SHOCKINGLY ORIGINAL

SBIR Contract spurs entrepreneurial advances

When Pete Bitar ran a Styrofoam-recycling company in Portland, Oregon in the 1990s, the recycling process produced significant amounts of static discharge. Occasionally, the bursts of electricity shocked him, a phenomenon of industrial-scale Styrofoam friction. For an innovative businessman, it was an entrepreneurial aha moment.

"I thought, 'Dang, this would make a great weapon,'" Bitar said.

Years later, he had the opportunity to test that idea by responding to a Department of Defense (DoD) Small Business Innovation Research (SBIR) solicitation to develop a non-lethal electroshock weapon.

"I wonder if I can dust off my old Styrofoam idea and make it a thing?" Bitar recalls thinking. "It was just that idea of physically sending electricity through the air without wires."

At the time, Bitar was running a parachute-painting business called Xtreme ADS, a shorthand reference to "advertisements." By his own account, he wasn't prepared for the SBIR process. But the self-proclaimed "garage inventor" tweaked XADS to stand for Xtreme Alternative Defense Systems, and went to work. He was a one-man company.

"I'm sitting here painting parachutes and doing odd jobs and I have to start a company from nothing," he said. "I'm scrambling."

Bitar built upon the principles learned from his years of producing electricity as byproduct while running Styrofoam through a grid of wires and vibrating screens to render uniformly sized packing peanuts. The technology that emerged from his tinkering was a variant of a solid-state Tesla coil that created channels of electricity.

Gibbs said Bitar's story exemplifies the value of the SBIR program, which encourages innovation and opens up opportunities for both private companies and the Department of Defense.

"We were doing it electronically with semiconductors rather than with big generators and arcs of currents," he said.

George Gibbs, a former infantry weapons program manager for the Marine Corps Systems Command in Quantico, Virginia, initiated the SBIR solicitation to explore whether a viable wireless alternative to the Taser could be developed for expanded military applications. Gibbs, who is now retired, recalls that Bitar's technology clearly stood out from the other candidates' proposals. Bitar secured the contract in 2002.

"It really, really worked, every time," Gibbs said.

But Bitar said the electroshock weapon project was derailed by the costs and complications of required testing on humans. Around that time, however, improvised explosive devices (IEDs) were becoming an increasingly pervasive threat to U.S. Armed Forces in Iraq and Afghanistan. So Bitar set about repurposing the technology.

Pete Bitar

"The mission focus changed for the technology, but it was the same tech," he said. "We adapted it and tuned it and tweaked it more for the counter-IED mission rather than being concerned whether it was lethal or non-lethal."

In the summer of 2004, Bitar was ready to demonstrate the refined technology. He purchased fireworks, buried them and fired a bolt of electricity into the ground, capturing the explosion on video. The counter-IED technology was approved for SBIR funding in 2005. Now aided by a small team of employees, Bitar continued improving the system by transitioning from electric bolts to pulses.

"It made more sense to inject it directly into the ground and radiate it with pulses," he said.

The updated XADS counter-IED system included an auxiliary power unit, auxiliary control unit, a proprietary electrical pulse generation module and an emitter arm assembly. Bitar developed a variety of configurations, allowing the system to be mounted onto any vehicle, trailer, or robotic platform. As the vehicles or robots drove, the arm assembly dragged cables that continuously pulsed electrical energy into the ground. The system detected feedback from a conductor, meaning it wouldn't confuse an iron rock for a bomb. The high-voltage electrical pulses either struck the buried explosive directly or its command wire, resulting in pre-detonation.

The system proved both highly effective and safe in demonstrations. Manned vehicles would push a mine roller mounted with the technology, and the lengthy arm assembly ensured human injury prevention. Remote-controlled

Photos courtesy Pete Bitar

The counter-IED system from XADS sends pulses of electricity through the ground.

robots, however, would have been the more common vessel in the field.

Gibbs, who oversaw the SBIR contract, said there was no viable alternative to the XADS system

"It was a huge game changer, just the whole concept that you didn't have to find the IED before you tried to do something about it," Gibbs said. "You were able to clear a route with a system that worked really well."

Just as the technology was coming to fruition, however, the United States was ramping up troop withdrawal in Iraq. The military shut down the division to which Bitar reported, and the program's funding was pulled.

"It was never used overseas," Bitar said.

Still, between 2006 and 2012, XADS grew to 33 employees, peaking in 2012 with $8 million in contracts with multiple branches of the U.S. military. Bitar has launched a number of other pursuits and has 14 patents to his name. XADS, which is based in Anderson, Indiana, was named Madison County's small business of the year in 2013.

"Without the SBIR, we wouldn't have had any funding at all," he said. "I literally started the company with the $10 it took to FedEx the proposal.

"We functioned completely off the SBIR," he continued. "We leveraged any profits we made back into keeping the company going and into research and development."

Gibbs said Bitar's story exemplifies the value of the SBIR program, which encourages innovation and opens up opportunities for both private companies and the Department of Defense. Gibbs said he typically oversaw about a dozen active SBIR contracts in various phases at any given time.

"The SBIR program is really a good way to introduce technology into the operating forces," Gibbs said. "It provides a leap ahead in technology with someone else's money, but by the same token it's really difficult to get it into use.

"But the other part is the commercial market," he added. "Something like Pete's system ... any place that people are going to congregate and look like a target for an IED, this kind of system ought to be there."

Xtreme Alternative Defense Systems (XADS), LTD
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