



[National Defense](#) > [Archive](#) > [2015](#) > **November**

Technology Tomorrow

DARPA Confab Has Good News Story to Tell

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The defense industry conference formerly known as DARPATech made a return in September, although with a different name and on a smaller scale.

The Defense Advanced Research Projects Agency once put on that big splashy — and probably very expensive to produce — show about every two years. It was last held in Anaheim in 2007. Its main purpose was to put program managers on stage to communicate their needs to potential research-and-development partners. Hopeful contractors could also schedule private meetings with PMs to pitch their ideas.

Recruiting new program managers, who normally serve at the agency for only a few years, was another big part of the program. "Come join us," was a constant refrain from the podium.

DARPATech fell out of favor at the agency with smaller industry days now used to communicate its needs to potential contractors.

In September, DARPA held the "Wait, What? A Future Technology Forum" in St. Louis, its first conference of this size in eight years.

The three-day symposium and exhibition attracted Defense Secretary Ash Carter as a keynote speaker along with a sold-out crowd of 1,400 from research labs, companies and universities.

Other speakers included experts from inside and outside the agency, who gave five-minute TED Talk-style presentations about cutting edge technologies.

The tone at this conference — streamed live on the Internet and archived on YouTube for anyone to watch — seemed markedly different. There was little about DARPA's technology wish list and more about what it's doing now and its accomplishments. (It must be agency policy that DARPA's involvement creating the Internet be mentioned whenever the director makes a public speech.)

Indeed, the agency, which most Americans probably have never heard of, has made a profound impact in their everyday lives with the Internet and its early investment in what would be GPS serving as two of the most well-known examples.

Director Arati Prabhakar in her keynote speech said there are some 200 DARPA programs at any given time — many of them classified. The agency's purpose remains to "make the pivotal early investments in breakthrough technologies to create huge new possibilities for national security," she said.

DARPA's other notable successes making these early investments include stealth and precision-guided bombs. Yet many of these investments made for and by the Defense Department do end up serving a greater good. Several such technologies in development were included in the three-day conference.

Bill Chappell, an electrical engineer at DARPA, spoke of a day in the not too distant future when just about everyone on the planet will be tapping into the radio spectrum with his or her smartphones. Managing the airwaves will not only be a problem for the military, but for everyone else. The Radio Map program's purpose is to identify signal behavior — not only where it is coming from, but what its content might be. Spectrum being used for texts is different from that employed to transport videos. DARPA is looking at interference as something that can help identify the nature of these signals and make spectrum use more efficient. Policy dictates that interference should be avoided. "Embrace the interference and use that as a feedback for learning," Chappell said.

DARPA's relatively new biological technologies office has notched some breakthroughs for warfighters who have returned from combat with traumatic injuries. Program Manager Justin Sanchez said in one case, a man who had been paralyzed for more than a decade because of a spinal cord injury was able to feel sensations through a mechanical hand that was directly connected to his brain. While blindfolded, the subject was able to determine which prosthetic finger was being touched.

"Prosthetic limbs that can be controlled by thoughts are showing great promise," Sanchez said. "But without feedback from signals traveling back to the brain it can be difficult to achieve the level of control needed to perform precise movements. By wiring a sense of touch from a mechanical hand directly into the brain, this work shows the potential for seamless bio-technological restoration of near-natural function."

Air Force Col. Dan Wattendorf, a program manager in DARPA's biological technologies office, is looking at using humans' own immune systems to speed up the development of antibodies that can be used in vaccines.

Speed and scalability and the ability to distribute a vaccine immediately can stop disease outbreaks quicker, he said. DARPA is looking at providing genetic sequences of the antibodies using a synthetic process and a body as a "bioreactor."

"We have done this. We have done this for the flu and we have done this for [an] Ebola patient that survived in the United States," he said.

Human-machine interface was an overarching theme at the conference. With talk of implants to stimulate the brain, mechanical arms and legs that do a person's bidding, the fields of neuroscience and computer science are merging. This has repercussions that stretch far beyond the defense sector.

"Every technology has its own set of ethical questions and it's important to get those concerns on the table early," Prabhakar said.

The new conference seems to have different goals than DARPATech. Presenters from outside the agency were there to stimulate discussions. There was an exhibit hall and plenty of opportunities for attendees to get together and share their ideas.

If an ulterior motive is to tell the public a "good news" story — that some of these defense technologies will ultimately be useful beyond the military — that is laudable. But the five or six-minute talks were too brief. Four minutes were spent explaining the problem, and less than a minute on the possible solution, making it sometimes hard to grasp what the program managers are doing.

Nevertheless, DARPA's return to putting on major conferences is good news in and of itself.

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