

IN DEPTH: TECHNOLOGY

Not-so-secret science

Johns Hopkins APL has opened its once-sealed doors to private tech firms

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Staff

After more than 60 years, the Johns Hopkins Applied Physics Laboratory is still protecting the homefront while exploring a new front.

Launched in March 1942 as a collaborative effort between the federal government and Johns Hopkins University to help bring an end to World War II, scientists at the lab -- commonly known as APL -- searched for ways to protect U.S. ships against enemy air attacks.

Researchers seized on technology to make a proximity fuze, an electronic device for detonating a warhead as it approaches a target. The nearly four-year effort to design, build and test the fuze yielded what historians consider to be one of the three most valuable technological developments of the war effort, along with the atomic bomb and radar.

From such focused beginnings, APL's more than 2,000 scientists today cast a wider net. Still concentrating largely on air and sea defense for the U.S. Navy, the APL (www.jhuapl.edu <<http://www.jhuapl.edu/>>) also supports the Department of Defense in homeland security initiatives, assists NASA with navigation systems and performs a wide range of information technology work.

Within the last four years, APL has worked more closely with private tech firms. Earlier this month, the Maryland Technology Development Corp. (www.marylandtedco.org <<http://www.marylandtedco.org/>>) invited local tech firms to APL to discuss possible collaborations with the lab's scientists.

The lab attracts more than \$545 million in funding to help its research sponsors tackle challenges that grow more complex each year. Enemy submarines get quieter, stealthier. Missile systems get more accurate, faster and deadlier.

"Year by year the complexity of the challenge and the degree of difficulty changes," APL Director Richard T. Roca said. "This is the constant game of offense-defense."

A tech psyche

Before the Navy could use the proximity fuze in anti-aircraft shells to protect its ships in World War II, APL scientists discovered a problem: Getting the shells close enough so that detonation would effectively take out the enemy aircraft. Scientists worked diligently to understand the Navy's needs, refining the design and testing and retesting the fuze before trusting it to protect the fleet.

APL's research and development philosophy was born -- marrying technological advancement with a sophisticated understanding of the day-to-day operational challenges

faced by those counting on, and paying for, its expertise, exclusively in the interest of public service.

"That branded the psyche of this place," Roca said. "We're a public service institution. I think it goes to our charter. We're not here to earn returns for shareowners -- we ain't got any."

Of the more than 3,300 staffers who work at APL, more than 2,000 have Ph.D.s. About a thousand engineers call the 360-acre Laurel campus home; about 600 researchers have degrees in math and computer science, while another 300 hold physics and chemistry degrees.

In fiscal 2002, more than \$160 million of APL's funding went to civilian space programs. Another \$140 million went to air and missile defense and about \$70 million went to undersea warfare.

Last year, APL scientists disclosed 149 inventions. The lab's Office of Technology Transfer executed 14 license agreements and filed 131 patent applications. Seventeen U.S. patents were issued.

Wayne Swann, APL's director of tech transfer, estimates his office gets word of a new invention or breakthrough about every other day -- fueling a continuing breakneck pace of innovation at the lab.

Real science

Scientists choose to work at APL over NASA or the Defense Advanced Research Projects Agency, or DARPA, because of the focus on pure science, lab officials and observers say.

And, researchers are encouraged to immerse themselves in specific niches. A scientist particularly interested in studying how the sun impacts the atmosphere between the Earth's environment and space would be drawn to APL's work with NASA on its solar terrestrial probes.

While APL's work is done in the service of the federal government, it doesn't fall under the direct purview of a specific federal agency, and lab observers say this keeps the scientific talent top-notch, the research cutting-edge. The relationship with Johns Hopkins University gives the lab a wealth of biomedical resources to use to for homeland defense projects, particularly detecting and vanquishing microscopic pathogens.

"APL is the most competent of the labs I've ever interacted with. They really know their [stuff]," said Bruce Montgomery, president of Syntronics Corp., a Columbia company built around APL electronics technology used in optical communications and space exploration.

James Franson, an APL physicist, came to the lab 25 years ago after earning his Ph.D. APL's tie to Johns Hopkins University (www.jhu.edu <<http://www.jhu.edu/>>) has given him the chance to do basic research, while its government ties provide plenty of opportunity to work on applied projects.

"There's a real-world connection here. We can do both at the same time," he said.

Franson and a team of researchers are currently working on new quantum computing methods that show promise enhancing cryptography. He is already in talks with an information security company interested in his research.

The 'stealth lab'

Little of APL's research funding comes from the private sector due to the lab's unique role as a "trusted partner" of the Department of Defense. APL scientists are often called on to evaluate technologies the DOD is considering buying from the private sector, so the lab has to steer clear of potential conflicts of interest.

APL's role in national defense earned it the nickname the "stealth lab," for the mysterious nature of the work that went on behind the gates of the Laurel campus. But the lab has worked to open its doors more to private industry, and in 1999 established an office devoted to finding and spinning out research with commercial potential.

Syntonics was the first spinout, and four more startups have followed. Other area companies have licensing agreements for APL technology. Sphere Software Corp., a promising XML software company in the University of Maryland, Baltimore County's tech incubator, is headed by founder and CEO Dave Glock, a former APL engineer.

And North Star Science and Technology LLC develops satellite tracking and monitoring systems for environmental and wildlife researchers. Scientists use North Star's technology to track global migration patterns of birds.

"It's a very niche-y business but it's very interesting and our clientele is worldwide," said North Star partner Blake Henke.

The small company expects to book \$700,000 in gross revenues this year while also launching a Web site featuring a mapping technology known as shaded relief mapping. Digital elevation data is translated into pictures that map enthusiasts around the world have long accessed at a Web site maintained by Ray E. Sterner, an APL space scientist.

Henke thinks there is a market for Sterner's content and plans to launch a site in a month or two containing high- and low-resolution pictures sold for a download fee or through a subscription.

"We're trying to figure out how we're going to market this," Henke said.

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