June 2018

NSSC This Month

U.S. Army Garrison Natick Public Affairs Office

The "X Factor"

Army Scientists Join 82nd Airborne Division Paratroopersin the Field

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Installation Management Command
Maj. Gen. Keith L. Ware Awards
First Place, 2017, PDF Publication

Publisher's Note

John Harlow
USAG Natick Public Affairs

It's hard to believe June has come and gone and we're staring at Independence Day.

It was great to see everyone participate in the celebration of our Army's 243rd Birthday. There were some moving words from LTC Martin and having the World War 1 Dough Boy re-enactors on hand to honor those who served in the "War to end all Wars" was a nice touch to the day.

We have two new leaders on the installation. The new Product Manager, Force Sustainment Systems is Lt. Col. Alexander Babington and the new first sergeant at Human Resources Development Detachment is 1st Sergeant Sean Caruso. Babington took over for Col. Frank Moore and Caruso replaces Miguel Martinez as the Detachment first sergeant.

Things don't slow down as summer comes. Col. Raymond Phua relinquishes command of the U. S. Army Research Institute of Environmental Medicine to Col. Sean O'Neil.

With the Fourth of July holiday right around the corner, enjoy the holiday, but be safe. Hydrate use plenty of sun block. I am still peeling skin from Memorial Day.

If you have a story you would like in NSSC This Month, please e-mail me john.d.harlow.civ@mail.mil, Vannessa.l.josey.civ@mail.mil or Kenneth.h.waters4.civ@mail.mil. We are here to tell the story of the Natick Soldier Systems Center.

Thanks for reading NSSC This Month and enjoy your Independence Day holiday.

John Harlow

Chief of Public Affairs/Legislative Liaison

USAG Natick

NSSC This Month

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About this newsletter

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NSSC This Month

Message from the IMCOM CG

The Value of Army Civilians

By Lt. Gen. Kenneth Dahl, commanding general, IMCOM

Photo by Brittany Nelson

One of the great lessons I've learned as Commanding General of U.S. Army Installation Management Command is to value the diversity and contributions of Army civilians.

Before taking command of IMCOM and its 50,000 plus cohort of civilian professionals, I had little experience in leading or working alongside them. I was ambivalent about their role in making our Army ready. I had no appreciation for how vital their leadership is to the continuity and success of everything we do. Now, after witnessing the wisdom, dedication, technical expertise and professionalism of Army civilians in a personal way, I feel obliged to champion their service.

After visiting 80 installation communities around the world, I am as familiar with today's Army as anyone. It is clear to me that our Army could not do all of what it is expected to do without civilians in nearly every command, in some cases side-by-side in theater.

Civilian professionals provide foundational continuity in times of turbulence; design, test and field our weapon systems; play critical roles in supporting Soldiers and their Families; maintain our training facilities; and myriad other critical tasks that give Soldiers the freedom to focus on warfighting. Army civilians are integral to readiness, and a part of the team I have grown to accurately value and appreciate.

Can we improve the system? You bet, but we should not paint all Army civilians with the same brush based on limited experiences where a small number have made a bad impression or had a negative impact. Detractors of employing civilians should think through the alternatives. Totally contractors? Have Soldiers do everything? These solutions are often more expensive and can negatively impact Army readiness in serious ways.

Army Civilians are probably the most efficient and effective way to sustain readiness. Their contributions are priceless; our nation simply cannot purchase their level of loyalty and commitment. They are part of the Army's DNA. I encourage more Army leaders to learn and understand this important truth sooner than I did.

Photo by U.S. Army

Saying Goodbye

Photo by Richard Walunas, NSRDEC Strategic Communications

Looking Back on Three Years Leading PM-FSS

By John Harlow, USAG Natick Public Affairs/Natick, Mass.

Three years ago when Lt. Col. Frank Moore accepted the charter to lead as the Product Manager, Force Sustainment Systems, he said of the team at PM-FSS, "good people, great mission, focused on the Soldier."

Now as Col. Frank Moore leaves PM-FSS to become the Military Deputy of the Natick Soldier Research, Development and Engineering Center, those thoughts remain.

"The culture of the organization is very strong," said Moore. "Hopefully we have improved things here a little bit in my three years. Although there are some challenges on the horizon with Army priority shifts, I see just as many oppertunities for PM FSS. It's a great team with great people who will take advantage of this change.

Under Moore's leadership, PM-FSS managed 43 acquisition programs in areas ranging from aerial delivery to shelter systems.

PM-FSS is one of the organizations where turnover doesn't happen very often, but there are some key positions where the leaders are calling it a career.

"Losing the institutional knowledge of guys like Gary Thibault and possibly Mike Hope sounds scarier than it actually is," said Moore. "A measure of a good leader is not only what they do, but building the bench and creating the next generation of leaders. I believe our team has done that."

Moore, a native of Maine who studied mechanical engineering at Worcester Polytechnic Institute, enjoyed the opportunity to come home to serve the Army.

"This has been my best job that I have had," said Moore. "It just kind of worked out perfect for me with my New England family connections. My background isn't sustainment, but this has been a good fit. The personalities and leadership of this organization just was the perfect fit for my leadership style."

Moore took a moment to reflect on the relationship with his deputy, Jim McLaughlin.

"What a luxury to have a guy like Jimmy across the way," said Moore. "People in the positions like Jim has either have the experience and lose the passion or have the passion but not the experience. Jim has both. He is engaged and passionate about what he does and also the experience and expertise to go with it which is very hard to find."

Looking back on the one big highlight as the leader of PM-FSS, Moore said it would be the awarding of the contract on next generation camouflage contract.

"It was a huge effort that was awarded to three different vendors," said Moore. "The contract is for nearly a half-billion dollars so it was high visibility with congressional interest and to actually get it awarded on the timeline we planned and the team pulled it off. That was an outstanding effort."

Moore gave a hint of advice for Lt. Col. Alex Babington, the new leader of PM-FSS.

"You are inheriting a strong team," said Moore. "Listen to them and point them in the right direction and you can't go wrong."

Babbington Takes the Reins During Ceremony

By Vannessa Josey, USAG Natick

The Product Manager-Force Sustainment Systems leadership changed hands in a short ceremony held July 21 at Grant Conference Center, Natick Soldier Systems Center, Natick, Massachusetts.

Col. Adrian Marsh, Project Manager, Expeditionary Energy and Sustainment Systems, gave inspiring remarks to both the outgoing project manager, Col. Frank Moore and the incoming project manager, Lt. Col. Alexander Babbington.

"The Army continues to find great leaders," said Marsh. "We have had great leadership with Col. Moore and look forward to continued great leadership with Lt. Col. Babbington – clearly making a difference in global operations."

Babbington is a native of Connecticut. He served six years in the Connecticut National Guard as an Infantryman in the 29th Infantry Division. Babbington was commission as a Quartermaster officer detailed to the Infantry upon graduation from The University of Connecticut Reserve Officer Training Corps program in 2000.

Babbington, the incoming project manager of PM-FSS, spoke only a few moments with a poignant message which encouraged more teamwork through the changes.

"As the newest product manager, following Col. Moore, I have big shoes to fill," said Babbington. "One of my rules, remember it is always we, us or ours. There is no I. We are a team."

For his years of dedicated service to PM-FSS, Moore was presented the Meritorious Service Medal. Additionally, Moore was also inducted into the Order of St. Michael for his contributions to Army Aviation.

PM-FSS provides U.S. Warfighters with the world's best expeditionary force sustainment systems at an affordable cost.

Hall of FAME

Natick Employee Recognized for Extraordinary Contributions to Feeding the Warfighter

Photo by Research and Development Associates

By Jane Benson, NSRDEC Public Affairs/Natick, Mass.

In recognition of her immense contributions to feeding the warfighter, Betty Davis, a longtime Natick employee, was inducted recently into the Research & Development Associates for Military Food and Packaging Systems Hall of Fame.

Davis is a supervisory food technologist and Science and Technology branch chief in the Combat Feeding Directorate, or CFD, at the Natick Soldier Research, Development and Engineering Center.

CFD is committed to optimizing Soldier performance, readiness, and lethality through the development of cutting-edge advances in food and nutrition, as well as food processing and packaging technologies. The directorate is also dedicated to creating high quality food items for the warfighter that will lighten the warfighter's carrying load.

According to the citation presented by R&DA, Davis was acknowledged, in part, for "her 30 years of service and significant accomplishments in support of the American warfighters serving their nation around the world. . . Davis recognized that nutrition is a key enabler for successful military operations and she contributed significantly over the years in optimizing our warfighters' nutritional status so that they could better endure the harsh environments encountered in today's battlefield."

"Betty's depth of knowledge in the area of field feeding research and her distinguished career as a science and technology manager have not only directly benefited the warfighter, but gained the respect and admiration of the entire military rations industry," said Stephen Moody, NSRDEC CFD director. "Her selection to the R&DA Hall of Fame was well deserved."

John McNulty serves as the executive director of R&DA, an organization dedicated to providing the safest and highest quality food to the U.S. Armed Forces. R&DA fosters communication and cooperation among private industry, government, academia and technical/trade/professional associations.

"It's an extremely high honor to be inducted into the R&DA Hall of Fame," said McNulty. "It's afforded only to those who have made an absolutely extraordinary contribution to the warfighter. Betty Davis is a major contributing individual to the improvement of our rations and to the science and technology that has gone into making our rations better, more nutritious and more prone to improve warfighter performance. We've only had 26 other hall of famers in our 72-year history."

During her career, Davis, along with others at CFD, has been involved in several key areas that led to significant ration improvement. Davis played a role in developing experimental packaging, the flameless ration heater and menu improvements for the Armed Forces Recipe Service -- only a few areas that benefitted from her contributions.

Davis was part of CFD's collaboration with the ration assembly industry to test and to potentially introduce cutting-edge technologies. She was also part of CFD's collaborative efforts with the U.S. Army Research Institute of Environmental Medicine, or USARIEM, to develop the nutritionally optimized First Strike Ration.

"I recognize that it was teamwork that allowed some of the efforts that I was working on to transition so I accept the award for CFD and NSRDEC," said Davis. "My heart bursts with pride to be one of four CFD/NSRDEC employees to be inducted in the R&DA Hall of Fame since its inception."

The hall of fame induction reflects the supervisory food technologist's commitment to serving the warfighter.

"They repeatedly face situations where they may potentially lose their lives," said Davis. "Trying to provide them with technologies that make their life easier or improve their ability to fight and succeed in any battle, due to the nutritional solutions that we provide, is rewarding and very fulfilling."

"Natick is one of the most important government partners that we work with," said McNulty. "What Natick does is extremely unique. No one else does it. It's important for our industry partners to know what is going on at Natick. American industry produces the food, but government states the requirements and specifications and does the research and development."

"Over the years, doing what I can to put the best technology into the hands of the warfighter has been paramount to me," said Davis.

"Anything that contributes to the effectiveness and performance of our warfighters is very important," said McNulty. "And food is one of those of things."

Protecting the Warfighter

Natick Researchers Evaluate Shelter Protection System

Photo by Jeff Sisto, NSRDEC

By Jeff Sisto, NSRDEC Public Affairs/Natick, Mass.

An early user evaluation of the Expeditionary Shelter Protection System, or ESPS, was successfully conducted on May 22-24 utilizing Human Research Volunteer Soldiers from the U.S. Army Natick Soldier Research, Development and Engineering Center.

The ESPS is a ballistic panel and attachment system comprised of a series of stackable, interlocking, 7 feet high by 4 feet wide, ruggedized panels and support system.

This provides warfighters, who live and work in military shelters, with a rapidly deployable, immediate, mobile ballistic protection against small arms and fragmentation threats.

Four-person Soldier teams participating in the user evaluation successfully performed a full ESPS setup and strike around a 32 feet by 20 feet air-supported, tent system.

Technical personnel from the NSRDEC and Product Manager - Force Sustainment Systems, or PM-FSS, provided new equipment training for the Soldiers, observed and documented all user evaluation activities and obtained detailed user-feedback from the participating Soldiers on the ESPS at the conclusion of the evaluation.

"Attention to Human Systems Integration early in system development was the key in creating an ESPS system that is both mission-effective and simple to deploy," said NSRDEC Human Factors Engineering Lead, Dawn Woods.

Photo by Jeff Sisto, NSRDEC

LGBT Pride Month
Communicaiton Matters

Natick Solider Systems Center (NSSC) civilian employees attend NSSC's 2018 LGBT Pride Month Workshop. The theme of the workshop was "communication matters." The event was hosted by the USAG Natick and the NSSC LGBT Committee. (U.S. Army photo by K. Houston Waters).

Dr. Francisco Surace, Ph.D, (left) and Dr. Stephen Gresham, Ph.D., (right), staff psychologists at the Edith Nourse Rogers Memorial Veterans Affairs Medical Clinic (Bedford, MA), speak at Natick Soldier Systems Center (NSSC) 2018 LGBT Pride Month Workshop. (U.S. Army photo by K. Houston Waters).

Natick Solider Systems Center (NSSC) civilian employees participate in a group excercise for NSSC's 2018 LGBT Pride Month Workshop. (U.S. Army photo by K. Houston Waters).

Dr. Francisco Surace, Ph.D, (left) and Dr. Stephen Gresham, Ph.D., (right), staff psychologists at the Edith Nourse Rogers Memorial Veterans Affairs Medical Clinic (Bedford, MA), receive recognition for their participation in the NSSC 2018 LGBT Pride Workshop (U.S. Army photo by K. Houston Waters).

The Fayetteville Observer

The "X Factor"

Army Scientists Join 82nd Airborne Division Paratroopersin the Field

Cpt. Justin Holmes pulls on a device simulating a dead lift while Jessica Schindler, a biomechanics research engineer at U.S. Army Natick Soldier Research, Development and Engineering Center, measures the simulated weight he's shown to lift. The display was part of an Interactive Senior Leader Orientation Day which allowed Soldiers to see tools developed to help monitor and measure the human condition of Soldiers before, during and after combat situations. (Photo by Melissa Sue Gerrits/The Fayetteville Observer).

By Drew Brooks, Fayetteville Observer/Fayetteville, N.C.

Imagine a world where Army leaders can monitor their soldiers much as you would a video game character — with something akin to a health bar and real-time tracking of physical and mental readiness.

That's what the 82nd Airborne Division wants. And now, a group of scientists led by the U.S. Army Natick Soldier Research, Development and Engineering Center are working to make it happen.

On Wednesday, leaders from across the Army were given a peek at how that work is coming along.

At Green Ramp, officials from Natick Soldier Research, Development and Engineering Center and eight other organizations that are partnered for the a first-of-its-kind, multi-domain study provided an overview of their efforts so far and what's to come.

Erika Hussey, a research psychologist on NSRDEC's Cognitive Science Team and one of the program leads for the Monitoring and Assessing Soldier Tactical Readiness and Effectiveness, or MASTR-E, study, said researches had measured hundreds of metrics with the help of Fort Bragg paratroopers earlier this month with a goal of identifying the human performance "x-factors" that can reliably predict sustained soldier and squad lethality.

The data collected included heart rate, body temperature, stress levels, energy intake and shot accuracy during a 72-hour live-fire training exercise conducted by soldiers with the 3rd Brigade Combat Team, 82nd Airborne Division.

More than 60 paratroopers from A Company, 2nd Battalion, 505th Parachute infantry Regiment took part in the study, setting baseline measures across four categories — health, physical, social-emotional and cognitive.

The soldiers then wore a variety of sensors during a field exercise. They included GPS trackers to measure swarm behavior and social distance; pods that tracked walking speed acceleration; bioharnesses that measured heart rate, breathing patterns, balance and body temperature; wrist sensors that measured sleep and activity; and sensors on their helmets that tracked their head movements.

Scientists also measured stress, muscle fatigue and immune system functions through saliva samples and measured water intake throughout the exercise.

Officials established baseline measures before the exercise and also tracked howthe soldiers recovered in the days following the mission. The big question on Wednesday:

Marcus Washington, left, listens as Megan Cayne with the U.S. Army Natick Soldier Research, Development, and Engineering Center explains monitoring devices. Washington and other Soldiers joined for an Interactive Senior Leader Orientation Day which offered insight into the tools developed to help monitor and measure the human condition of Soliders before, during and after combat situations. (Photo by Melissa Sue Gerrits/The Fayetteville Observer).

"What are we going to do with all this data?" Hussey said.

Officials said the study still underway could eventually help enable leader decisions on the battlefield and inform better training on the homefront. It is also helping to drive the development of other research projects, including the development of exoskeletons meant to reduce physical injuries while increasing speed and strength.

The MASTR-E study is a collaboration between NSRDEC and several other Army and academic organizations, including the U.S. Army Research Institute of Environmental Medicine, the U.S. Army Aberdeen Test Center, the Walter Reed Army Institute of Research, the Edgewood Chemical Biological Center, the United States Military Academy at West Point, the Army Research Institute and the Center for Applied Brain and Cognitive Sciences, which is co-directed by NSRDEC and Tufts University.

Hussey said that more than 100 scientists and researchers have participated in the effort.

The partnership between NSRDEC and the 82nd Airborne Division began roughly two years ago, officials said.

Maj. Gen. Erik Kurilla, commanding general of the 82nd Airborne, challenged Army scientists to "solve for x" to help the division better track the cognitive and physical ability of its paratroopers and, if needed, adjust training to get the most out of its soldiers.

The goal, he said, was to make paratroopers more lethal.

Kurilla said he envisioned being able to see the status of paratroopers in much the same way one would view a character in the popular Call of Duty or Halo video games series.

Douglas A. Tamilio, director of NSRDEC, said the Army is seeking a dashboard not unlike one found in a car, with a gas gauge and measures of the car's performance.

Officials said such a dashboard could eventually track not only physical measures, but also the amount of ammo a soldier is carrying and could help predict injuries and fatigue before they occur.

The information would be viewable by commanders overseeing the mission or by leaders on the ground using handheld technology already available to soldiers.

Tamilio said the partnership between NSRDEC and the 82nd Airborne Division was unlike anything that has been done before.

But it could open the doors to even more partnerships, he said, with officials from the 10th Mountain Division, 25th Infantry Division and 101st Airborne Division having reached out to potentially follow in the 82nd Airborne Division's footsteps.

But first, officials are pouring over the data collected from the 82nd Airborne Division paratroopers with the hopes of refining future data collection.

Officials said the multi-domain study allows researchers to see how the human body works as a whole and identify which measures are most important.

And by studying soldiers working as a squad, researchers also hope to pinpoint characteristics that make a good team and a good team leader.

British Army Brig. Oliver Kingsbury, the 82nd Airborne Division's deputy commanding general for plans, said the division is taking the MASTR-E study very seriously.

He said no subject is too technical or forward thinking when it comes to better preparing paratroopers, and highlighted the effort as being part of the Army's larger efforts to modernize.

"Anything we can do to look after soldiers and make them more efficient is critically important," he said. "Modernization is front and center."

Enhancing Lethality

Natick Leads First-of-Its-Kind, Soldier Readiness Study

By Jane Benson, NSRDEC Public Affairs/Natick, Mass.

The Natick Soldier Research, Development and Engineering Center, or NSRDEC, is the lead organization in a first-of-its-kind, multi-domain study called Monitoring and Assessing Soldier Tactical Readiness and Effectiveness, or MASTR-E. MASTR-E will be performed with the 82nd Airborne beginning in late May. A study volunteer (pictured here) performs a hand-grip test with a dynamometer. The dynamometer is being used by NSRDEC's Biomechanics Team to assess strength. (Photo Credit: NSRDEC)

The Natick Soldier Research, Development and Engineering Center, or NSRDEC, is the lead organization in a first-of-its-kind, multi-domain study. The study, called Monitoring and Assessing Soldier Tactical Readiness and Effectiveness, or MASTR-E, will be performed with the 82nd Airborne beginning in late May.

The multi-domain approach is unique in that it allows for the study of several areas at once instead of studying areas separately.

MASTR-E will focus on biomechanics, load carriage, performance nutrition, equipment use, injury reporting, navigation, and recovery times -- to name just a few areas. Researchers will also monitor cognitive performance.

"In reality, all the domains actually influence each other," said Dr. John Ramsay, an NSRDEC research biomechanics engineer. "The human body is intertwined between all these domains. If you pull on one thread, many others react."

"We'll evaluate the impact of long-term fatigue and duress, incurred during extended training exercises, on cognitive performance, including how Soldiers make decisions on what to eat, where to go, or how they remember information pertinent to their mission," said Dr. Erika Hussey, a research psychologist on NSRDEC's Cognitive Science Team.

The MASTR-E study is the first Soldier study with Soldiers wearing sensors while conducting relevant Soldier tasks, at the squad and platoon level, that is sponsored by a division commander. Sensors will continuously measure heart-rate, breathing-rate, body temperature, and fluid/food intake -- to name just a few items.

"Sensors will provide information about potential risk factors of injury," Ramsay said.

"The research team will begin the study by baselining Soldier performance and then will track performance throughout a training exercise by using sensors to minimize the burden on the Soldier," Hussey said. "The team will also collect data from study volunteers for five days following the end of the training to measure recovery functions."

The MASTR-E study will encompass both the individual and the squad. The study will help researchers gain insights into individual performance, as well as pinpoint the characteristics that make a good team and a good team leader.

Paratroopers with the 82nd Airborne Division's 1st Brigade Combat Team gain cover and return fire during mountain training near north Gerorgia's Camp Frank D. Merrill. The Soldiers and attacking insurgents are firing blanks. (Photo Credit: Sgt. Michael J. MacLeod).

The NSRDEC-led MASTR-E study is a collaboration with numerous renowned Army and academic organizations, including the U.S. Army Research Institute of Environmental Medicine, the U.S. Army Aberdeen Test Center, the Walter Reed Army Institute of Research, the Edgewood Chemical Biological Center, the United States Military Academy at West Point, the Army Research Institute and the Center for Applied Brain and Cognitive Sciences, which is co-directed by NSRDEC and Tufts University.

"We've linked up with some incredible researchers Army-wide and beyond who are excited to bring their respective scientific questions to the field to shape future lab efforts based on what we learn about Soldier performance during sustained training exercises," said Hussey.

The MASTR-E study is the direct result of NSRDEC partnering with the 82nd Airborne and the knowledge obtained by scientists bringing the lab to the field.

"One goal of MASTR-E is to bring what we learn in the field back to the lab to continue refining the science for the warfighter," said Hussey.

The idea to partner with units came about after Maj. Gen. Erik Kurilla, commander of the 82nd Airborne Division, sought out NSRDEC's expertise to help define what factors contribute to Soldier performance.

"Certain behaviors have emerged as crucial to Soldier lethality," said Rick Haddad, assistant deputy chief of staff, G3/5, Operations and Plans, NSRDEC.

"Typically R&D efforts about lethality are capability-focused, like building the next-gen weapon," said Hussey. "Here, we're studying the intangibles of performance, including the factors about the Soldier that make him or her proficient in using new capabilities. That is, the Soldier is the capability for studies of human performance. We ask, 'how do we measure and improve the Soldier under various conditions?'"

Haddad initially worked with Col. Phillip Kiniery of the 82nd Airborne to build the bridge between the 82nd and Natick. Kiniery, his staff, and company commanders provided NSRDEC with a unique and invaluable white paper that detailed the battalion's cognitive and physical challenges.

NSRDEC is now working with the 82nd Airborne's Lt. Col. Graham White to execute MASTR-E. White is the commander of the 2-505 PIR, 3 Brigade Combat Team, 82nd Airborne Division.

"In order to prepare for future combat environments, the paratroopers of the 2nd Battalion, 505th Parachute Infantry Regiment are participating in an NSRDEC study led by Dr. Hussey and Dr. Ramsay," said White. "Though still in the preliminary stages of testing and development, our paratroopers are keenly interested in the long-term impacts of

such a study on the health, physical, social-emotional and cognitive factors affecting sustained performance for the warfighter. We appreciate the potential impact this study could have on the future of ground combat, and we are encouraged by the strong relationship and rapport already developed between our paratroopers and the professionals at Natick."

"There are several near-term and far-term goals that we have for the study," said Hussey. "One far-term goal is to develop decision aides to inform commanders of their Soldiers' readiness in real-time. Some of the more near-term goals involve identifying better ways to capture and track performance, which is why wearable sensors are an important part of this study. It's important to characterize performance in a way that we can put numbers on, rather than relying entirely on subjective evaluations."

"We're approaching this as a bridge between a training mission and an actual mission," said Ramsay.

"The unit is organizing this as if it is a real mission. Once the mission is completed, we can look at how much recovery time was required to be ready for subsequent team or squad training. Likewise, a leader in combat who has access to this type of information can look across all the different platoons and be better able to determine which ones have recovered so that they can feel more confident that they are sending out their Soldiers more safely. Consider it personnel risk management, driven by data taken directly from the individual Soldier."

MASTR-E's impact will be far reaching. Numerous organizations have already expressed interest in obtaining data gathered during the study. The methodologies developed for the study will also be applicable to other studies.

Hussey and Ramsey believe that the opportunity to partner directly with Soldiers has been invaluable.

"Members of the 82nd believe that human performance is key to mission success and that it is really a critical piece of the puzzle in Soldier survivability and lethality," said Hussey. "We have a lot of work we need to do in the way of understanding performance in different operational contexts. It is rewarding to partner with a unit that puts human performance at the forefront and that is open to working with us. The unit can bring their wealth of knowledge to us so we can shape the science to meet their needs."

"When scientists and Soldiers actually talk -- and there's that lightbulb between them -- that can lead to something remarkable," said Ramsay. "We are addressing a question that Soldiers are asking. They want to know how to perform better. Everyone wants to get the edge and enhance their lethality to win the fight."

Paratroopers with the 82nd Airborne Division's 1st Brigade Combat Team gain cover and return fire during mountain training near north Georgia's Camp Frank D. Merrill Sept. 21, 2011. The Soldiers and attacking insurgents are firing blanks. (Photo Credit: Sgt. Michael J. MacLeod)

SimSensei

USARIEM Partners to Explore Using Virtual Humans to Measure Cognitive Performance

By Mallory Rousell, USARIEM Public Affairs/Natick, Mass.

A Soldier talks to Ellie, a virtual human agent who is a part of SimSensei, a clinical decision support tool that can read expressions, speech patterns and body movements in order to detect signs of psychological distress. The developers of SimSensei, the University of Southern California Institute of Creative Technology, or ICT, are now collaborating with the U.S. Army Research Institute of Environmental Medicine, or USARIEM, along with other Department of Defense partners, in order to enhance Ellie's capabilities so she can detect changes in cognitive status during training and battlefield scenarios (photo by Albert Skip Rizzo, USC Institute for Creative Technologies).

Facial expressions, body movements and features of speech can communicate volumes about a person's physical, cognitive and emotional states.

Army researchers from the U.S. Army Research Institute of Environmental Medicine, or USARIEM, have recently begun collaborating on developing and enhancing technologies that can be used to accurately and objectively detect degraded cognitive performance in Soldiers, allowing unit leaders and medics to be able to make informed mission decisions and assess who is operationally fit to fight.

Picture this: You turn on your mobile device or slip on a virtual reality headset and connect to Ellie, who is going to measure your cognitive performance. Ellie begins to ask you questions. Her calm, nonjudgmental demeanor and her responsive body language and facial expressions encourage you to open up. If you shift away or avoid eye contact, Ellie adjusts her approach, helping you to re-engage in the conversation. The conversation resembles the ones you have had with a medical provider, friend or family member.

The only twist to this story is that Ellie is not a real person. She is a virtual human agent.

Ellie was developed as part of SimSensei by the University of Southern California Institute of Creative Technology, or ICT, and the Army Research Laboratory in 2011 as part of a new generation of clinical decision support tools that can be used to detect signs of psychological distress by automatically analyzing human behavior. As a support tool, SimSensei would provide military personnel and their families with better awareness and access to care while reducing the stigma for seeking help.

SimSensei enables engaging face-to-face conversations by using two technologies: Multisense and Ellie. Multisense is state-of-the-art sensing technology that automatically tracks and analyzes facial expressions, body posture, speaking patterns and higher-level behavior descriptors, such as whether you are paying attention or if you are fidgeting. As you converse with Ellie, Multisense tracks all of your behaviors and movements, information which is then used to guide Ellie, so she can respond to you appropriately.

While ICT originally created Ellie to facilitate mental health screening in deployed Soldiers, the developers are now working with scientists from USARIEM; Walter Reed Army Institute of Research, or WRAIR; the U.S. Military Academy at West Point and MIT Lincoln Laboratory, or MITLL, on expanding Ellie's capabilities.

According to Dr. Kristin Heaton, a USARIEM research psychologist who specializes in evaluating warfighter cognitive performance in diverse military training and operational environments, an enhanced Ellie could provide a novel and cost-effective approach for assessing warfighter cognitive performance.

"We are finding ways to improve Ellie's ability to detect changes in warfighter performance that can be indicative of an emerging illness or injury," Heaton said. "ICT has a powerful and innovative virtual human platform. We are working with them and our other collaborators to identify physiological, cognitive and emotional features that will help Ellie predict how well a warfighter is functioning at any given point in time."

SimSensei is based on more than 10 years of research by ICT on how facial and vocal cues correlate with psychological health. While some of this work can be applied to analyzing cognitive readiness, Heaton explained that there is more research that needs to be conducted to pinpoint which subtle facial and vocal changes indicate degraded cognitive performance, which may impair attention and decision-making and jeopardize the mission.

"The brain coordinates speech and facial expressions in an exquisite way," Heaton said. "When cognitive performance is compromised, that coordination can start to break down. You can see this in a variety of speech disorders. Even when someone is tired, they sometimes sound as if they are intoxicated. They slur their words. Their voice might drift off, get softer or sound monotonous. Something similar could occur if a person has depression. They might also have muted facial expressions. Different disorders and stressors can change these facial expressions and speech."

At USARIEM, Heaton has collaborated with MITLL to investigate the relationship between vocal and facial expression signals and Soldiers' physical and cognitive performance. Heaton is particularly interested in how combinations of facial muscle movements and speech characteristics may be used to distinguish changes in performance in a variety of military occupational and environmental conditions Soldiers are exposed to during training and on the battlefield.

With a simple tablet computer, the USARIEM team has been collecting high-quality video and audio recordings of study volunteers pronouncing syllables, reading scripted passages, answering open-ended questions and making various facial expressions to cues. These data will not only help USARIEM and MITLL researchers develop algorithms to

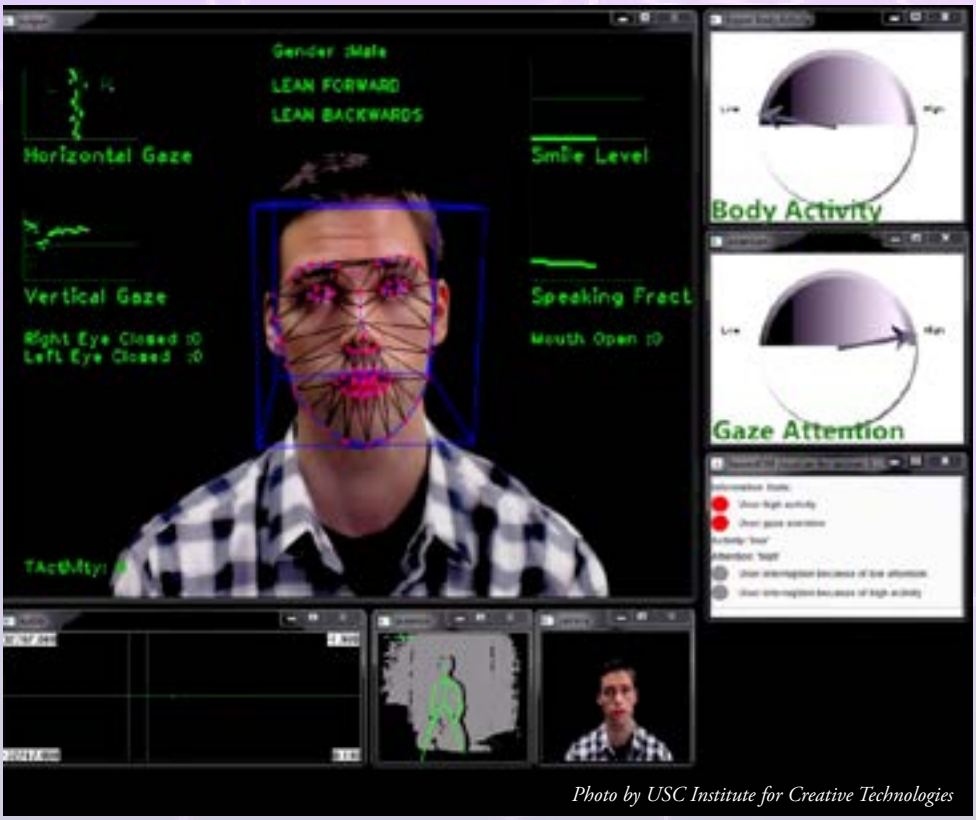

Photo by USC Institute for Creative Technologies

detect changes in cognitive status under different exposure conditions, but they can also be used to enhance Ellie's programming.

"We need to understand what speech and facial expressions look like in a variety of exposure conditions, whether it be a single exposure or stressor or multiple stressors," Heaton said. "This information could then be used as a signal to identify individuals at elevated risk of becoming a casualty or sustaining an injury."

Virtual human agents like Ellie may become the new normal for the future force. According to Heaton, Ellie could be tremendously helpful for people who do not have easy access to medical facilities or treatment providers or for those who may fear the stigma of mental health services. Users who interact with Ellie in a private and anonymous setting have reported that they feel less risk in honestly reporting and self-disclosing psychological issues, as compared to talking with a real person or even checking off symptoms on the Post Deployment Health Assessment questionnaire. While these technologies are not intended to replace evaluation, diagnosis or treatment by a trained medical provider, they are cost-effective and accessible, with 24 hours a day, 7 days a week availability from anywhere in the world.

Looking ahead, Heaton indicated that future work will expand the application of this technology to other useful applications, such as physical and cognitive performance coaching, educational tutoring and health and wellness assessment and tracking.

"Virtual human agents like Ellie are more common now than they ever have been," Heaton said. "The idea is to make this technology work for the Soldier by providing a personalized bridge between the user and readiness and wellness enhancing resources."

Whether a Soldier is a well-seasoned general or a freshly-recruited private, everyone is susceptible to decreased cognitive performance. Dr. Karl Friedl, the Army's senior scientist for physiology, stated that the research findings from the SimSensei project could open the door to other emerging technologies that can accurately predict when a Soldier's cognitive status is declining, providing the Army with necessary tools that can help prevent catastrophic events during missions and ensure we have a vigilant, lethal force that can win our nation's wars.

> **We need to understand what speech and facial expressions look like in a variety of exposure conditions, whether it be a single exposure or stressor or multiple stressors. This information could then be used as a signal to identify individuals at elevated risk of becoming a casualty or sustaining an injury.**
>
> **Dr. Kristin Heaton**
> **Research Physiologist, USARIEM**

"In addition to Soldier avatar coaching applications, Multisense Ellie provides a research platform to determine the combination of physiological measures that reliably predict mood and cognitive status in stressful conditions," Friedl said. "These measures will form the basis of future man-machine interfaces for optimal human performance, such as adapting the complexity of information displays, and they can be incorporated into wearable monitors for Soldier readiness status."

Photo by Teresa Dey, USC Institute for Creative Technologies

Courtesy photo

Compete to Conceal

Army Netting Modernized Camo

By PEO CS & CSS/Detroit Arsenal, Warren, Mich.

The U.S. Army recently awarded three engineering manufacturing development (EMD) contracts to start industry off on competitive prototyping for the next generation of modernized, ultralightweight general-purpose camouflage.

The new gear -- dubbed the Ultra-Lightweight Camouflage Net System (ULCANS) Increment I -- is designed to better bolster the lethality and survivability of military personnel and equipment. ULCANS will be an all-weather, state-of-the-art signature management concealment system that provides multispectral protection. The program aims to replace the legacy woodland and desert camouflage variants developed in the 1990s, and will develop new light/dark woodland, snow/alpine, and desert/urban variants to restore combat overmatch against new and future sensor threats.

With these awards, the Army will kick off a six-month competitive prototyping effort between three potential suppliers. Plans call for making a selection by the first quarter of fiscal year 2019 for final development and test. Low-Rate Initial Production is slated for the third quarter of fiscal year 2019, and the First Unit Equipped for the fourth quarter of fiscal year 2019.

"With ULCANS Increment I, we are executing a development and fielding strategy to ensure camouflage is made available as quickly as possible to units with the most pressing operational needs," said Col. Frank Moore, product manager, Force Sustainment Systems within the Project Management Office for Expeditionary Energy and Sustainment Systems, U.S. Army Program Executive Office for Combat Support and Combat Service Support.

John Viggato, assistant product manager for Force Sustainment Systems, explained that ULCANS Increment I represents the first new camouflage in a generation. "We've awarded contracts to three global leaders in camouflage, now we are having them compete head to head through a series of unique sensor-defeat tests in operationally relevant environments around the world -- ultimately to award a single production contract to the best performer."

Viggato singled out the U.S. Army Natick Soldier Research, Development and Engineering Center (NSRDEC,) which partners with PM FSS, in providing a collaborative and highly technical team of engineers and scientists. These scientists now are working on the Competitive Prototyping Phase of the contract, which consists of unique NSRDEC-supported test events, he added.

"ULCANS Increment I is critical to Soldier lethality and overmatch. As adversary technology continues to evolve, we have to be able to quickly reduce battlefield signatures and limit the enemy's ability to detect personnel, weapons systems, vehicles, and other equipment," said Claudia Quigley, director, NSRDEC Expeditionary Maneuver Support Directorate. "This program has been characterized by great teaming among the research, acquisition and sustainment communities, as well as by a concerted, unified commitment to getting ULCANS to units most in need of this modernized capability."

The U.S. Army Program Executive Office, Combat Support & Combat Service Support, headquartered here, oversees the Project Management Office, Expeditionary Energy and Sustainment Systems, including force sustainment systems. With approximately 150 programs in active management and an annual budget of more than $3 billion, PEO CS&CSS is responsible for managing the design, development, and delivery of the majority of equipment across the Army's Transportation, Engineer, Quartermaster, and Sustainment portfolios.

Sgt. Maj. Keith E. Green, left, a senior enlisted noncomissioned officer assigned to the Mission Command Element (MCE) of the 1st Infantry Division, Fort Riley, Kansas, fastens together camoflauge netting with 550 cord to reduce visibility of the tactical command post during the Saber Strike training event in Bemowo Piskie Training Area, Poland, May 28, 2018. Saber Strike 18, a multinational excercise running from June 3-15, tested the eFP battlegroups located in Estonia, Latvia, Lithuania, and Poland. The Excercise is part of NATO's overall detterance and defense posture and will demonstrate the Alliance's determiniation and ability to act as one in response to any aggression against its members. (U.S. Army photo by Dustin D. Biven/22nd Mobile Public Affairs Detachment).

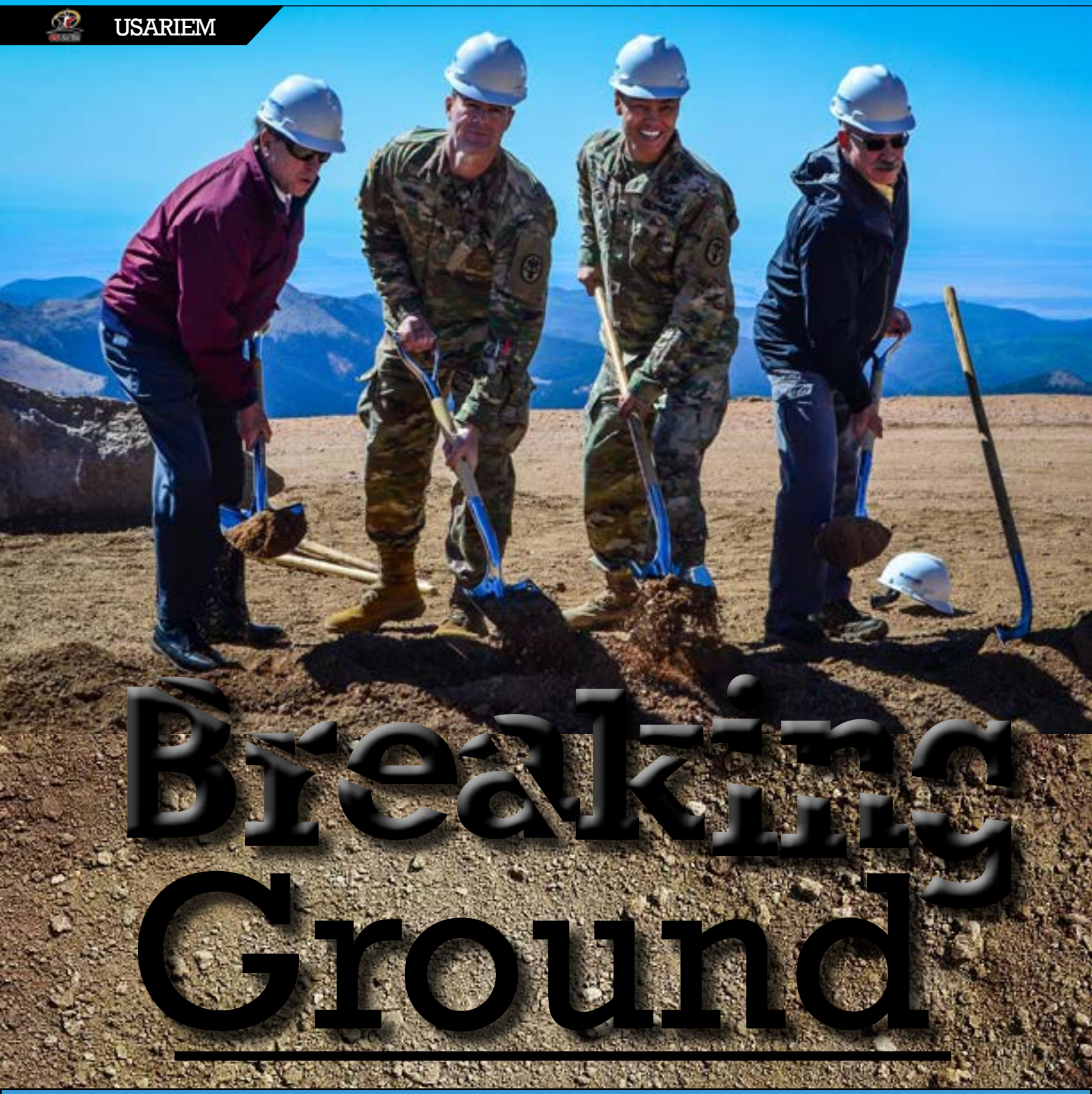

Photo by Colorado Springs

Breaking Ground

Construction of New USARIEM Pikes Peak Labratory Begins this Summer

By Mallory Rousell, USARIEM Public Affairs (June

After standing on the 14,115-foot summit of Pikes Peak in Colorado for more than 50 years, the walls of the U.S. Army Research Institute of Environmental Medicine, or USARIEM, High Altitude Research Laboratory are finally coming down this summer.

The city of Colorado Springs, in partnership with USARIEM, the U.S. Forest Service and Colorado Springs Utilities, is building a new Summit Complex and Visitors Center, which officially broke ground on June 4. The new, ecologically sensitive Pikes Peak Summit Complex will offer sweeping views and feature digitally interactive displays focused on the history, significance and geology of Pikes Peak.

As part of this massive construction effort, the site will consolidate USARIEM's high-altitude research lab, a facility support building and Colorado Springs Utilities Communications Facility. The new Pikes Peak lab will be constructed on the west side of the new complex and slightly below the summit, giving tourists an unobstructed 360-degree view of the sweeping landscape surrounding the Peak. The excavation of the new site began last week, and construction of the new complex and the USARIEM lab is anticipated to be complete by the fall of 2020.

High altitude and mountainous terrains are militarily relevant operational environments where our warfighters must adapt and fight. No one knows this better than Dr. Stephen Muza, USARIEM's deputy director of science and technology, who has contributed to numerous USARIEM Pikes Peak studies over the past 26 years. According to Muza, the new lab will help USARIEM fulfill its mission to optimize warfighter health and physical and cognitive readiness during high-altitude missions.

"The new Army High Altitude Research Lab will enhance our nation's ability to continue conducting high-altitude medical research to provide America's military with warfighters who are ready and capable of overmatching our adversaries in future high-altitude mountain operations," Muza said at the groundbreaking celebration on June 4.

Muza explained that U.S. Army, Navy and Air Force researchers, along with many academic scientists, have partnered with USARIEM to use the Pikes Peak lab to research ways to optimize Soldier health and performance readiness in high-altitude environments. He added that medical research conducted on Pikes Peak contributed to the success of U.S. military operations in the mountains of Afghanistan after September 11.

Yet, the USARIEM researchers also learned from these Afghanistan mountain operations that there is much more research that needs to be conducted in order to optimize and sustain warfighter health and performance in high altitude.

"In support of the Army Modernization Priorities, specifically increasing Soldier lethality, our goal is to understand how altitude affects Soldiers physiologically in order to mitigate altitude illness and opti-

During a 1978 field study in the U.S. Army Research Institute of Environmental Medicine, or USARIEM, High Altitude Research Laboratory on top of Pikes Peak in Colorado, Dr. Kent Pandolf, right, and Dr. Andrew Young, left, analyze a study volunteer's respiration rate while completing a bike exercise at high altitude. The lab's unique facilities, including living accommodations for researchers and study volunteers, allowed USARIEM the unique advantage of being able to conduct decades of altitude studies where volunteers lived on the summit. (Photo: USARIEM Historical Archives)

mize physical and cognitive performance," Muza said. "Our understanding of how the human body can adapt to a high-altitude environment and how altitude illness, otherwise known as Acute Mountain Sickness, or AMS, happens is incomplete and requires further studies."

Soldiers who are abruptly exposed to the lower oxygen pressure levels at moderate to high altitudes (4,000 to 14,000 feet) can face unique, debilitating changes in performance and overall health. When Soldiers ascend above 4,000 feet, their physical performance can progressively decrease, limiting their ability to perform missions. At above 8,000 feet, AMS is common, with Soldiers experiencing symptoms like headaches, vomiting, fatigue, lassitude or trouble sleeping. Severe cases of AMS could even require medical evacuation.

Anticipated to be complete by 2020, the new, ecologically sensitive Pikes Peak Summit Complex will offer sweeping views and feature digitally interactive displays focused on the history, significance and geology of Pikes Peak. As part of this massive effort, the U.S. Army Research Institute of Environmental Medicine, or USARIEM, High Altitude Research Lab, left, will be consolidated with other Pikes Peak facilities slightly below the west side of the summit, giving tourists an unobstructed 360-degree view of the sweeping landscape surrounding the Peak. (Photo: Colorado Springs)

The symptoms can be so debilitating that adversaries who are already acclimatized to high altitude could use the terrain to their advantage. The 1962 Sino-Indian War between China and India, one of the first large-scale confrontations between military forces at high altitude, was a great example of this.

That war sparked the U.S. Army's interest in altitude research, which eventually led the Army to establish the first Pikes Peak Lab in 1969.

From its humble beginning in the 1960s, USARIEM's Pikes Peak lab facilities, technology and research evolved in later years into what Muza described as the "center of altitude research." The lab's unique facilities, including living accommodations for researchers and study volunteers, allowed USARIEM the unique advantage of being able to conduct decades of altitude studies where volunteers lived on the summit.


Photo by David Kamm, NSRDEC

Some of the medical breakthroughs from previous research on the Peak have led to the Food and Drug Administration's only approved altitude sickness prevention medicine, a better understanding of Soldiers' nutrition and hydration needs at high altitude, as well as guidance to optimally help Soldiers acclimatize to a high-altitude environment.

While this information was primarily discovered and developed to help warfighters, Muza noted that it also has benefited all Americans through improved health and quality of life.

For more than 50 years, the Pikes Peak lab has stood as a symbol of USARIEM's proud record of mountain medicine research, and USARIEM will continue to lead Army health and performance research in the future.

"The U.S. Army has been sharing the summit of Pikes Peak since the 1960s to advance medical research for the benefit of our military and all Americans," Muza said. "The current lab has been on the summit since 1969, and on a personal note, I have conducted research studies in that lab since 1992. The Army has enjoyed a great working relationship with the management team of America's Mountain, and we look forward to many more decades of collaborative work."

a promising Capability

DOD Exoskeleton Technical Interchange Meeting Focuses on Reducing Warfighter's Load

By Jane Benson, NSRDEC Public Affairs/Natick, Mass. (June 6, 2018)

The exchange of knowledge and spirit of collaboration were in the air at the DOD Exoskeleton Technical Interchange Meeting, recently held at the U.S. Army Research, Development and Engineering Command Soldier Center, an organization dedicated to increasing the lethality and optimizing the performance of the nation's warfighters -- while working to reduce the warfighter's load.

Heavy loads can increase injuries as well as impact mobility. Exoskeletons are a potential solution to some problems related to load carriage. They are wearable devices that enable warfighters to perform physically strenuous activities, such as movement and supply handling, with greater strength, endurance and safety.

The DOD Exoskeleton Technical Interchange Meeting was hosted by Dale Ormond, principal director, Research, Office of the Under Secretary of Defense for Research and Engineering, or OUSD R&E; Douglas Tamilio, director of the Natick Soldier Research, Development and Engineering Center; and Brig. Gen. Vincent Malone, deputy commanding general of RDECOM and senior commander of the Natick Soldier Systems Center.

OUSD R&E sponsored the event, which was co-organized by OUSD R&E and NSRDEC.

"The Secretary of Defense's number one priority is increasing Soldier lethality," said Ormond. "We have so loaded up Soldiers with ammunition, food, armor, guns…We need to figure out a way to reduce that load and exoskeletons provide that opportunity."

Tamilio said that the Chief of Staff of the Army has made exoskeleton technology a top priority and noted that the meeting was a who's who of the leading experts in exoskeleton advances.

During the event, exoskeleton experts took part in presentations, panel discussions and brainstorming sessions on the needs of military users and the technolo-

The Soldier pictured here is participating in a Natick-led study on the effects of bulk on Soldier performance. A recent technical interchange meeting held at Natick focused on exoskeleton technology as a way to reduce the warfighter's load and the effects of bulk and weight on performance and lethality. (Photo credit: Jeff Sisto, NSRDEC)

gies required to best serve them.

"We want to encourage healthy debate about what is technically achievable," said Ormond. "We have to balance cost, performance and risk."

The event featured experts from numerous organizations across DOD, including the Program Executive Office Soldier, the U.S. Army Research Laboratory, the U.S. Army Research Institute for Environmental Medicine, the U.S. Army Medical Research and Materiel Command, the U.S. Army Training and Doctrine Command, the U.S. Special Operations Command, the U.S. Marine Corps, the U.S. Air Force Air Mobility Command, the U.S. Air Force 711th Human Performance Wing and the U.S. Department of Veterans Affairs.

Several universities presented at the event, including the Massachusetts Institute of Technology, the University of Florida, Georgia Institute of Technology, Harvard University and the University of California, Berkeley.

Experts from industry also participated in the event.

"The warfighter load overburden problem remains," said Greg Kanagaki, an NSRDEC systems engineer, who, along with members of OUSD R&E, co-organized the event. "From the Army perspective, exoskeletons are a promising capability to address that problem, enhancing Soldier readiness and mission effectiveness. In particular, we view exoskeletons as an enabler to the Army's 'Movement & Maneuver' and 'Sustainment' operations, allowing Soldiers the capability to maintain peak performance longer."

The warfighter load overburden problem remains.From the Army perspective, exoskeletons are a promising capability to address that problem, enhancing Soldier readiness and mission effectiveness.

Greg Kanagaki
Systems engineer, NSRDEC

"Putting exoskeletons on the battlefield is going to be a revolutionary change," said David Audet, branch chief, Mission Equipment and Systems Branch at NSRDEC.

Douglas Tamilio -- director of the Natick Soldier Research, Development and Engineering Center -- addresses the DoD Exoskeleton Technical Interchange Meeting held recently at the Natick. The meeting was hosted by Dale Ormond (seated front row, second from right), principal director, Research, Office of the Under Secretary of Defense for Research and Engineering, or OUSD R&E; Tamilio, director of NSRDEC; and Brig. Gen. Vincent Malone, deputy commanding general of the U.S. Army Research, Development and Engineering Command and senior commander of the Natick Soldier Systems Center. (Photo Credit: Richard Walunas, NSRDEC)

Independence Day

July 4, 2018

The Presidential Salute Battery, 3d U.S. Infantry Regiment (The Old Guard), supports the Capitol Forth Concert honoring the Nation as part of a fourth of July celebration in Washington D.C., July 4, 2014. (U.S. Army photo by Spc. Cody W. Torkelson)