Army invests in ideas for stronger future

U.S. Army

ABERDEEN PROVING GROUND, Md. (Dec. 21, 2012) -- It's hard to pinpoint the exact moment a scientist gets a spark of inspiration when a new idea strikes like lightning. It's even harder to harness innovation and mold it in tangible ways that benefit the greater good. That's why the U.S. Army Edgewood Chemical Biological Center, or ECBC, here, is giving its workforce the financial push it needs to creatively pursue projects that could yield high rewards.

By investing in projects that would otherwise be overlooked, ECBC is laying the groundwork for new innovation the same way a farmer plants seeds, watches crops grow and when the time is right, harvests the return. In 2011, ECBC provided three projects with a small amount of Section 219 funding that has generated new business worth millions of dollars.

"This is to be used essentially as seed money to turn into more money. You invest a little bit of money to make a lot of money. A single grain of rice can tip the scale. That's what this money can be used for at ECBC," said Peter Emanuel, Ph.D., BioSciences division chief in Research and Technology Directorate.

"It's when you have a project that's right there, when the golf ball is just hanging on the lip and is just ready to fall into the hole, it just needs a gentle nudge. We can't fund full efforts with 219 funds but we can give it that nudge so the ball just falls into the hole to be awarded a larger pot of funding."

Section 219 funding comes from the National Defense Authorization Act of 2009, which allows military and government research laboratories to tax customers up to 3 percent of all revenue sources as an indirect fee that helps finance the overall cost of a given project.

Justin Johnson, ECBC chief financial officer, said the center has never levied the full three percent on customers because of an economic climate of diminishing resources. Instead, ECBC has held a 1.3 percent rate across its customer base.

Section 219 funding can be used for infrastructure improvements, the recruitment and training of personnel, and basic and applied research programs. Johnson said infrastructure projects included the repair and modernization of buildings, roofs and equipment, and they comprised nearly 90 percent of ECBC's 219 funds in 2012. By expanding opportunities for funding across the center, under-developed research projects could begin to thrive in places that are typically difficult to generate new business leads.

"If the research proves to be successful, it could catch the eyes of organizations that fund ECBC for research and development later on in the life cycle. Potentially the Defense Threat Reduction Agency or the JPEO will be interested in funding

additional research to utilize the technology generated out of this program," Johnson said.

"That's the intent -- to transition new technologies to the warfighter force," Johnson continued. "Hopefully we do something in the basic or applied research arena that makes a light bulb go off for customers that want to utilize this in their programs."

Under the supervision of Emanuel, two projects that started out with small amounts of 219 funding resulted in large investments from outside customers, including a project that turned $10,000 of seed money into a $330,000 contract with the Department of Homeland Security for the validation of a device that will help first responders analyze suspicious powders on-site.

"We've always been on the search for a better tool. It's essentially re-engineering a technology that we've seen before called ATP (adenosine triphosphate) detection," Emanuel said. "Only living things have ATP. So if I look at a powder, is it even a biological powder or is it talcum? It could be coffee creamer. I want something that takes me three seconds to reliably determine if the powder is biological. If it's not, I want to be able to rule that out."

The company 3M originally developed the device to test meat packing plants to ensure the machines were properly cleaned in between processing batches of hamburger patties. Now, ECBC is re-imagining the technology for a homeland security application. Emanuel said researcher James Wright used the 219 funds to buy testing swabs from 3M that were used to test powders. If the sample powder contained ATP, it would emit a light signifying its biological origin.

The successful analysis of the powders demonstrated the technology's accuracy and efficiency that could one day save state and local governments millions of dollars that result in common powder hoaxes. But it also properly prepares first responders for an emergency in case of a real threat. The precision technology ultimately led to the contract that will enable ECBC to conduct more extensive research.

Emanuel is also in the final stages of solidifying a second contract of $1.3 million with DHS and CBI Polymers to develop a cost-effective decontamination gel that could potentially kill chemical and biological agents like anthrax. This would not have been possible without the 219 funding that led to a breakthrough when researchers Vipin Rastogi, Ph.D., and Lisa Smith used a non-pathogenic strain of anthrax to successfully test various "kill cocktails" on samples of materials that makeup Army airplanes and vehicles as well as plexiglass, computer screen, concrete, carpet and rubber.

The catalyst for developing this new product followed a talk with Larry Stack, CEO of CBI Polymers, in which he talked about his experiences responding to the radiation spill from Japan's Fukushima Dai-ichi nuclear power plant after it was devastated by a tsunami in 2011. Stack described how difficult it was to decontaminate rescue helicopters used to image the damaged reactor. Emanuel said the decontamination process took days and produced 19,000 gallons of radioactive liquid runoff that

could have been prevented had the gel-based solution been developed.

"When considering any response and remediation you have to consider how long it will take and how much it will cost. The full life cycle cost to resume the mission is crucial. Furthermore, what is the ecological footprint you leave behind?" Emanuel said.

The new compound being developed by ECBC answers some of these questions. The solution, which contains the "kill cocktail" ingredients, would be sprayed onto a contaminated surface where it dries and hardens overnight, trapping the hot zone of biological agents to prevent it from spreading through reaerosolization. After 24 hours, the compound can be peeled off, crumpled up and disposed of as hazardous waste that has roughly 1/50th the volume footprint of the liquid runoff solution, Emanuel said.

With the DHS contract, the R&T Directorate would be able to pursue additional testing that could help scientists prove that many biological and chemical agents beyond anthrax could be safely and successfully decontaminated using the gel.

"The 219 funding allows us to dip our toes in the pool," Emanuel said. "Now we're ready to take some laps."

Joe Domanico, pyrotechnics and explosives branch chief within the Engineering Directorate, received $25,000 in Section 219 funding for the development of a smoke grenade design that could serve multiple purposes for the warfighter in theater. The result: a $250,000 investment by the Project Manager for Close Combat Systems.

Domanico said Soldiers who are ill-equipped in the field are forced to creatively use color smoke grenades for screening even though the grenades are designed for signaling purposes and produce smoke for short durations and in various colors. A screening grenade, on the other hand, is designed to last longer, provide more on-the-ground-coverage and is typically white or gray in color. To address the problem, Domanico developed an all-encompassing smoke grenade that could be used in multiple ways.

The Selectable Color Single Canister Smoke Hand Grenade utilizes a horizontal configuration with three dye chambers, each filled with a primary color: yellow, red and blue. The top part of the grenade features two dials that when twisted together open two dye chambers that can create new colors: orange, green or purple. When all three dye chambers are released at the same time, the grenade produces a seventh color -- black. The innovative design lowers the amount of equipment and ammunition the soldier would have to carry in combat.

Domanico's smoke grenade design was originally crafted 20 years ago but never came to fruition because of insufficient funding. With the 219 funding, however, Domanico and his team were able to pursue the project with a refreshed optimism that reflected the branch's motto: yesterday's techniques with today's technologies.

"I went back and looked at how I did things back then and thought if I change it a little now with the additional capability that I have, I think I could make it work," said Domanico, who said he would not have pursued the project without the funding.

Now the smoke grenade is on its way to becoming field operable for Soldiers in theater. With the investment from PMCCS, the prototypes will undergo rudimentary testing at hot and cold temperatures as well as water submersion to check the overall design capabilities before being tweaked during human factor testing.

Domanico said the 219 funding boosts the center's ability to compete with commercial entities within the private sector that may be developing similar technologies.

"The commercial market does their research and development, makes a product, advertises and sells it. The government says give me money, and I'll make a prototype," Domanico said.

"So it really is completely different than the commercial world, but this funding can get us in line with competing commercial firms where the director takes an idea, evaluates it with a board, and then the good ideas can get some money," Domanico said. "And this might be simple. It might be a clay model, a computer program, a set of drawings. It could be anything, but the idea is to open the 219 money to everyone in ECBC who might have an idea."

After successfully funding three projects last year, ECBC is looking to expand its 219 funding across the center. Johnson said all the directorates will received a formal data call for submissions in November while the feasibility of each will be determined in December by a panel of senior scientists. By January, the final projects will be awarded their respective 219 funding and have one year to execute their development plans.

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