatings contain micrometer-sized (one 1 millionth of a meter) particles, such as silica, or a combination of micro- and nanometer scale particles. (A nanometer is one 1 billionth of a meter.) When these coatings are applied onto textiles or hard surfaces, such as glass or metal, their surfaces are modified with micro- and nanoscale surface features. These features are similar to a lotus leaf's hierarchical nonwetting surface, which enables the plant to float and glide on water, or a water strider's feet, which let the insect walk on water without sinking.

By working on the nano level, NSRDEC's scientists and engineers have the opportunity to expand the applications of this technology for the good of the Soldier.

THE PERFECT NONFOIL

The Advanced Materials Engineering Team (AMET), part of NSRDEC's [Combat Feeding Directorate](#) (CFD), is investigating high-barrier, polymeric materials for military ration packaging and for food packaging that supports deep space missions for [NASA](#). Nanocomposite materials are an ideal packaging choice for shelf-stable processed foods because they can improve the barrier, mechanical and thermal properties of nonfoil food packaging. Polymeric laminates with foil as the barrier are currently being used for ration packaging. These structures provide an

exceptional barrier to oxygen and moisture, but can also experience stress cracking and pin holing. “The incorporation of nanotechnology into barrier films has proven to be a critical ingredient in our packaging design that will allow us to achieve food protection properties only seen before through the use of foil-based systems,” said Dr. Christopher Thellen, a Ph.D. materials engineer in the CFD. “The exfoliated dispersion of nanoparticles in polymers forces penetrating oxygen and water vapor molecules to follow a tortuous pathway through the packaging material, thereby increasing the time needed to penetrate the packaging and improving barrier properties.” Nanocomposite packaging can be lighter in weight and less expensive than foil pouches. That reduction in size can not only reduce the amount of solid waste and enhance the quality of the rations by preserving them

better and longer, but it also reduces the warfighter's logistical burden. NSRDEC is exploring technology that is based on incorporating nanoparticles into thermoplastic resins to create a nanocomposite material that is 1,000 times smaller than conventional composite material fillers. Nanoparticles have proven to be cost-effective and compatible with many polymers used in packaging.

As a result, the high-barrier, nonfoil polymeric packaging will comply with the Meal, Ready-to-Eat requirement of maintaining a three-year shelf life. For space applications, it will maintain up to a five-year shelf life.

NOT YOUR GRANDMA'S CANNING

Food sterilization techniques, in combination with proper packaging, play an important role in extending shelf life. Retorting, similar to pressure cooking, is the food industry's most common commercial sterilization process for prepackaged, low-acid foods. This process exposes food packages to high moisture and high temperature conditions under pressures of up to 2.5 atmospheres. In some cases, the long retort process leads to a reduction in food quality and limits the types of packaging materials that can be used.

Dr. Jo Ann Ratto, AMET team leader, whose doctorate is in plastics engineering, said that the implementation of a nonfoil structure into food packaging will make it possible to consider novel sterilization methods, such as microwave-assisted thermal sterilization (MATS) and pressure-assisted thermal sterilization (PATS). MATS and PATS are desirable alternatives to retort sterilization because they reduce the time needed to raise the product temperature to that required for the thermal lethality of target bacteria—that is, it kills botulism and other toxins faster. A shorter process time can improve food quality and nutrient retention at a lower cost, which is one reason these methods are so attractive for both the U.S. military and NASA.

AMET is exploring polymeric packaging for these novel methods in collaboration with CFD's Food Processing Engineering and Technology Team. The two teams are also studying the effect of the various processing methods on vitamin stability in an effort to preserve freshness and food safety and prevent nutrient loss.

“The nanocomposite research and development work has been challenging and rewarding for the Advanced Materials Engineering Team. After further demonstration and vali-

dation work, we will know if these materials have acceptable performance to be considered for incorporation into ration packaging for the warfighter,” said Ratto.

‘SO’ CLEAN

Soldiers are frequently in muddy, dusty and oil-contaminated environments. NSRDEC and its industry partner, Luna Innovations Inc., have worked together to develop omniphobic coatings for fabrics. Omniphobic surfaces do not become wet when exposed to water, liquid chemicals, organic solvents and some oils, such as cooking and motor oils.

Unlike omniphobic surfaces, which can be found in nature, super-omniphobic (SO) surfaces are purely man-made, engineered surfaces based on a 2007 discovery by the Massachusetts Institute of Technology. SO surfaces are both super-hydrophobic and super-oleophobic and theoretically repel most, if not all, known liquids, including those that with extremely low surface tensions, such as the solvents heptane and hexane, which would make most surfaces, without SO protection, wet.

NSRDEC's research and development of omniphobic and SO technologies, which will be used in protective clothing applications, will improve warfighters' quality of life and lessen their logistical burden. Omniphobic fabrics require much less frequent washing, reducing water and detergent usage. NSRDEC is also investigating the development of SO coatings, inherently SO fibers and micro- and nanosurface transparent films.

Besides being super-repellent to liquids when applied onto protective clothing, SO coatings will also contain an antimicrobial additive to retard the growth of microbes responsible for causing body odors. The SO fibers with the antimicrobial additive will be woven into yarn, made into fabric and finally fabricated into protective clothing that will require no laundering and remain clean, dry and odor free. The hierarchical micro- and nanoscale SO transparent films will be applied onto protective lenses, goggles and visors to provide the Soldiers with “always clear vision” by shedding water, oils and chemicals on the outer lens surface while preventing fog from forming on the inner lens surface. These features will help Soldiers better complete the vision-dependent aspects of their missions, including driving, firing, viewing maps and operating electronic equipment in multiple

environments, especially under wet and rainy conditions.

To bring Soldiers the very best science has to offer, NSRDEC is combining its expertise with the expertise of academia and industry. Quoc Truong, an NSRDEC physical scientist, emphasized the importance of these collaborations. “NSRDEC provides concepts and ideas, technical approaches and guidance and methods of testing and evaluation to best meet our Soldiers' needs,” he said. “We also have a thorough knowledge of user requirements and materials specifications, while our collaborators have expertise, technical knowledge, resources and personnel who are academically trained and also have experience” in a range of related disciplines. Those collaborators include nanomanufacturing experts at the University of Massachusetts Lowell; fiber spinning experts at Clemson University; experts in re-entrant nanosurfaces, theories and modeling at MIT; and experts in omniphobic coating processes at Luna Innovations.

“Single inventors, such as Edison and Einstein, are now much rarer,” said Truong. “Our world remains complex, but more and more scientists and engineers are trained in their specialized areas. Therefore, collaboration is a necessity for new inventions and discoveries. This way, we can put our heads together in solving longstanding problems or coming up with new and innovative products and practical solutions, to help our Soldiers complete their mission in the safest and most efficient manner.”

INHERENTLY ‘SO’

According to Truong, the characteristics of the SO coating will provide a significant improvement over the omniphobic coating. Moreover, SO surfaces will cause most liquid droplets to roll off and will minimize dirt and dust attraction. In addition to coatings, NSRDEC researchers are now working with academia and industry partners to develop fibers and transparent films that are inherently super-liquid-repellent based on their surfaces' physical nanoscale structures and features.

“Clothing and shelters fabricated from fabrics woven using inherently SO fibers will simply stay clean,” said Truong, adding that yarns made from inherently SO fibers, then woven into cloth and made into clothing, are expected to be much lighter and more flexible and, therefore, more comfortable to wear.

The fabric made from SO fibers will be more breathable because of a physical structure that has multiple “micro-scale” air channels (with nano features on its fiber surface) that run the entire length of the fibers. Since the inherently SO fibers will no longer require the added step of coating, the clothing is also expected to have a lower manufacturing cost.

CONCLUSION

SO coatings, inherently SO fibers and SO micro- and nano-surface transparent films have different applications. The coatings will be used on soft and hard shelters, textiles, cables, solar panels, intricate shapes and objects, and flexible and hard surfaces, including windows, cars, ships and airplane exteriors. The inherently SO fiber technology will be used on textiles and filtration products.

“With SO technologies, Soldiers will have clothing that always stays clean and fresh,” said Truong. “Their goggles, visors, vehicle windshields and windows will always stay clean, which allows them the clear vision to fight and complete their missions. Applying the technologies to ship hulls will allow them to move much faster on the water surface with less fuel consumption.”

Like SO coatings, SO films will be used on durable, hard surfaces—solar panels, windows or airplanes, for example—to make them repellent to dust and dirt, and super-repellent to water, oils and other liquids.

“It is my hope that these new breakthrough technologies will help to enhance existing technologies the same way that carbon fibers improved the structural strength of buildings and cars,” said Truong. “However, these SO materials, which are just about a year or two away from their formal introduction to commercial applications, will have vastly more potential, especially because of transparent SO film.”

Being super-clean means being more mission-ready and more hygienic, with enhanced protection from contaminated water and liquid chemicals. “This exciting research and development project work is underway, and it is expected that sample-size fabrics and lens products will be available for further testing and evaluation by December of 2015,” said Truong.



Brain Domain

Natick, Tufts team up to create new center

By Jane Benson, NSRDEC Public Affairs / NATICK, Mass. (June 29, 2015)

Army researchers have teamed up with the [Tufts University School of Engineering](#) to create the Center for Applied Brain and Cognitive Sciences, or Center for ABCs.

The center is co-directed by Dr. Caroline Mahoney, team leader for the U.S. Army [Natick Soldier Research, Development and Engineering Center](#), or NSRDEC, [cognitive science team](#), and Dr. Holly A. Taylor, a professor of psychology in Tufts' School of Arts and Sciences who also has an appointment in mechanical engineering at Tufts.

"The new partnership between Tufts and NSRDEC will allow NSRDEC scientists opportunities to partner with Tufts faculty and students and utilize unique center resources," Mahoney said. "It will also afford the opportunity for Tufts faculty, undergrad and grad students to gain further real-world experience working collaboratively with NSRDEC scientists to solve Soldier problems in specialized NSRDEC facilities, such as the climatic chambers, that are not available to them at the university."

"This partnership will also extend the expertise available for innovative, collaborative projects for Tufts researchers and graduate students by involving the NSRDEC researchers," Taylor said. "Interdisciplinarity is highly valued at Tufts already, and this center fits that emphasis."

By bringing together experts in engineering, neuroscience, psychology, linguistics, computer science and robotics, the collaboration aims to advance researchers' understanding of

how people think, respond and perform in demanding, real-world situations. The center will ultimately provide insight into how Soldiers think in response to ever more complicated and challenging environments.

"Our objective at the cooperative center is to identify innovative, interdisciplinary approaches to monitoring Soldier physiological and mental states, predicting how those mental states influence operational behavior, and optimizing behavior via adaptive, multimodal interfaces and robotic platforms," said Dr. Tad Brunyé, center program manager and member of NSRDEC's cognitive science team. "This objective is accomplished through fundamental and applied interdisciplinary research to inform the design and development of next-generation support and augmentation systems, enhancing future Soldier capabilities and performance during kinetic operations."

The center's research will be divided into four areas.

The first area will examine the principles, which govern interactions between people and intelligent supporting systems.

"These include hand-held and person-borne devices [smart phones, head-mounted displays and tablets] and autonomous robotic platforms aimed at augmenting and optimizing human cognition, effect, and/or physical capabilities in mixed initiative teams," Mahoney said.

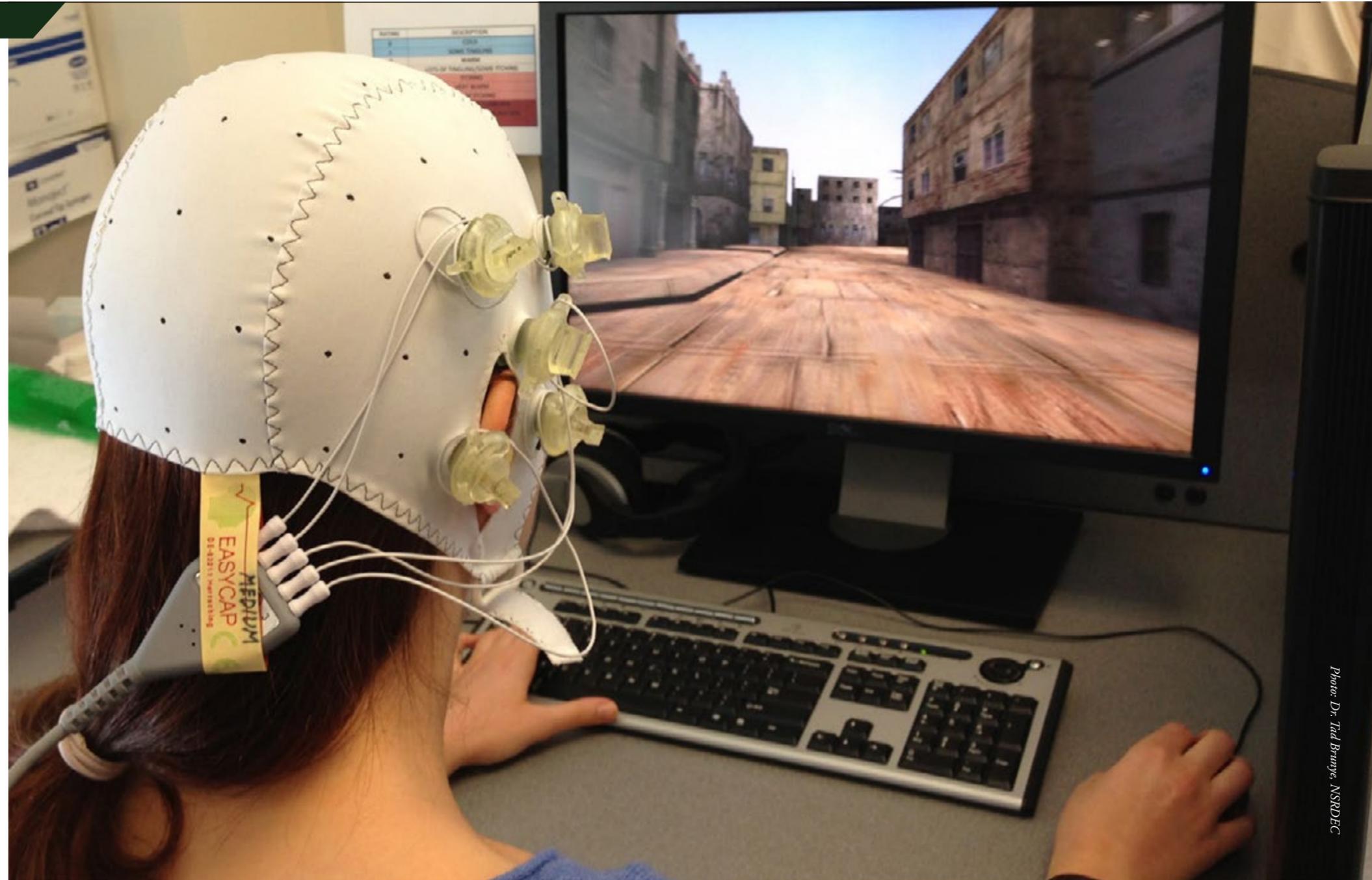


Photo: Dr. Tad Brunyé, NSRDEC

The second area involves monitoring, characterizing and optimizing cognitive and non-cognitive states.

"Research efforts will focus on establishing and testing multimodal - physiological, neurophysiological, behavioral, hormonal - measures and metrics for monitoring and characterizing relevant cognitive and non-cognitive states such as frustration, mental workload, stress, readiness for problem-solving, fear, uncertainty and fatigue - cognitive and physical," Mahoney said.

The third area involves studying ambulatory human performance of cognitive and physical tasks. The area will examine warfighters on

the move engaged in environments based on real-world conditions and demands.

The fourth area of study will focus on applying cognitive science findings to team-based situations, which require interaction, communication and cohesiveness among team members.

Mahoney is excited about the center's possibilities.

"The Center for Applied Brain and Cognitive Sciences is a tremendous opportunity for NSRDEC human sciences to pioneer a truly innovative environment that brings together

a multidisciplinary group of world-renowned experts in the fields of cognitive science, psychology, neuroscience, computer science, robotics, engineering, linguistics, and nutrition to push the state of the science on measuring, predicting and enhancing cognitive capabilities and human-system interactions for individuals and teams working in naturalistic high-stakes environments," Mahoney said. "The research focus for the center is the dismantled Soldier, but certainly data and knowledge products developed will have the potential to make a significant impact on law enforcement, emergency first responders, and the medical community, as well."

Scientists at the Center for Applied Brain and Cognitive Sciences collect data on the efficacy of administering targeted brain stimulation on memory and navigation performance in novel environments.

The Tufts School of Engineering is one of the eight schools and colleges that make up Tufts University. The school, located in Medford/Somerville, Massachusetts, offers undergraduate and professional degrees in several fields of engineering and computer science.



Research steers Soldiers in right direction

By Jane Benson, NSRDEC Public Affairs / NATICK, Mass. (May 6, 2015)

Soldiers face special challenges during navigation. Their jobs are physically demanding. They are often under extreme stress, and they often need to make quick decisions in an ever-changing and sometimes dangerous environment. They may be cold, hot, hungry or tired. All of these factors can affect the ability to make wise navigation decisions.

Army researchers use virtual reality to test to test Soldiers and discover influences on choices people make when choosing a route.

Dr. Tad Brunyé, a member of the Cognitive Science Team at the Natick Soldier Research, Development and Engineering Center, investigates spatial and non-spatial influences on Soldier navigation choices.

“This type of knowledge will help optimize Soldier performance,” Brunyé said. “Soldiers also show reliable biases in memory for landmark locations due to the emotional nature of events that transpired at that location.”

Spatial influences pertain to things in an actual space, such as topography, local and distant landmarks, or the position of the sun. Non-spatial influences are a little harder to define and can include a Soldier’s emotional state, level of stress, mission and task demands, skills, abilities, traits, and his or her past experience in a geographical area, all of which can affect navigational choices.

“We are still trying to identify and characterize the full range of spatial and non-spatial influences and how they interact with emerging representations of experienced environments,” Brunyé said. “We all have our current mental states. So, you may see the same landmarks as I do, you may see the same topography that I do, but I might be in a very different state that leads me to interpret and use that same information in very different ways.

Virtual reality capabilities, including head-mounted display systems, have revolutionized cognitive science research by allowing Soldiers to get engaged in visual worlds,

scenarios and tasks that accurately emulate aspects of operational experience while maintaining important experimental controls.

“As part of our goal to understand, predict, and optimize navigation behavior, we have leveraged virtual reality research and technologies to advance the state of the art in spatial cognition research and gain new insights into the brain mechanisms, strategies, and biases that Soldiers use when selecting routes, learning new environments, and solving complex problems,” he said.

Individual cognitive abilities and individual personalities can also affect navigation choices. Brunyé has found that good navigators tend to be more open to new experiences and are less anxious than poor navigators.

“How confident do I feel in my environment? Is there a history of enemy activity? Are there certain areas I want to avoid? Are there certain safe spots that I want to keep in mind? There is always interplay between what you sense in the environment, what you perceive, what you know, what you predict will occur, and ultimately how you act.”

There are also misperceptions that influence navigation choices. One of the key discoveries made by Natick Soldier Research, Development and Engineering Center researchers is that many people will choose a route that goes south because they equate going south with going downhill. They perceive a southern route as easier than a northern route, which they equate with going uphill. This incorrect assumption can lead to less than optimal navigation choices.

“This finding has been coined the ‘north-is-up’ heuristic, and has been replicated in not only the USA, but also in Bulgaria, Italy, and the Netherlands,” Brunyé said.

Moreover, Brunyé said that right-handed people tend to prefer making right turns. Left-handed people prefer going left, and most people will chose a route that is straight initially, even if it curves and becomes suboptimal later in the journey.

“At this stage of our research we are tasked with understanding and quantifying the conditions under which various heuristics and behaviors emerge, and how they might interact with one another to guide navigation behavior,” Brunyé said.

By studying and monitoring people’s choices in navigation (through non-intrusive devices and methods) and by observing patterns of physiology and neurophysiology, Brunyé is developing ways to predict behavior and optimize navigation performance. The goal is to incorporate his observations into Soldier training, providing Soldiers with concrete tips for becoming better navigators in a variety of situations. In addition to training, Brunyé is exploring redesigning tasks and support technologies to better match individual and contextually guided Soldier capabilities and limitations.

The team is also investigating stimulating areas of the brain with low-current, electrical charges. Brunyé said that the low-current charges have been shown to help some poor navigators become better navigators, but the charges do little to help those who are already competent navigators. Brunyé pointed out that brain stimulation could also ultimately be used to accelerate learning or help Soldiers overcome barriers to flexible performance, such as fear, anxiety or lack of confidence.

“Being a scientist at NSRDEC affords working on a wide range of impactful research programs that result in innovative technological solutions for optimizing Soldier cognition and action,” Brunyé said. “This project has been particularly rewarding given its direct fit with my training and expertise, and its direct relevance to a real-world problem space.”

The research is expected to have a major impact in the future.

“The knowledge garnered from this research could ultimately affect military strategy, including predicting which way an enemy will go,” Brunyé said. “The research also could help predict the movement of friendly personnel who are disoriented or lost. By understanding the way the mind works, we can make some predictions about what people are going to do when they are lost or isolated. This knowledge will help improve survivability and mission effectiveness.”

Test Case continued

sample of that soft armor, plunge it through an eight-inch-diameter hole, and we measured how much force it took to plunge it two inches through. We took all that data of all those designs and compared it to the human-factors assessment. And believe it or not, as you got panels that took more force to plunge, you could see that the Soldiers would say it was too stiff or prohibited range of motion. We found the threshold where Soldiers didn’t like it. We also found a lower threshold where they started to say that it was too soft.”

Thus, the new test methods are a standardized way to evaluate soft armor based on direct Soldier input.

“It is very simple, reliable and repeatable,” DiLalla said. “The apparatus provides an accurate way to test current armor and future designs. The reason that this test is better is that we can actually test a system level, multi-layered system unlike the previous method of measuring the fabric stiffness of a single ply. We wanted to come up with a method that was operationally relevant and that reflected what the Soldiers would think, and at the same time not prohibit new materials/constructions from being used.”

The second new test method measures wear durability with an apparatus that subjects an armor sample to load conditions that replicate physical movements used frequently by warfighters - including squatting, bending and twisting - in a single mechanical stroke.

“In this case when we say durability, we are trying to predict wear life or say that the system will at least last for some period of time. If Soldiers are in theater and wear this every day for a year - will the protection hold up to wear over 12 months? We don’t want a system that will degrade in performance from normal, expected field use. We developed a test method to measure that. We came up with an apparatus that can mechanically work an armor sample in one stroke, and it’s repeatable. Previously, there was no test method available to show how long the ballistic protection would last with typical use.”

PROTECTING EYEWEAR TESTING

Previous testing methods for eye protection, including goggles and spectacles, did not adequately test for real-world conditions, including the desert conditions that have been prevalent in many Soldier operations.

“Our eyewear must be scratch resistant, fog resistant, and protect from dust and sand infiltration,” said Michelle Markey, NSRDEC

science and technology researcher. “This can be accomplished through design and specialty coatings. More ventilation can mean less fog, for example, but it can also mean more dust and sand gets in. It’s a challenging balance that continuously needs to be looked at.”

Previously, there wasn’t a very reliable, effective test method for the laboratory. So, researchers had to rely on user field test data, which is time consuming and expensive. NSRDEC developed a new fog test and apparatus that measures anti-fog performance and provides quantifiable measurements that apply to real scenarios.

“Instead of having to test products in the field or a large chamber, we can now do it at a laboratory scale,” Markey said.

Eyewear for Soldiers also needs to work, as part of a system and in conjunction with a helmet, which made private industry test methods inapplicable.

“Wearing eyewear with a helmet can affect air flow,” Markey said. “The existing test methods didn’t account for design, style, how it is worn, and the various environmental conditions the eyewear is used in. So, Natick came up with a test methodology to look at all these different considerations.

“A heated moisture bath in the head form is used to simulate heat and moisture from the eyes.

Mounting on a head form also allows the space factor between the eyewear and the head to be considered, as well as the effect of other equipment, such as helmets. The environment is also a factor. Is it cold? Is it warm? What is the relative humidity and what effect does it have? The test apparatus addresses all of this, and is enclosed in a chamber, basically creating a miniature controlled environment for consistent test conditions.”

SERVICE

This type of testing will improve Soldier safety because Service members will be more likely to keep their protective goggles and spectacles on if they do not have problems with fogging.

NSRDEC also developed a new standard test method for abrasion resistance. The method

incorporates the use of rapidly blowing sand to replicate real-world conditions. None of the previous methods could accurately replicate this type of damage. In fact, eyewear that performed well under previous methods sometimes performed poorly when exposed to the blowing sand test mechanism.

“Abrasion resistance is always a key concern with eye protection,” Markey said. “It’s a challenge because of the nature of the impact-resistant material we use. It is soft and has to be coated to keep it from scratching. The durability of those coatings must be tested, ideally with something similar to what is experienced in the field. In a desert environment, blowing sand can be quite abrasive.”

CONCLUSION

“People tend to focus on just the products, but they don’t realize that behind the scenes we are working diligently to develop new

“People tend to focus on just the products, but they don’t realize that behind the scenes we are working diligently to develop new methods to better assess the performance of these products.”

Robert DiLalla, NSRDEC

methods to better assess the performance of these products,” DiLalla said. “In many cases, old-test methods can’t be applied to the new products. So, we need to be the lead, not only in developing these new products, but in developing operationally relevant methods to assess them.

“TECD Force Protection Soldier and Small Unit has been committed not only to developing new material solutions and knowledge products, but also to the development of improved test methods, which is one part of providing better capabilities to the Soldier. The program is set to wrap up at the end of FY2016 with numerous products transitioning to multiple stakeholders.”



Tickets for Troops

Soldiers from the Natick Soldier Systems Center presented the Colors June 25 at the Red Sox-Baltimore Orioles game at Fenway Park, which was “Tickets for Troops” day, when fans can donate their tickets to members of the armed forces.

Photo by John Harlow, USAG Natick Public Affairs

