

Militaries exploring Venture Capitalism to fund Research and Development

Chinese firms have become significant investors in American start-ups working on cutting-edge technologies with potential military applications. The start-ups include companies that make rocket engines for spacecraft, sensors for autonomous navy ships, and printers that make flexible screens that could be used in fighter-plane cockpits. Many of the Chinese firms are owned by state-owned companies or have connections to Chinese leaders, as reported by Paul Mozur and Jane Perlez in New York Times.

Over all, China has been increasingly active in the American start-up world, participating in investment rounds worth \$9.9 billion in 2015, according to data from the research firm CB Insights, more than four times the level the year before. Chinese investors have a bigger appetite for risk and a willingness to do deals fast, said Neurala's chief executive, Max Versace. American military officials have "figured out a very good way to give \$10 billion to Raytheon," he said. "But to give a start-up \$1 million to develop a proof of concept? That's still very, very hard."

China has developed strategy to boost its military innovation through Military civil Integration. At a key Communist Party meeting in October, Xi identified innovation as the most critical of five concepts for development, followed by coordination, "green" development, opening up and sharing. Xi called for better integration between the military and the civilian sector to boost innovation in both the army and the nation. "Through in-depth development of military-civilian integration, military technologies are gradually applied in civilian fields, making high-tech equipment available to

commercial markets. At the same time, we have also emphasized the importance of encouraging more civilian product suppliers to actively participate in the defense-building process," said Dai Hao, Director-General of China's Institute of Command and Control.

The deals are ringing alarm bells in Washington. According to a new white paper commissioned by the Department of Defense, Beijing is encouraging Chinese companies with close government ties to invest in American start-ups specializing in critical technologies like artificial intelligence and robots to advance China's military capacity as well as its economy.

"What drives a lot of the concern is that China is a military competitor," said James Lewis, a senior fellow at the Center for Strategic and International Studies, who is familiar with the report. "How do you deal with a military competitor playing in your most innovative market?"

US military has also planned to boost innovation by investments in startups, global and grassroots innovations. New group under the U.S. Department of Defense, called Defense Innovation Unit Experimental, or DIUx has been formed with an office in Silicon Valley and in several other tech hubs across the U.S., the mission of DIUx is to bridge the different cultures of tech startups and the U.S. military to meet national security needs.

Many of the technologies the DoD will depend on in future will come from outside the DoD. The declining military budgets, the industry are investing less in new technology and increasingly depend on the global market for innovation. "We must be open to global, commercial technology as well, and learn from advances in the private sector," Defense Secretary Ashton B. Carter told the House defense appropriations subcommittee.

The US Defense Industry is in a Race to Acquire Hot Tech Startups.

The start-ups include companies that make space robots, using AI techniques for cyber security, autonomous vehicles, and communication chips.

In just one year, the nation's largest defense contractor has injected close to \$20 million into tech startups. And more investments are coming, says Chris Moran, executive director and general manager of Lockheed Martin Ventures. Lockheed Martin's venture capital unit had also invested in Terran Orbital, a manufacturer of small satellites for customers that provide internet connectivity or survey farmland. "The opportunity to invest in a nanosat leader allows us to address our customer's increasing interest in rapid, responsive, and cost-effective technology missions," said Chris Moran.

According to US army, there are many benefits of Smallsats in LEO: the first is low per-unit cost that enables affordable satellite constellations with minimal personnel and logistics tail and opportunity of frequent technology refresh. The second is high survivability as they fly far above common threats and crowded airspace. The constellations also degrade gracefully and lost capability can be rapidly augmented and reconstituted.

Lockheed is financing New Zealand's Rocket Lab, which is building a carbon-composite rocket to launch small satellites into orbit for less than \$5 million. The Pentagon is just beginning to grasp the significance of commercial space innovation, Moran says. Small satellites and rapid launch means the military could deploy systems in weeks, not years. And with satellites that offer higher revisit rates, the government could monitor areas of the globe more frequently.

Lockheed last year struck a deal with Cybereason, which has developed machine learning software that detect network

attacks as they happen rather than traditional defenses that depend on analysis and patching of malware after the attacks. "Artificial intelligence looks for pattern changes to prevent attacks before significant damage occurs," Moran says in an interview. "Cybereason was one of the early practitioners in this space." Boeing announced it has teamed with Verizon to fund SparkCognition, a company that develops artificial intelligence and machine learning software for cybersecurity and other uses.

Also among Lockheed's investments is Peloton Technology, a developer of autonomous vehicle technology that could be useful in military projects such as unmanned truck convoys. And earlier this year, Lockheed bought a stake in chipmaker IQ-Analog. The company designed chips that relay data at very high speeds, a technology with enormous potential in commercial and military communications system, as reported by Sandra Erwin in Scout.

The Army as Venture Capitalist: An Innovative Approach to Funding Research and Development

The United States Army is having difficulty balancing its need for new technologies with the resources available to develop them. The Army currently faces the challenge of finding better methods for developing the new technologies needed to stage its revolution in military affairs (RMA) while keeping current equipment relevant and affordable. RAND researchers recently introduced a novel solution: that the Army should fund some of its technology development through a private venture capital organization.

Over the last few decades, venture capital has emerged as a financial engine for the new technologies and industries that

are changing the world. RAND analysis shows that not only would an Army venture capital fund help reinvigorate research and development (R&D) in the defense industry; it could also help the Army leverage outside resources, like co-investors, that would allow it to stretch its own R&D resources. In addition, revenue returned on the Army's venture capital fund investments could be used to re-invest in more new technologies.

Army Venture Capital Can Better Access Commercial Technology, says RAND. "A growing portion of technical innovation occurring in the United States is happening in the commercial sector, thus making Army access to that sector more important than ever. Army leadership, recognizing the importance of tapping the commercial technology sector, has emphasized its desire to increase collaboration with commercial technology developers. Unfortunately, the Army's traditional contracting methods make this difficult. A venture capital organization could circumvent some of the Army's problems in trying to collaborate with the commercial sector. The Army venture capitalist could act as a middleman who understands the needs of the business and technology communities. He/she could shape agreements that solve Army technology problems while also meeting those needs."

Venture Capital Can also Leverage Non-Army Resources. "Today, most Army research is conducted exclusively with Army resources. Assuming the Army's fund invests in technologies with commercial potential, it is likely to be able to attract significant co-investment. The Army can thus stretch its own R&D resources so that it can accelerate the development of key technologies while also continuing to invest in a wide range of new ideas."

Venture Capital Provides a Return on Investment (ROI), says RAND. "As mentioned earlier, venture capitalists expect large returns as compensation for their investment risks. Most of the technologies appropriate for investment by an Army venture

capital fund will have a longer term commercial potential. By using a venture capital model to make the initial investments in new technologies, the Army will be able to earn a ROI as the commercial market for these technologies grows.”

What Is Venture Capital?

Venture capital organizations provide a financing source for start-ups or emerging companies that have a concept, a plausible market, and a business plan but lack the resources necessary to develop and market their ideas. By investing in these new businesses, venture capitalists accept a greater-than-average investment risk for the short term but potentially reap higher long-term returns than they would from other investments, says RAND.

“Venture capitalists typically receive an equity stake in the funded business and usually provide management and business expertise to the businesses they are backing. Although venture capital is a relatively young concept, it has been extremely successful in developing and exploiting innovation. Companies such as Intel, Apple, FedEx, and Netscape used venture capital as a key resource and are examples of its success.”

The reasons for venture capital’s success are its inherent incentives and an organizational structure that helps innovative ideas develop. Businesses that venture capitalists back tend to be young, small, and growth-oriented. Company founders tend to be risk-takers who are motivated by their vision. Investors are experienced businessmen and businesswomen who know how to manage young companies and commit a significant amount of ideas, experience, and time to the companies they back.

Could the Army take advantage of the incentive and organizational structures that make venture capital such an

engine of innovation? RAND researchers believe that ample evidence exists to suggest that it could, and they present many compelling reasons why the Army should consider a venture capital fund.

References and Resources also include:

<http://www.scout.com/military/warrior/story/1789008-defense-in-dustry-race-to-buy-hot-startups>

https://www.rand.org/natsec_area/products/vc.html

<https://www.nytimes.com/2017/03/22/technology/china-defense-start-ups.html>