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New Force Behind Agency of Wonder



Michael Temchine for The New York Times

LEADER Regina Dugan of the Defense Advanced Research Projects Agency.

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ARLINGTON, Va. — The [Defense Advanced Research Projects Agency](#) is different from other federal agencies. For one thing, the agency, known as [Darpa](#), created the Internet (really). For another, it is probably the only agency ever to offer a \$40,000 prize for a balloon hunt, a contest that was inspired by Regina Dugan, a 47-year-old expert in mine detection, who took over last summer as its director.

NEW TACK Regina Dugan, director of Darpa, with Brig. Gen. Robert F. Hedelund before testifying in Congress. She is the first woman to lead the agency.

Dr. Dugan, who has a Ph.D. in mechanical engineering from the [California Institute of Technology](#), is the first woman to be the director of Darpa, and those who know her say she has a knack for inspiring, and indeed insisting on, creative thinking.

[Last December's balloon hunt](#), otherwise known as the [Darpa Network Challenge](#), is a good example. In marking the 40th anniversary of the connecting of the first four nodes of the Internet in 1969, the agency offered a \$40,000 prize to the first team of volunteers able to locate 10 large red balloons hidden around the country.

The task only sounds frivolous. It was actually something that experts agreed was impossible using traditional intelligence techniques. The challenge was designed to test new methods, involving the use of social networks.

The idea for the balloon search came out of Dr. Dugan's insistence that a group of Darpa fellows — rising military stars — who had been posted to the agency for several months do something more innovative and useful than taking the usual field trips and meet and greet sessions. With her repeated prodding, the fellows — captains, majors and colonels — designed and organized the contest.

The balloon hunt, which would ultimately attract almost 500 teams of volunteers from around the world, was won by a group of [M.I.T.](#) experts in the analysis of social networks. The results suggested the potential of these new ways of gathering intelligence. For Dr. Dugan, it was a great example of how Darpa can contribute to what she has called a “renaissance of wonder.”

Her biggest challenges, however, lie ahead. She must orchestrate the work of the military, contractors and universities around a set of ideas to produce scientific and technological breakthroughs. Darpa is built around specific projects undertaken by elite scientists and engineers who sign on for several years to provide service to the country. It is results oriented and not meant to be a long-term home for researchers.

In the past, Darpa has supported the design of the ARPAnet, the forerunner of the Internet and many of the technologies that define the modern computer age, as well as military systems including the stealth fighter, unmanned [drone aircraft](#), the global positioning satellite system, and even the M16 rifle.

The agency has also spawned controversy. During the 1990s it became a lightning rod for a bitter political debate over the question of whether the United States should have an industrial policy to invest in hand-picked industries and technologies.

In 2002, Dr. Dugan's predecessor, Tony Tether, set off a firestorm of opposition from civil liberties advocates when he created Darpa's Information Awareness Office run by a former Reagan national security adviser, Adm. [John Poindexter](#). Admiral Poindexter wanted to build a computerized data mining system to look for potential terrorists, and Congress responded by cutting financing for the project.

More recently Darpa has been criticized as focusing too closely on “deliverables” for the nation's soldiers, in the process forgoing the high-risk technology gambles that originally were the agency's trademark.

Dr. Dugan must try to redress that balance. Under her direction Darpa is focusing on areas as diverse as advanced manufacturing, biological sensors and the rapid development of vaccines, as well as cyberecurity.

Her ability to see the world in nontraditional ways has impressed Gen. James E. Cartwright of the [Marines](#) and vice chairman of the [Joint Chiefs of Staff](#), who has begun working closely with Dr. Dugan in the past four months.

“Watching her work with the service chiefs has been really amazing,” General Cartwright said. “They listen for 10 or 15 minutes and you can feel lights start to come on and then they’re hooked.”

She has also won strong initial backing outside of the military.

Not long after taking the position last year she toured five of the nation’s leading universities in an effort to address the chill that had set in between Darpa and the universities during the eight years that Dr. Tether ran the agency.

“We did a deep dive and we tried to understand what the universities were experiencing and what they were expressing,” she said. What she found was that not only had financing declined but that there were also a variety of indirect effects crucial to the basic research community, like the ability to include foreign nationals in research, the freedom to publish and the limits placed by export control regulations.

“We came to a better understanding of what the agency needs to do, and then we went to the university community with a challenge for their side as well,” she said, “which is to bring their best and brightest to the table to work on defense problems.”

The new approach has paid off in enthusiastic reviews from many of the agency’s recent critics.

“She came to attract brilliant faculty to become program managers as opposed to selling a research agenda,” said Randy Katz, a [University of California](#) computer scientist and former Darpa program manager. “My immediate impression was that when she arrived she commanded the room.”

Within the agency she has started recruiting the next generation of managers. The man she has chosen to run the Information Processing Techniques Office — which has had a huge influence on the computer industry in the last four decades — Dan Kaufman, is a unique choice, even by Darpa standards.

Mr. Kaufman is a veteran Silicon Valley lawyer who has run a video game company and has also been the chief operating officer at [DreamWorks](#) Interactive, a joint venture between the movie company and [Microsoft](#).

Dr. Dugan created the Transformational Convergence Technology Office to focus on a range of technologies, including social networks, synthetic biology and machine intelligence. For that

office, she tapped Peter Lee, the chairman of the computer science department at [Carnegie Mellon University](#).

Both men said they had taken office director jobs because they were captivated by Dr. Dugan's vision of a reinvigorated Darpa and the opportunity to contribute to the development of transformative technologies.

For Dr. Lee, it has been an intense experience so far. He said that Darpa had been collegial, but that he had been struck by the challenges that he had been put under by the director.

"It's what I imagine it's like working for [Steve Jobs](#)," he said. "The amount of intellectual pressure we're put under all day, every day is significant and beyond anything in my professional experience."

It pays off, he said.

He described what he referred to as the "four stages of Regina Dugan" that occur when trying to meet her insistence on thinking in new ways. They are: being a little scared, really scared, frustrated and then enlightened.

This is Dr. Dugan's second tour at the agency, and her first time may give an idea of what is to come.

She came to Darpa in 1996 as a program manager charged with developing sensor technologies that could be used to detect land mines. She has long had a reputation as a scientist who likes to roll up her sleeves and get directly involved in problems.

In 1998 her penchant for field experience led to a "small international incident," when the State Department decided that she was missing-in-action while on a mine clearing exercise in Mozambique. She led a team in mine detection exercises, but to do so she needed to gain real-world experience.

"I would go to the 'no-kidding' operational field once a year and I would bring them back the stories from those experiences," she said. "That's how I ended up in places like Bosnia and Africa."

Clearing mines in Mozambique was done by a giant vehicle with huge metal wheels and a V-shaped hull designed by the South African military. "We would drive these vehicles through the live mine fields and purposefully blow up the mines," she said. On the trip she frequently drove the lead vehicle on an expedition. Every fifth mine was a "jumper" — explosives that pop into the air to detonate at waist-level.

"You never quite get used to the jumpers," she said. "Because when they go there is an explosion right in front of the vehicle and then the rat-tat-tat of the shrapnel on the windshield."

A communications mix-up led to the concern that she was missing. Even though she was soon located, when she returned to the United States, Larry Lynn, the Darpa director at the time, told her that if he had known what she was doing, he would never have approved the trip.

“Exactly!” she responded.