

Nextgov

EMERGING TECHNOLOGY



Introduction

Outside Washington, there's a notion that the private sector outpaces the public sector in adopting new technology.

In the past year, the federal government has been taking measured steps to change that perception. The departments of Defense and Homeland Security both opened outposts in Silicon Valley, aiming to absorb new ideas and commercial tech talent. The president's 2016 budget request includes \$146 billion in research and development.

This eBook takes us on a tour of federal projects involving leading-edge technology — from the Census Bureau's plans to modernize the 2020 survey, by outfitting fieldworkers with mobile devices, to "gamifying" disaster response by nudging first responders to compete with each other on the job.

In the process, these agencies give us a glimpse into what the government of the future looks like, one, five or 15 years down the line.

Camille Tuutti
Executive Editor
Nextgov

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Census' Plan for 2020 Count Full of New Tech

Focus on new technological techniques and cost savings

By Hallie Golden

From offering Internet response options to equipping fieldworkers with mobile devices, the Census Bureau has big tech plans for its decennial count.

On Sept. 8, the bureau released its 2020 Census Operational Plan, a detailed outline of how it will carry out its nationwide population count. And if all goes according to this plan, these innovative techniques could make it the first count to be cheaper than its predecessor.

In 2010, the count cost about \$124 per household, said Lisa Blumerman, associate director for decennial census programs, during a Sept. 8 review of the plan. The bureau's estimated cost for the 2020 count is \$88 per household.

The overarching goal of the plan is simple: "to count everyone once, only once, and in the right place." The techniques Census plans to use for achieving this goal, however, are much more complex and involve a big boost in how the agency uses technology.

Census plans to encourage the public to respond to the count via the Internet, use data

previously collected to reduce door-to-door visits, automate operations in the field and use geographic information systems and aerial imagery to boost the accuracy of its address list.

This will be the first time the bureau has used many of these techniques to count the entire country. (The agency attempted to use mobile devices during the 2010 count, but ultimately failed). With only fours years left of preparation time, Census is entering crunch time.

"Conducting a successful and cost-effective census takes years of careful planning," said Sen. Tom Carper, D-Del., in an Oct. 6 statement about Census' 2020 plans.

Successfully counting some 320 million people in a matter of months will also require Congress to equip the bureau with the necessary resources to both prepare for the count and execute it, Carper added.

"If Congress continues to subject the bureau to 'crisis budgeting,' with repeated stop-gap spending measures, sequester, and shortfalls in funding, the bureau's operational plan will quickly be thrown off track," he said. ■

"CONDUCTING A SUCCESSFUL AND COST-EFFECTIVE CENSUS TAKES YEARS OF CAREFUL PLANNING."

Sen. Tom Carper, D-Del.



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TATIANA SHEPELEVA / SHUTTERSTOCK

Are Cyber Doppelgängers in Our Future?

Martine Rothblatt's vision of a big-data world

By Camille Tuutti

In the not too distant future — perhaps sooner we'd expect — humans could have digital doppelgängers who look like us, act like us and potentially, even have the same legal rights as us.

It may sound like science fiction, but it's the vision Martine Rothblatt has of a world powered by big data.

Admittedly, Rothblatt's ideas are a bit out

there. She's a transhumanist, a futurist who believes technology can free humans from their limitations. Rothblatt pointed to the fact that increasingly today the contents of our minds — thoughts shared on social media platforms, video surveillance and purchases made on e-commerce sites — are being poured into big data repositories. In the near future, all that data can be used to create cyber carbon copies of humans that can outlast physical bodies, she argues.

"It will be inevitable that there will be digital replicas of ourselves that sound like ourselves, think like ourselves, perhaps even feel like ourselves," said Rothblatt, CEO of biotech company United Therapeutics, speaking Sept. 30 at The Atlantic's Washington Ideas forum. And when our bodies begin to fail, for example, because of dementia or Alzheimer's, these "cyber-conscious continuations of ourselves will claim they are ourselves and they will have a right to continue our activity as citizens."

CYBER DOPPELGÄNGERS | Tuutti

In that scenario, Rothblatt says, issues like ethics and legality will come into play. But more important, what will need exploration is the philosophical question about whether a cyber human is just “a fancy digital puppet” or possesses values and has internal feelings about its world, Rothblatt said.

Moreover, should cyber-conscious beings be granted the legal rights of their predecessors?

Rothblatt has taken on this topic more in depth in her latest book, *Virtually Human: The Promise*

product that will “out-Siri Siri,” by creating and tweaking “mindware” to closer approximate our human personalities, Rothblatt said.

“The hottest area of software development is what I call mindware: software that replicates more and more aspects of the human mind and the human personality,” Rothblatt said.

And as this mindware gets fine-tuned to reflect each individual’s unique personality, a world with digital doppelgängers may not seem so crazy after all. N

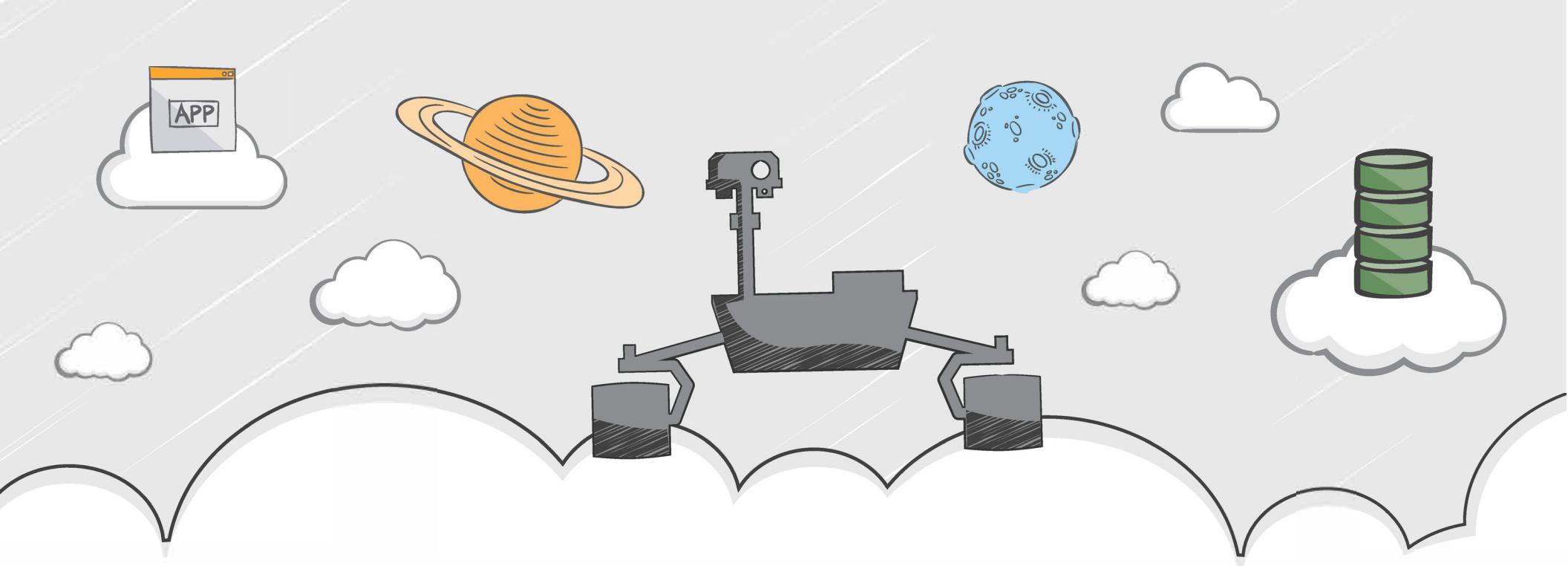
“IT WILL BE INEVITABLE THAT THERE WILL BE DIGITAL REPLICAS OF OURSELVES THAT SOUND LIKE OURSELVES, THINK LIKE OURSELVES, PERHAPS EVEN FEEL LIKE OURSELVES.”

Martine Rothblatt

and Peril of Digital Immortality, which explores the potential rise of digital doppelgängers.

A world with so-called mind clones may seem light years away. But consider some current advancements in intelligent technology that a few years ago seemed mere fantasy. Rothblatt, a transgender woman, has an artificial intelligence modeled after her wife, Bina Aspen Rothblatt, dubbed Bina48, who’s mentioned in a [March 2015 TED Talk, “My Daughter, My Wife, Our Robot and Our Quest for Immortality.”](#)

But on a bigger, commercial scale, today’s software companies are racing to develop a



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How Games Transform Federal Disaster Response

NGA's gamification efforts trim inefficiency and help first responders

By Mohana Ravindranath

For more than a year, the National Geospatial-Intelligence Agency has been refining its open-source disaster mapping system, GeoQ. The system lets first responders document damage — tornado wreckage, for instance — and upload geo-tagged images to an open, crowdsourced, searchable map, helping to ensure responders aren't duplicating their clean-up and rescue efforts.

The spy agency is continually updating GeoQ — adding new features such as color-tagging workflow — and NGA is still figuring out how to measure whether it's worth the time and financial investment. NGA tech lead Ray Bauer chatted with Nextgov about the agency's efforts to trim inefficiency by giving first responders a clearer picture of disaster scenes.

This conversation has been edited for length and clarity.

What are NGA's future plans for GeoQ? How is it evolving?

Ray Bauer: [NGA Director Robert] Cardillo really wants us to push forward with the “democratization of GEOINT [geospatial intelligence]” — his words. How are we to pull in a lot of this data that's out there and make sense of the noise?

In talking with [GeoQ's Huntsville, Alabama, team], they noted that during emergency response in triage centers, first responders were actually writing on their arms the number of critically injured to less-severely injured to keep track of those numbers at a location. So we added the ability to triage, and a way for them to add information to an online version of a triage list that, in real time, hospitals could watch as those numbers would increase or decrease.

How do you measure success of open source projects like GeoQ?

Bauer: Since it's new for us, trying to collect the appropriate business analytics is kind of an emerging science for us. One of the ways I've been measuring the success of GeoQ is the

number of stars that it's gotten on GitHub. Stars are the equivalent of “likes.” GeoQ has received over 237 as of this morning. Somebody out on GitHub made a heatmap that shows you all over the globe people that have starred your repository. We're not trending in Kazakhstan yet, but we are in some areas of Asia and Europe.

How do you market this project to first-response teams?

Bauer: We're kind of new to this, especially with Github, even though we've been out there for over a year.

We have created these projects for anyone to participate with us in developing, or even for companies to take the code and make it better, and possibly resell it. There's no restriction on the licensing for this.

Another person [on the GeoQ team] has been contacted by an insurance company who sees using GeoQ as a really great way to do an after-damage [report] to show where insurance agents have done adjustments.

Tell us how you're gamifying disaster response on GeoQ.

Bauer: We set up the gamification server almost a year ago. It gives you badges and it gives you points, following a lot of those other apps like Waze and others. We kind of looked at them and tried to mimic some of the best features.

Right now, they are getting points for "Feature Creation." For each damaged house, they would get a point. You can see how this

badges and the maximum amount of points. That's one of our main goals.

We actually tested gamification during a tornado outbreak in Oklahoma a year and a half ago and we witnessed what was I thought pretty awesome. We didn't even tell the folks what the points were for, and people started to compete in a friendly way. They were actually coming to look for more work, because the analyst next to them had completed their work and had 10 points and they completed theirs, and only had eight.

town in Alabama, local has to contact the state, which has to contact federal. That time takes away from disaster response. Instead of having the federal agencies be in the lead for some of these tools and doing damage assessment, I'm trying to flip that collaboration model on its head.

We're also seeing that we can overcome certain legal and policy issues if we do change the collaboration model in putting the locals and states in the lead, [including laws about] domestic imagery... We as part of the intelligence com-

"ALL DISASTERS ARE LOCAL, SO WHEN A TORNADO HITS A SMALL TOWN IN ALABAMA, LOCAL HAS TO CONTACT THE STATE, WHICH HAS TO CONTACT FEDERAL. THAT TIME TAKES AWAY FROM DISASTER RESPONSE."

Ray Bauer

kind of wouldn't be fair if someone got an area that didn't have damage.

We want to use badges to help develop our tradecraft. For example, if we have a group of people who do disaster response, we want to make sure everyone gets a "Tornado Badge," everyone gets a "Hurricane Badge," everyone gets an "Earthquake Badge." And then, we can also measure their level of proficiency within that.

In a perfect world, we would want everyone who does disaster response to have all the

We actually found one gentleman who was helping us test this system — he was gaming the system. He was creating lots of little damage points, instead of drawing one damage polygon. What he taught us is we have a lot more to learn.

What's GeoQ's ultimate goal?

Bauer: I'm trying to change the geospatial-intelligence collaboration [process] through GeoQ. All disasters are local, so when a tornado hits a small

munity are not permitted to spy on U.S. persons, so in order to get imagery and collect it, we must go through the appropriate PUM, or Proper Use Memorandum, and through our lawyers, which takes time to do correctly.

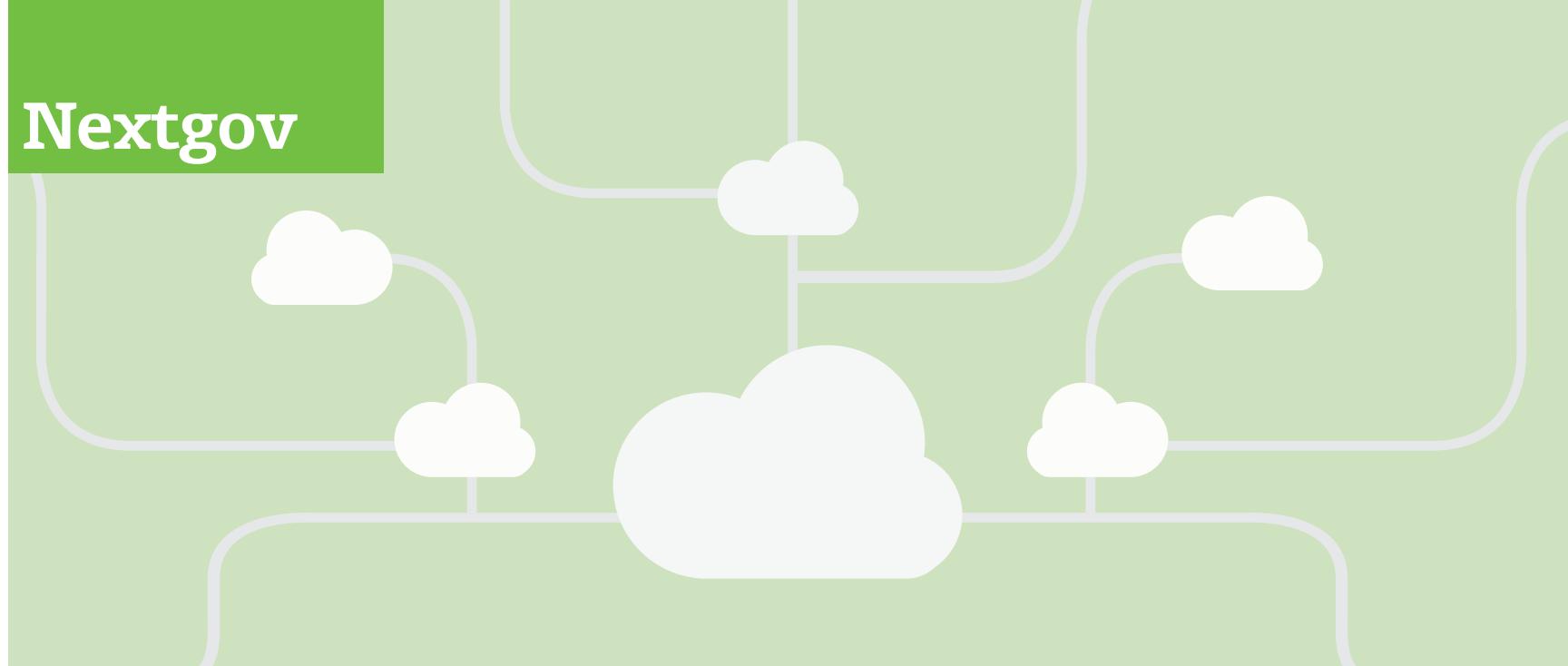
However, the locals and these states don't have that hindrance. So they can start the process... sometimes quicker than we can. 

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FCC's Ambitious Cloud Plan

The agency plans its IT to be nearly 100 percent cloud based in 2017

By Frank Konkel

Cloud computing is expected to change how government does business, but at a time when most federal agencies are hesitantly trying out the concept, the Federal Communications Commission has shoved its poker chips to the center of the table and yelled, "all in."

By the end of 2017, [the agency plans](#) its IT to be nearly 100 percent cloud based, which includes a dual-pronged ongoing effort to physically move servers out of FCC's current headquarters while modernizing current and future applications for cloud use.

In terms of cloud vision, few agencies [outside the Central Intelligence Agency](#) can match FCC's for radical IT innovation. What's surprising, though, is how far behind the technological curve FCC was only a few years ago.

Speaking in July at an event [hosted by Nextgov](#), FCC Chief Information Officer David Bray outlined the myriad challenges facing FCC when he took the CIO helm almost two years ago. The agency, which employs 1,750 people, had 207 different systems, or one system for every nine people, with more than half of those systems over 10 years old. More than 80 percent of FCC's IT spending went toward maintaining legacy IT systems, Bray added.

There were personnel issues as well.

The entrenched tech team employed some 50 federal employees and 375 contractors. The average tenure of the existing federal employees was nine years; for contractors, it was 15 years. About the only job changing was the one Bray took: FCC had employed nine CIOs in eight years when Bray began in August 2013.

"They had gotten used to doing things on site," Bray said.

PEOPLE, THEN TECHNOLOGY

Bray's approach was first to focus on the deep-seated personnel problems.

In the late 2000s, FCC experimented with a "new media" team of Silicon Valley tech

talent – think of it as a sort of precursor to the General Services Administration’s 18F team. That effort ultimately didn’t work out. The team, while not lacking ideas, didn’t integrate with FCC’s existing staff and the resulting friction “left people scarred,” Bray said.

That experience, combined with Bray’s cloud-heavy vision for FCC, made it an

FCC won’t need contracted staff to maintain legacy systems, a task that will be done by commercial cloud providers.

Instead, FCC’s focus will be on a modular, data-centric approach “that remixes existing [software-as-a-service] and [platform-as-a-service platforms] that’s much faster, more resilient and easier to maintain than anything

with new ideas and integrate them with the existing team. It worked.”

Calvosa said FCC’s tech team created the necessary conditions for people to “come in and try things,” with “top and political cover” provided by Bray, the self-proclaimed “human flak jacket.” When Congress, other feds or contractors dish out the verbal 21 questions

“GOING TO CLOUD WAS ACTUALLY EATING INTO THE PROFIT MODEL OF LEGACY CONTRACTORS. AND SOME OF THOSE LEGACY CONTRACTORS WE USE TO DO THINGS ON SITE ALSO KNEW THEY WOULD BE OUT OF A JOB ONCE WE GOT THIS DONE.”

David Bray

unsettling time for established contractors. They felt threatened by FCC’s strides away from the decades-old and very lucrative “waterfall” development approach, to a more agile, cheaper way of doing business.

“Going to cloud was actually eating into the profit model of legacy contractors,” Bray said. “And some of those legacy contractors we use to do things on site also knew they would be out of a job once we got this done.”

If funded by Congress to fully complete its IT modernization, FCC will eliminate approximately 60-80 contracted O&M positions, Bray told Nextgov. That’s because

they could do on-premise themselves,” Bray said.

Bray integrated the remaining members of the defunct new media team with the rest of the agency and made additional new hires. They included established feds like Deputy CIO John Skudlarek and Deputy CIO of Resiliency Christine Calvosa, and a mixture of talented techies from both inside the Beltway and the West Coast.

“The good news is that people come here and stay for a long time,” Skudlarek told Nextgov, before providing the punch line: “The bad news is they come and stay for a long time. We had to bring in some new people

to FCC, it is Bray or his top advisers who take the heat.

“There’s a real trust factor here,” Calvosa said. “We make decisions, then inform.”

Managing egos and a battered workforce is one side of the challenge. Implementing technological innovation in an agency replete with several hundred risk-averse lawyers is another.

Speaking Tuesday, FCC senior strategic adviser, Tony Summerlin, explained the main challenges as inventorying assets, rewriting existing applications for the cloud environment and getting legacy suppliers out of the way. Interestingly, Summerlin said

the inventory itself led to the elimination of approximately 15 percent of internal servers that did little more than guzzle energy and take up space.

Summerlin said the business case buy-in was more about speed and agility improvement than it was about saving money. In "Top Gun" speak, FCC feels the need for speed.

"Cloud may save you money, it may save you time, but the main thing is, it's fast," Summerlin said.

EARLY RESULTS

FCC granted IBM an authority to operate its Softlayer Federal Cloud last month, meaning IBM will be one of several vendors the agency uses as it transitions all its IT services to cloud over the coming two years.

Already though, FCC has experienced a resounding "win" in cloud computing by replacing its aging Consumer Help Center.

Designed to facilitate communications between FCC and the public with consumer complaints, Bray said Tuesday building it internally would have cost \$3.2 million over 18-24 months, according to estimates FCC obtained.

"We didn't have the time or the money to wait," Bray said.

Instead, one of Bray's newly hired senior technical advisers, Silicon Valley startup founder Dustin Laun, pulled together a SaaS solution in six months at a cost of \$450,000, according to Bray.

In other words, FCC got its SaaS solution at one-sixth the price of an internal system, in perhaps half the time. Under the internal model, O&M would have cost FCC \$600,000 a year to maintain, Bray explained. Using the cloud solution, O&M costs are \$100,000 a year.

Still, it wasn't an easy lift.

"Along the way, the change agents I had, Dustin Laun and [Sarah Millican], they were experiencing severe flak from both government and contractors," Bray said. "It was my role as CIO to say, 'Hey, talk to me, not them, they're just getting stuff done.'"

Since launching in January, it's worked well, too.

In replacing 18 outdated complaint forms with one easy-to-use Web portal and increased complaint-handling speed, the Consumer Help Center has performed well enough to earn awards and even help save some Americans money.

"Other organizations can do this, too," Skudlarek said. "It is translatable. But other organizations are going to have to do the hard work. It's not easy, but it's been worth it." N

"THE GOOD NEWS IS THAT PEOPLE COME HERE AND STAY FOR A LONG TIME. THE BAD NEWS IS THEY COME AND STAY FOR A LONG TIME."

John Skudlarek



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A photograph of a server room with two rows of tall server racks. In the center of the room, there is a large projection or screen displaying a vibrant city skyline at sunset, with a bridge over water and skyscrapers illuminated. The overall aesthetic is futuristic and tech-oriented.

Physical, Virtual, Public, Private, Hybrid Cloud

A DARPA Deal for Robotics Makers

Pilot aims to get small businesses to work on robotics contracts

By Mohana Ravindranath

Technological advancements — potentially critical to national security — could be happening in garages and other “maker spaces” never to be discovered by the Defense Department.

That’s what DOD is trying to avoid with a new pilot program aimed at getting small businesses and individuals to work on small robotics contracts. DOD’s Defense Advanced Research Project Agency in May announced the Robotics Fast Track effort, which aims to reduce the

proposal-to-contract turnaround time to less than a month for robotics technology.

The program’s purview includes expansion and improvement of commercial off-the-shelf products, especially those that could improve the agility and speed of robotic technology for defense use. It also includes hardware and software that could be used for nonmilitary missions, such as firefighting and emergency response.

“We spend too much time creating three- to four-year solutions for six-month problems,” Mark Micire, a DARPA program manager, said in a statement.

Robotics Fast Track was designed to present DARPA as a development partner, especially to the small business community that has “tended to fly under the radar of traditional federal agencies and commercial technology providers, which generally rely on multiyear, multimillion-dollar contracts for technology development.”

Each project could last between six months and a year, with an average cost of \$150,000, according to DARPA. The agency is promoting the effort through the Open Source Robotics Foundation, a nonprofit focused on software development.

OSRF is, in turn, working with federal contractor BIT Systems to help technologists navigate federal contracting. The groups are working on a website that can collect technology proposals, submit them to a review board, and streamline the vetting process, according to Brian Gerkey, chief executive and founder of OSRF.

During a call with reporters, officials declined to share estimates for the total budget for the program as it is still in the pilot stage. DARPA’s goal in running this pilot, Micire said, is to “prove the technical prowess of this community”. ■

“WE SPEND TOO MUCH TIME CREATING THREE- TO FOUR-YEAR SOLUTIONS FOR SIX-MONTH PROBLEMS.”

Mark Micire



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