


Your Guide to DevOps in Government Today

carahsoft.



A woman with long dark hair and glasses, wearing a white t-shirt and jeans, stands in a meeting room. She is pointing her right hand towards a wall covered in numerous colorful sticky notes (yellow, green, and purple). In the foreground, a desk is visible with a laptop, some papers, and a small potted plant. The background is slightly blurred, showing other people seated at tables.

“DevOps simply adds the idea that small, cross-functional teams should own the entire delivery process from concept through user feedback and production monitoring.”

– *A Seat at the Table: IT Leadership in the Age of Agility*

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Carahsoft and GovLoop have partnered to provide resources around the latest federal, state and local DevOps initiatives and legislation. The goal is to guide government leaders and stakeholders interested in learning more about improving their software strategies.

Executive Summary

Software and applications are more critical to government's success today than ever before. Think about all that citizens and employees rely on — from project management software, to website uptime, to critical applications that deliver services that improves daily lives.

Due to the critical nature of successful software and applications today, DevOps has become a strategic approach for government. DevOps is a project management methodology that solves the problematic product handoff between developers and operations staff. Instead of operating in silos, both teams collaborate on a project from start to finish.

Think about it this way: In any organization that creates its own technology applications or software, there are two broad teams — developers and operations staff. Traditionally, these teams follow a linear development process. Developers create code for the service based on broad parameters that organization leaders provide. Once the developers build the product, they send it to the operations team to deploy and manage.

This handoff is often referred to as “tossing it over the wall” because operations and development staff pass the application off without truly understanding how each team is using it. It's like there is a wall between them blocking transparency or meaningful communication. This approach creates all sorts of problems. Because developers

don't have a clear view of how operations will use the service, the product they create often doesn't stand the test of real-world deployment. The new service can disrupt existing workflows, overload or damage current IT systems, compromise security, or even fail regulatory requirements because developers didn't have enough information during development.

That's where DevOps comes in to help. The phrase DevOps is a combination of the terms “development” and “operations,” but it's often difficult to pin down. That's because it's an IT services management approach and is related more to a cultural shift and organizational environment than technology. Instead of being a specific toolset, analysis or process, it's a more holistic approach and mindset change.

Today, after having evolved out of Agile and open source technology and approaches, DevOps — and its security-integrated partner, DevSecOps — stresses communication, collaboration, continuous feedback, experimentation and integration between software developers and IT professionals.

This GovLoop guide, created in partnership with Carahsoft, will explore what you need to know about the current state of DevOps, how best to implement it and what tools can help you achieve it. It will also provide insights from public sector DevOps leaders.

Breaking Down What You Need to Know About DevOps Today

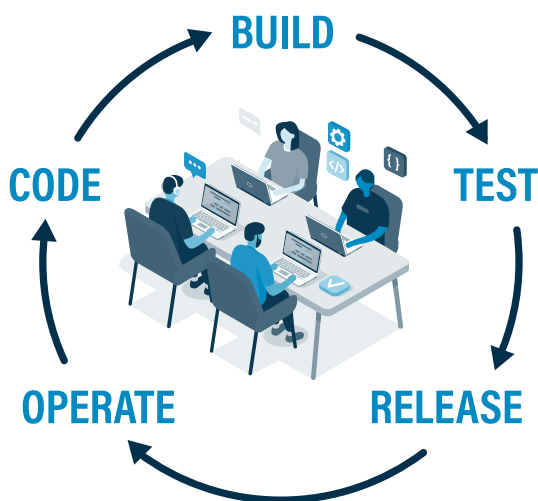
Chances are you may have heard the term DevOps, but maybe you're not exactly sure what it entails. Or maybe you think your agency is doing it but aren't entirely sure.

Either way, you're not alone. Simply put, the phrase DevOps is a combination of the terms "development" and "operations." But getting to the heart of what DevOps is and does can be tricky. That's partly because it provides a more iterative and continuous approach to developing, improving and deploying software. It also represents a cultural shift in the way that development, operations and even security teams communicate and collaborate to dramatically improve the software development cycle.

WHAT IS DEVOPS?

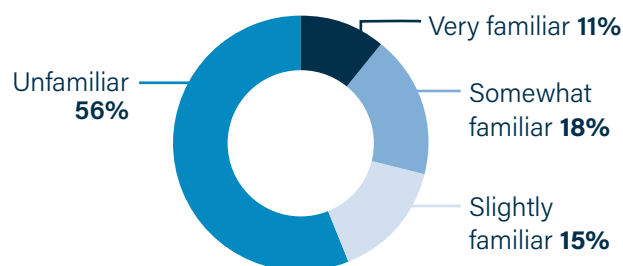
"DevOps is best described as the conventions and practices that create collaborative and communicative partnership between development and operation groups. These practices incorporate two concepts that contribute to the automation of the process of software delivery and infrastructure changes."

— [General Services Administration](#)



WHAT OUR COMMUNITY KNOWS ABOUT DEVOPS

We recently polled the GovLoop community to determine how familiar members are with the term DevOps. Here's how the 88 people who responded to the poll described their familiarity with DevOps:



More than half – 56% – of respondents said they are unfamiliar, which isn't surprising considering that DevOps implementation is still fairly new in government. Only 11% are very familiar.

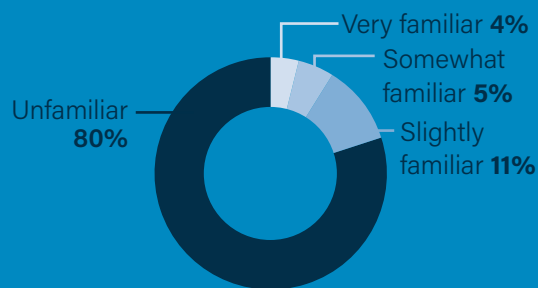
Unless you are directly involved in software development and operations, you may not be aware of what's happening behind the scenes at your agency. The ultimate concern for users is that the applications and services they rely on are intuitive and available when they need them.

THE RISE OF DEVSECOPS

DevSecOps takes DevOps to the next level by creating a collaborative environment among developers and the security and operations teams. Rather than static or manual security reviews of the software that agencies develop, DevSecOps integrates automated security checks into the software development cycle. This doesn't mean humans are entirely out of the loop. Instead, it combines the best of technology and manpower to thoroughly review software for any vulnerabilities or bugs faster and with greater precision.

WHAT OUR COMMUNITY KNOWS ABOUT DEVSECOPS

Similar to the DevOps poll, we wanted to know how familiar the GovLoop community is with DevSecOps. Of the 152 people who responded to this separate poll, here's how they described their familiarity:



The vast majority — 80% — of our community is not familiar with the term DevSecOps. As agencies work through the basics of DevOps and evolve those practices, DevSecOps will become more commonplace in government. Only 4% are very familiar, which in many ways is a reflection of DevSecOps adoption in government today. It's still nascent, but agencies understand that to maximize the benefits of DevOps, security must be an integral part of the equation.

WHY DOES DEVOPS MATTER?

One of the phrases you'll hear often in DevOps conversations is "security as code." If you think about the current and future states of physical hardware — such as servers — software powers them, too. As agencies move more services to the cloud, they use software to update, access and manage IT resources and infrastructure. The speed at which agencies can make critical changes to the applications that employees and the public rely on every day is vital. And software code is at the center of that work. Whether it's adding new functionality to a system or responding to a security vulnerability, agencies need a way to make those changes quickly and securely. That's why DevOps is such a gamechanger for government operations. What used to take months or years can now be done much faster — sometimes in a matter of days or even minutes.

WHAT TOOLS ARE INVOLVED?

DevOps is less about what tool you use and more about how you are introducing continuous development and software delivery cycles into your agency. Many automated tools can enhance your DevOps journey. But ensuring you have the right organizational structure in place is key. Without it, your agency will not see DevOps' full benefits, such as greater collaboration across teams and time and resource savings. So instead of thinking about DevOps as a specific toolset, analysis or process, consider it a more holistic approach and cultural mindset change.



HOW IS IT HELPING FEDERAL AGENCIES?

DevOps and DevSecOps unshackle agencies from the costly and time-consuming nature of traditional software development in government. Agencies that use DevOps report time and cost savings that weren't possible under the old system, known as a waterfall approach. This approach relies on a sequential product delivery timeline, leaving little room for collaboration or continuous feedback and iterations to improve the final product before release.

Take the [Housing and Urban Development Department \(HUD\)](#), for example. One of its program areas expects that DevOps will help save 1.3 million labor hours by modernizing decades-old systems that public housing authorities depend on to interact with HUD.

The [Air Force](#) is also using DevOps to move from relying on handwritten calculations to using software that can more efficiently determine refueling routes for aircrafts. You'll read about these and other examples in this guide.

HOW IS IT HELPING STATE AND LOCAL AGENCIES?

State and local governments serve the public at the ground level. In many ways, their systems power the services that residents rely on every day, such as trash collection, snow removal and pothole repairs. Those services need software to run smoothly and securely. As state and local officials face mounting pressure to quickly bring new services online and adjust to changing laws and mandates, DevOps can support those efforts. For federal, state and local governments, embracing DevOps could also be the difference between attracting or repelling top talent who expect organizations to deploy software in a modern way.

To help make custom projects more successful, GSA's 18F team recently released a state [software budgeting handbook](#). The 40-page guide is for executives, budget specialists, legislators, and other decision-makers who fund or oversee state government technology projects.

WHAT'S NEXT?

DevOps and awareness of it are still evolving in government. The experts that GovLoop spoke with agreed that education is integral to the future of DevOps. This will take various forms across government. For example, the General Services Administration recently launched a DevOps Community of Practice through which agencies can share how they are adopting DevOps. (*View recording of the July 2019 meeting [here](#).*)

Clint Troxel, an Innovation Specialist with GSA's 18F group, summed it up this way: "The thing that we need to do right now, and that we need to continue to do right now, is to spread the news of DevOps, to help other people in other agencies see what's possible with these tools. We need to keep demystifying DevOps, [and] we need to keep helping others get started on their own journey."



DevOps Cheat Sheet: Stats and Facts

Although DevOps isn't a new concept, the level of adoption varies greatly across government. Some agencies are in the early stages while others are just getting their feet wet. Below we've highlighted some key statistics and facts about DevOps.

For organizations new to DevOps, the 2018 State of DevOps Report recommends beginning with application deployments where *"the pain is more acute and visible."*

Source: [2018 Puppet and Splunk State of DevOps Report](#)

2/3

Roughly two-thirds of respondents to a Harvard Business Review survey reported that transitioning to DevOps increased productivity, innovation and service quality.

Source: [Competitive Advantage Through DevOps](#)

77%

of state and local governments have either adopted or plan to adopt DevOps.

Source: [2017 Challenges & Trends in State & Local IT Operations: United States](#)

43%

of state and local governments said that deployment of DevOps has made their IT function simpler.

Source: [2017 Challenges & Trends in State & Local IT Operations: United States](#)

"At the core of DevOps is a culture of collaboration and communication between all parties involved in the creation and delivery of software applications and services."

Source: [DigitalGov](#)



Employees on development teams outnumber employees on operations teams 10:1.

Source: [Sonatype and Signal Science DevSecOps Community Survey 2018](#)

48% 81% 7x

of developers know that security is important, but don't have enough time to spend on it

Source: [Sonatype and Signal Science DevSecOps Community Survey 2018](#)

of IT managers and 65% of developers surveyed agreed that DevOps saves time in the development process.

Source: [2018 Global Developer Report](#)

The failure rate of IT changes made by advanced DevOps teams is 7 times lower.

Source: [Accelerate: State of DevOps 2018](#)

"Agile and DevOps are for harnessing integration, interaction, and innovation."

Source: [Digital Agility: The Rocky Road from Doing Agile to Being Agile](#)

Organizations implementing DevOps processes are more likely to prioritize automation than those practicing Agile.

Source: [2018 Global Developer Report](#)

Organizations with high-performing DevOps structures spent

21%

less time on unplanned work and

44%

more time on new work.

Source: [2017 Puppet and Dora State of DevOps Report](#)

"DevOps simply adds the idea that small, cross-functional teams should own the entire delivery process from concept through user feedback and production monitoring."

Source: [A Seat at the Table: IT Leadership in the Age of Agility](#)

Why Do We Care About DevOps and Where Did It Come From?

To understand why DevOps is a big deal in government, you must first understand its origins and the problem that DevOps solves. Let's take a look at the IT challenges that plague many government agencies and how DevOps can address them.

CHALLENGE: THE GAME OF TELEPHONE IN IT GOVERNMENT OFFICES

By now, government employees are familiar with the fact that difficult legacy technologies are just a part of the job. And although change quickly transforms government workforces and services, some particularly problematic technologies are likely to linger.

In the federal government, about 80% of IT funding goes toward maintaining legacy systems. Therefore, modernization efforts – with remaining IT budgets – cannot afford to fail.

And yet, they do. Breakdowns in the organizational chain of command and communication can render a hopeful and well-intended modernization project useless. That's why it's important for any organization to prioritize projects correctly and accurately define business value – but there's an equally foundational component to getting past legacy IT.

Recognizing a problem is only the first step to solving it. Next is developing the solution. Although crucial, this is often where many organizations fall short, further alienating employees and encumbering systems because of lengthy and prescriptive requirements before deployment. And if they can be developed, implementing these technologies then requires operations teams to ensure that new systems can fit into existing frameworks – and that's no guarantee. In government IT structures, questions about systems can easily outnumber answers.

By and large, government organizations exist in silos that leave employees stranded when it comes to workflows and systems. In modernization, for example,

leaders will often receive requests from users about systems that impede their jobs and need upgrading.

If agency leaders sign off on the improvement, they'll often convey the general scope of the solution to procurement and development teams. From there, these teams will do their best to tailor a solution that matches all the criteria that leaders earmarked for the investment.

But therein lies the problem: Going forward, the solution's rollout is up to the interpretation of those who have little to no interaction with the systems, instead relying on possibly murky instructions from leaders.

Operations teams, the ones who will be responsible for using and maintaining the system, have no input into the system's development in this form of project management. Instead, the teams in charge of using and maintaining the system receive a solution that they had little or no direct influence over and provided no feedback on.

The whole project flow resembles a game of "telephone" played at elementary school lunch tables. By the time the original idea reaches its final iteration – or is "tossed over the wall" from development to operations – it looks nothing like how it was intended and might fail to interact with related systems or meet security requirements.

After the operations staff tests and reviews the project, it needs to be sent back over the wall to development teams to make changes. Even after several tosses back and forth over the wall, the final product can still come up short.

SOLUTION: DEVOPS CLEARING UP THE LINE OF PROCESS

DevOps is a response to this classic conundrum of projects across large organizations.

The methodology, which was formalized in 2009, integrates development and operations teams throughout the system's lifecycle. By eliminating barriers to communication, organizations can continuously iterate and improve systems to ensure that they meet user needs.

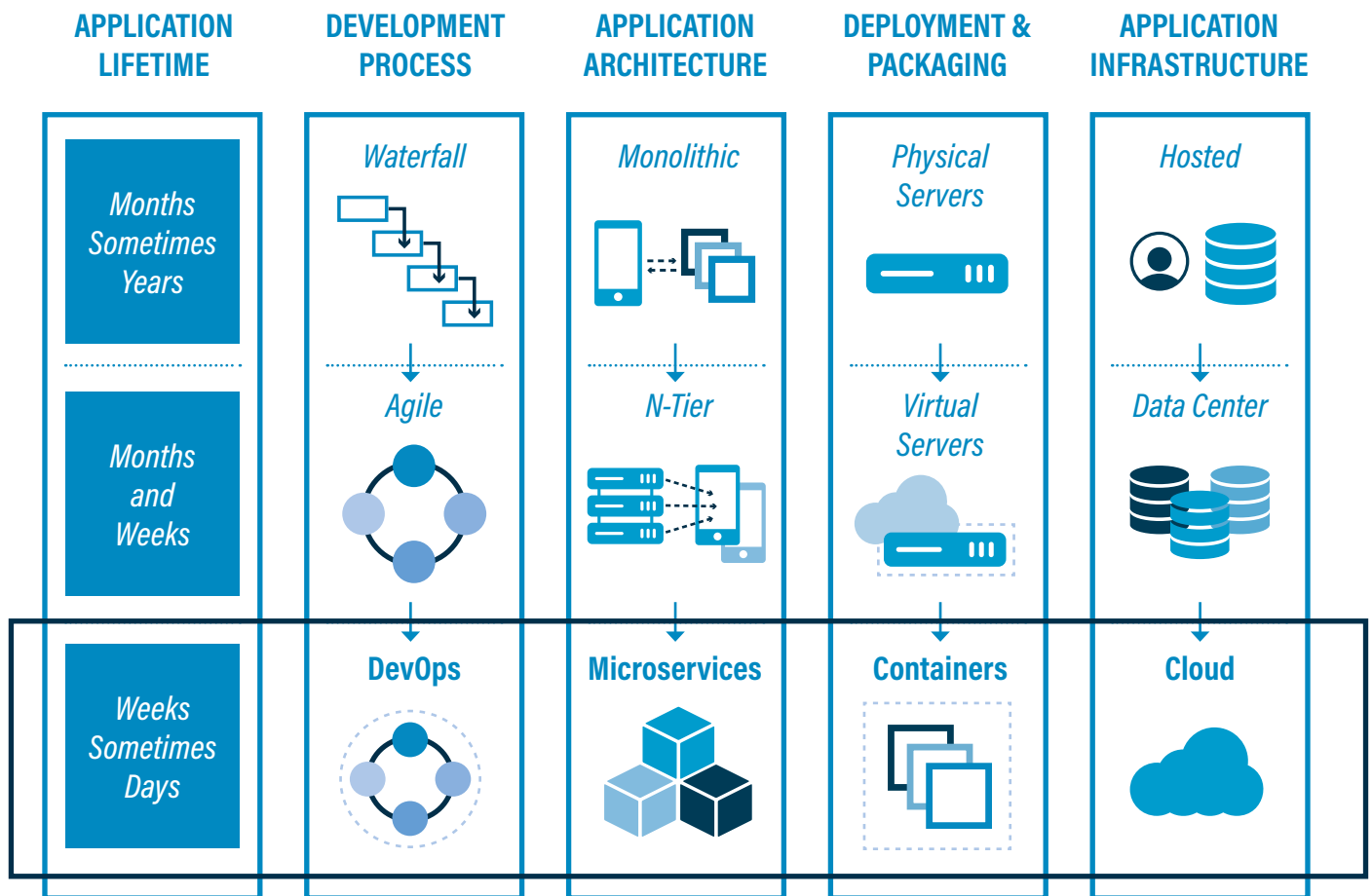
DevOps is derived from Agile processes of workflows, whereby organizations fail fast by constantly testing and tweaking projects in response to end users' experiences.

DevOps adds to the Agile process by breaking down barriers that prevent operations teams from responding to updated developments in the deployment processes for these fail-fast processes. Open source cultures, which encourage cross-team contributions to different phases of projects, also have contributed to DevOps implementations within agencies.

For many projects, DevOps offers a better way. Compared to traditional linear, waterfall processes for software development, DevOps allows agencies to deploy and launch projects with more direction, exactness and efficiency.

From Waterfall to DevSecOps

Source: DoD Enterprise DevSecOps Platform (Software Factory) DAU Presentation

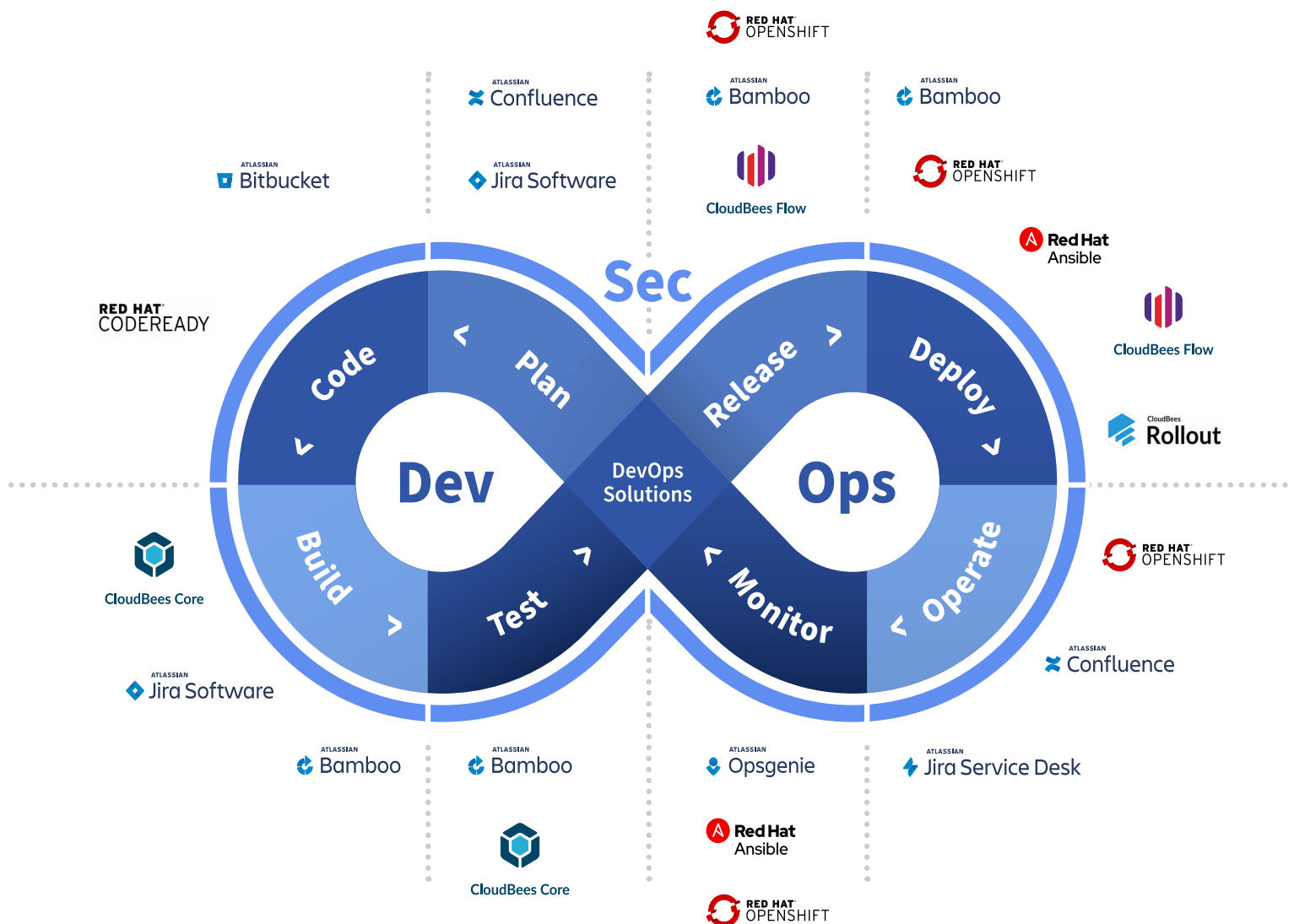


Carahsoft DevOps and DevSecOps Solutions Portfolio

DevOps and DevSecOps are philosophies, movements and even cultures of continuous improvement and integrated security – at scale. The result delivers a powerful advantage for government agencies who are undergoing digital transformation: faster releases, more secure releases, greater interoperability and the freedom to focus on the mission.

Carahsoft represents proven solutions, delivering to agencies the innovative solutions needed for every phase of the DevOps and DevSecOps lifecycles and with security built in every step of the way. These solutions deliver support for collaborative planning, rapid code builds, iterative testing, rapid release, optimized deployment and ongoing monitoring that continuously feeds into the next wave of planning.

See how agencies are benefiting from these solutions in the use cases featured here and learn more at carahsoft.com/DevOps.



Carahsoft's DevOps solutions are available through its reseller partners on a variety of contracts including Carahsoft's GSA Schedule 70, SEWP V, NCPA, National IPA, and numerous state and local contracts.

ATLASSIAN: HOW NASA BUILDS AND DEPLOYS MISSION CODE IN 24 HOURS

Developing software that allows humans on Earth to operate a variety of remote space explorers is no small task. Building and deploying that new code in 24 hour increments makes it even harder. But that's exactly what the NASA Jet Propulsion Laboratory, Ames Research Center and Johnson Space Center have teamed up to do.

To help these cross-country collaborators tackle high-stakes issues, they created a project called Ensemble. And to fuel Ensemble, JPL turned to Atlassian. Ensemble uses Jira and Confluence to stay on the same page with projects and requirements, and Bamboo to keep the code clean and fast.

One Ensemble project, an unmanned Mars rover named Curiosity, uses lasers, spectrometers and stereo cameras to investigate whether the surface of Mars could support

microbial life. Curiosity sends data back to Earth once a day, using a cloud-like computing hive with roughly a thousand CPUs. Curiosity's operators crunch through the day's data in a few hours, then beam up a task list for the next day.

Atlassian Bamboo powers a continuous deployment pipeline that delivers software updates to JPL's cloud as fast as the Ensemble engineers can crank them out. Code from six active branches is built using custom scripts, invoked by Bamboo. Each successful build is then deployed to, and rigorously tested on, two preliminary environments before going into operation.

Ensemble's engineers have the best bragging rights in the universe: The code they write on Monday is driving unmanned rovers on Mars on Tuesday.

CLOUDBEES: POWERING CONTINUOUS AND SECURE SOFTWARE DELIVERY

A prominent agency in the national security space was tasked with modernizing its mission applications quickly – but also securely. This customer historically had a decentralized Jenkins environment with little visibility or management ability, leaving development teams to work on their own scattered “islands.” This presented major roadblocks to collaboration and scaling up.

To achieve its objectives, the agency chose CloudBees Core as the enterprise-grade CI/CD solution to orchestrate and speed up the delivery of new mission capabilities. This allowed the agency's developers to adopt a multi-tenant enterprise platform, using CloudBees Core in its software factory to produce critical constituent-facing applications through trustworthy DevSecOps pipelines.

The automation inherent in CloudBees Core empowered the teams to focus their talents on writing code, without squandering manual effort on time-consuming things such as

user management, plug-in configuration, or security bottlenecks.

Concurrently, the shared services and security teams leveraged CloudBees Core's automation power to apply governance enterprise-wide, and well-orchestrated software delivery pipelines gave them the confidence that capabilities were being released within the confines of the organization's security policies and best practices. Today, the agency's 750+ developers are using CloudBees Core to produce capabilities at an ever-increasing velocity, with security built in from the start.

"It's a critical balance of security, quality, speed and governance," said Brian Dawson, DevOps evangelist at CloudBees.

"One of these imperatives cannot be sacrificed for another. We engage our government customers with the focus and experience necessary to help federal agencies deliver on their mission and keep developers focused on what they do best: writing code."

RED HAT: LEADING AGILE TRANSFORMATION THROUGH OPEN SOURCE ARCHITECTURE

Bringing new capabilities to the U.S. Air Force's fleet of F-22 Raptor fighter jets is no small feat. The Lockheed Martin F-22 is the world's most dominant fighter jet, but the legacy process for updating the jet's underlying software was mired in the traditional waterfall process.

It previously took five to seven years to identify requirements and release new capabilities for the existing architecture. That time-consuming process, along with code quality and integration issues, led to onerous rework and customization. Warfighters were not getting critical capabilities fast enough.

Lockheed Martin sought to create a team culture rooted in innovation and collaboration to transform its approach to application development. The company chose Red Hat Open Innovation Labs to lead it through the Agile transformation process and help implement an open source architecture

onboard the F-22, while simultaneously disentangling its web of embedded systems.

Through this eight-week Red Hat Open Innovation Labs residency, Lockheed Martin Aeronautics replaced the waterfall development process it used for F-22 Raptor upgrades with an agile methodology and DevSecOps practices that are more adaptive to the needs of the U.S. Air Force.

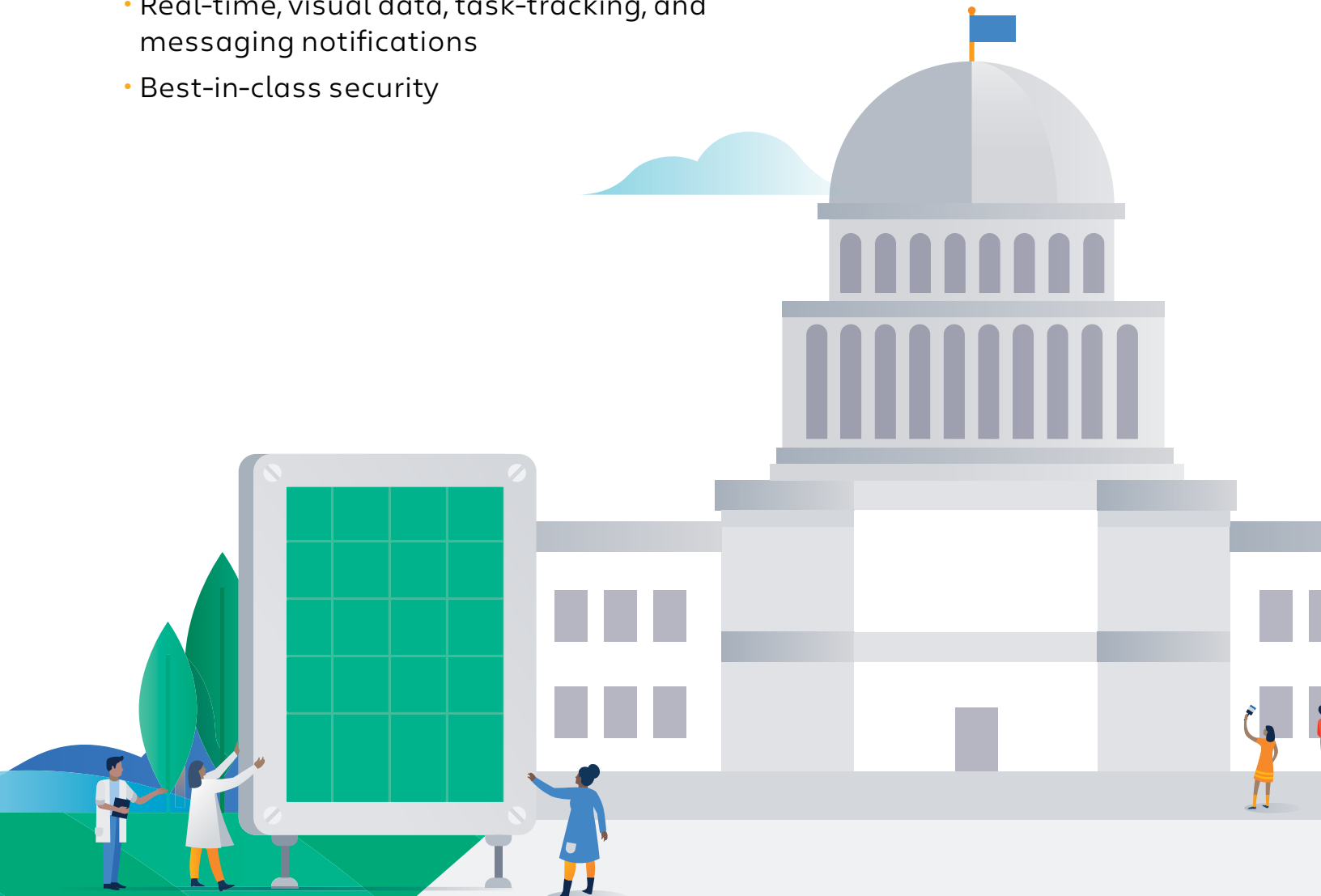
Together, Lockheed Martin and Red Hat created an open architecture based on Red Hat OpenShift Container Platform that has enabled the F-22 Raptor scrum team to improve its ability to forecast for future sprints by 40%. This summer—just one year after kicking off the project—Lockheed Martin is on track to deliver new software-defined capabilities three years ahead of schedule and is continuing to scale this approach to the entire F-22 development organization.

Been there. Scaled that.

Change is hard, especially for government agencies. Atlassian is here to help ease the pain of shifting to DevOps. Transform your agency workflows and speed application deployment time with open, flexible software.

Work smarter and faster, together.

- Unified workflows, centralized dashboards
- Streamlined knowledge management
- Real-time, visual data, task-tracking, and messaging notifications
- Best-in-class security



INDUSTRY SPOTLIGHT

Mapping Your Agency's DevOps Journey

An interview with Ken Urban, Senior Solutions Engineer, Atlassian

No two transformational journeys are alike, whether it's the underlying technologies supporting them or the personnel driving the decision-making.

The journey to adopt DevOps is much the same way. There isn't a hard and fast rule that guides every implementation because no two agencies or missions are the same. Although there are best practices agencies should embrace to make DevOps successful, think of DevOps as a philosophy — not a standard — that involves continuous collaboration among software developers and operations teams.

"You need to take the agile philosophy behind DevOps and mold it to your own team or agency culture. Then, find out what works best for you," said Ken Urban, Senior Solutions Engineer at Atlassian. The enterprise software company develops collaborative solutions for software developers, project managers and knowledge managers.

In an interview with GovLoop, Urban shared core tenets that agencies should consider when embarking on a DevOps transformation, as well as common pitfalls to look out for.

His first piece of advice: **Do your homework**. As elementary as that might sound, you must first understand what is broken and what needs to be changed before you get started.

"Maybe the answer to that question is nothing is broken, and everything is working as it should," said Urban, "but there's probably something that you want to improve upon."

Next, **DevOps is a team sport**. Take time to arm yourself with examples of teams that are executing DevOps with success. Preferably, these teams should be organizationally similar to yours. Urban, who previously ran a large software development team in the Defense Department, recommends that

agencies start small before looking to scale DevOps transformation across multiple teams.

"For example, you might want to get the operations team involved in the release process," Urban said. "Or maybe give the development team visibility into the process for responding to outages, so they can see the pain that operations has on a daily basis. Either way, the point is to slowly change your culture to a desired end state."

The top barrier to DevOps adoption is often not the technology, but the people. **DevOps changes work patterns**. So it's imperative that you don't force it. Spend time communicating the benefits, show the results and be transparent about challenges.

Another potential pitfall Urban highlighted was the lack of planning around standardizing on DevOps methodologies and toolsets before scaling. Again, don't force these decisions. The easiest solution is to take what works for you, including policies and tools, and make them available for use across your agency.

"Be as transparent as you can be while still respecting good security practices," Urban said, noting examples of commonly used Atlassian DevOps tools, such as JIRA and Confluence, that agencies use to fuel teamwork and enhance transparency.

Atlassian also runs an immersive DevOps simulator to help teams understand the cultural impact of DevOps and to develop a common shared language.

Ultimately, Urban said, transformational change is an ongoing effort.

TAKEAWAY: DevOps is not a standard or a one-size-fits-all approach to software development and operations. Success involves molding the philosophy of DevOps to fit the needs of your team and the culture of your agency.

Driving Innovation at 18F With DevOps



As Supervisor and Innovation Specialist at GSA's 18F, digital consultancy group, Clint Troxel regularly partners with federal, state and local government agencies to tackle tough technical problems.

"We also really focus on helping our partners learn new ways of working and new skills, like DevOps," Troxel said. "DevOps is definitely in 18F's nature, and nearly all of our projects have at least some foundational DevOps work, like automated tests, or continuous integration, or automated security scans or continuous delivery to a cloud platform like Cloud.gov."

In an interview with GovLoop, Troxel shared his take on DevOps adoption in government, how agencies can address the common challenges that arise when embracing a culture of DevOps and where DevSecOps fits in.

The responses below have been lightly edited for brevity and clarity.

GovLoop: How would you describe the maturity or use of DevOps in government?

Troxel: Some places in government are not mature. There are other places in government that are on a rocket ship and working at the edge of what we can do with DevOps. I've seen a huge increase really in the use of DevOps and the interest in DevOps tools and practices in federal and state and local government IT organizations, too. But one thing that I can say for certain is that there's still a lot of work to do — a lot of very foundational work.

As a government leader in the DevOps space, what do you see as the biggest challenge that organizations face, especially if they're transitioning?

One of the really big challenges in DevOps is just to make sure that we're all using the same words to speak the same language. DevOps has been a little hard to define historically. One way to think of DevOps is like a natural extension to Agile, not a transition. I think of DevOps as sort of extending Agile principles past the development of code into the entire system, into things like operations and security — and being Agile everywhere.

The best way that I know to start solving problems or making sense of DevOps, or these new tools that it brings, or these new concepts, is to just start. I think one of my favorite things about DevOps is that there are often some very low-hanging fruit. So, you can begin very simply and still make real improvements.

There have been horror stories of developers wasting hours because they ultimately didn't have permission to deploy code. What questions or red flags should employees consider before diving into DevOps?

You can find horror stories on both sides, with people who are not using DevOps or people who are using DevOps. I think that the really important thing to note here is that if you're learning a thing — I don't care what it is — you're going to make mistakes. And it's important to acknowledge that up front, and to make it OK. In DevOps, a way that we do that is to create a safe environment or create an environment where consequences for mistakes are low — a place where you can go practice a bunch.

What practical advice can you share to help others avoid those horror stories and ensure everyone is on the same page?

Automation and collaboration are core tenets of DevOps. Even in a situation where you have these wonderful automated scripts that do everything for you and don't require any handholding, things still break. It's software; there are bugs. Nothing works forever. And so, again, having other environments where you can practice and where you can make these mistakes and learn from them [is critical]. In fact, where you can, try to make these mistakes. [For example,] what happens if I lose my password for the deployment or whatever it is? How are we going to handle that in the future if that problem arises?

In a previous blog post you wrote, "Agile without DevOps is a bundle of potential energy with no outlet." Can you provide an example of how you've seen that play out in government, and what agencies can do to provide that outlet, obviously using DevOps?

Agile taught us to quickly adapt to changes like new features in our code. That was great, and the cycle requires lots of feedback from users as part of that Agile cycle. You make changes and then you check with users, and then see what they thought and then you incorporate those changes. A couple examples of how DevOps can really unlock that cycle is by creating these automated environments where potential changes can be tested and reviewed. That's the thing DevOps can do.

GitHub is at the root of a whole host of collaboration in automation in DevOps. It's where we talk about our code, where changes to code trigger other events in other systems. So, yes, agencies that are practicing Agile software development should also invest in DevOps because to say DevOps is to say applying Agile practices to operations.

You also wrote, "When bringing DevOps into government, making it DevSecOps instead may be the difference between failure and success." Can you elaborate on that?

In the federal government, security requirements are very complicated and demanding. Security offices can stop a project dead in the water. So, we learned what helps a lot in our project is for us to interface very early with the security apparatus, whatever it is. To try and, in a friendly way, break down those walls around security like we did for development and operations.

"The best way that I know to start solving problems or making sense of DevOps, or these new tools that it brings, or these new concepts, is to just start."

What has DevOps enabled that you otherwise think would not have been possible?

I don't think 18F would be here if we ignored DevOps. Processes like automaton, I see them as a lever that really enables small teams like 18F to have an oversized effect. Our entire Platform-as-a-Service, Cloud.gov, is run by a small team of humans. That would be impossible without large amounts of automation. [This is] similar on the [Federalist](#) side, [a publishing platform for modern, compliant government websites]. Operating these platforms services with small teams is only possible because of deployment automation.

Empowering Public Housing Authorities Through DevOps



When Kevin Portanova came to HUD's Real Estate Assessment Center (REAC) in 2014, he brought with him experience using Agile software development in the Navy.

At the time, Agile was a new concept across government, but one that Portanova saw great value in. "We started doing Agile first, and we didn't really see the need for DevOps until the team started growing," he said. As the team grew, so did the amount of work that the developers produced. The issue became how to get that software into production in a timely and efficient manner.

Although there are still a fair amount of manual processes, HUD as a whole is starting to implement continuous integration and continuous development, key tenets of DevOps. More specifically, REAC is using DevOps to modernize the way public housing authorities interact with HUD. REAC is charged with providing accurate, timely and reliable information for assessing the condition of HUD's portfolio, and GovLoop sat down with Portanova to learn how software is driving those efforts.

The responses below have been lightly edited for brevity and clarity.

GovLoop: Can you give our readers a sense of the critical role software plays in your organization?

Portanova: REAC, and HUD as a whole, has traditionally done all their software development through contracts and contractors. Back in 2014 now — so it'll be five years in September — then-[REAC] IT Director Patrick Evans and our Deputy Assistant Secretary for REAC, DJ LaVoy, said, "We have breaks in service, we have contractors who leave for other contracting jobs, so there's that loss of corporate knowledge. There's the inefficiency; we can't pivot these contractors to work on other high-priority things because they're locked into a particular contract for a particular system." For all those reasons, and I'm sure many others at the time, DJ and Patrick came together, and said, "Hey, you know, I think we can do this better ourselves. We want to hire some federal staff and hire a manager to run that organization as far as software development is concerned."

So in September 2014, they hired me as that manager and four software developers. We were quickly successful with the support and skillsets that we

brought to the table. That team of four developers quickly grew to 10 by the end of 2014. We're currently sitting at a staff of approximately 40 in our IT department, and about 35 of those are what we call IT specialists, our 2210 [IT management job series].

As REAC develops new software, are you also maintaining a dual environment with legacy systems?

Yes. The team of 40 is broken out into unique jobs and skillsets. We really have six teams. Four teams are dedicated to software development solely. More than half of the developers are focused on one of our largest projects. It's the modernization of our inventory management system. They're solely dedicated to that and have been for the last couple of years. Then the other two teams, we've been moving around as fires surface. We've had instances of the contract going away, or the funding for that contract went away, but we still have a need to support a system internally, a legacy IT system, and so we've had a team that's stepped up and taken that role. And then the final team is that DevOps unit.

Can you tell me more about that modernization project and what capabilities you hope DevOps will provide?

What DevOps is helping us with is that deployment pipeline. I like to tell everybody we're paving the road while we drive on it. We're learning as we go. That particular project is really unique because we deal with a lot of public housing authorities on the HUD side. Those public housing authorities a lot of times either have their own IT systems or a vendor that supports them in some function or another. And so we are really focusing our interaction on how we integrate our systems with their systems. We're migrating that inventory management system to a government business solution using application programming interfaces, web services, RESTful JSON.

Today, a lot of those organizations have to log in to their own systems at the public housing authority, or PHA, and then they have to log in at HUD and do the same work. There's a lot of duplicity involved. There's a lot of redundancy, not always for the right reasons, but just because that's the way the system was designed 20 years ago. REAC's been in existence since 1998. Most of these systems that we still [support] today were built around that early 2000 timeline. We really haven't had the ability to modernize those systems. And this inventory management system is really that first leap into that endeavor.

What will this mean for the public housing authorities?

It means an easier way to communicate with us instead of having to remember a username and password. About 605 of the calls we get in our Technical Assistance Center are username/password resets. Some people log in weekly or monthly, some people log in a couple of times a year when they have to do certain kind of work, whether it be the financial piece or the physical inspection piece. We do a lot of username/password resets. It's kind of a waste of our time and theirs, and so we're trying to move to a methodology where they don't have to worry about that. They just interact with their system, and their system will talk to us either real-time in a synchronous method, or asynchronously, [such as] nightly or weekly.

What metrics show how DevOps is enabling modernization?

Through that inventory management system, we receive a HUD 50058 form. That's the data PHAs have to submit to us for every household, and when they move [and for] annual reexaminations, where they review the documentation to make sure it's up-to-date. That's the process we're modernizing. Today, that system receives about 10,000 unique logins per week. Annually, we get about 10 million submissions of those 50058 forms. About 13% to 14% of those forms have issues and cause individuals at the PHAs to rework that process. That's about 1.3 million forms annually that they have to rework.

We anecdotally — and incorrectly, I might add — assumed it takes 10 to 15 minutes for PHAs to fix it and send it back. Truthfully, it takes at least an hour. So, one hour at 1.3 million forms, that's 1.3 million manhours that are wasted annually that we could fix tomorrow if we make a system-to-system communication. As quick math, 1.3 million hours is 625 full-time equivalents. That's 625 people nationwide that could be hired across the PHAs if we just fix that one problem.

How did you go about getting talented people on board? What skills did you look for?

As far as the job announcement perspective, we focused on skillsets that are here in this organization, whether it's Java, Oracle — those kinds of things. The 2210 [job] series, is relatively new for this organization. It had traditionally done IT with management analysts, the 0301 series, which is very generic. The 2210 series offered us some jump into technology expertise.

But it's that capacity of learning, but also the willingness of expanding your skillset, stepping outside your comfort zone that I look for. And also, from a personality standpoint, are you going to fit on this team? Are you going to fit in an organization that does Agile, where we require you to collaborate and communicate? Truthfully, a lot of people go into software development because they like to sit at a computer by themselves and solve problems.

Breaking Down the Roles in DevOps

“DevOps” combines “development” and “operations” into one term, but that doesn’t mean developers and operations teams are the only characters in your agency’s story. At heart, DevOps focuses on cultural and organizational reforms over technological upgrades. The truth is that all your agency’s personnel can participate in implementing this holistic approach to improving software development.

For its part, the private sector has long relied on personas to create realistic representations of key audience members from customer bases. In contrast, governments have largely relied on personas to improve user experiences.

The personas below represent some of the many public servants who can use DevOps:



1. DEVELOPERS

With DevOps, developers create the code that applications, software and IT systems use faster. It provides them with operational concerns early in the design process. This helps developers quickly spot — and address — breakdowns, flaws and pain points. Developers practicing DevOps also avoid redundancies and improve their coding by fulfilling operational requirements as soon as possible.



2. OPERATIONS STAFF

Operations teams ensure that agencies meet citizens’ needs by releasing products and services that function efficiently and smoothly. DevOps gives operations workers more visibility into the design process so that agencies deliver more satisfying products for users. These employees maintain continuous, seamless product operations so that their agencies are constantly meeting their citizens’ demands quickly and completely.



3. AGENCY LEADERS

Agency leaders are pivotal to DevOps because they guide the cultural reforms necessary for agencies to adopt it. These people also certify that their agency’s products are meeting their users’ needs. Additionally, DevOps aids agency leaders by reducing turnaround times for altering products and services, generating efficiency gains, and saving on costs. Because agency leaders often chart their organizations’ directions, DevOps is extremely difficult to realize without them.



4. HR MANAGERS

Human resources (HR) managers are another critical component of DevOps because they hire the employees necessary for implementing it. HR managers also assist with launching DevOps by recruiting and hiring people for the organizational culture it needs. By keeping an agency's many departments cooperating and aware of one another's work, HR managers make employees feel empowered and transparent through DevOps. In turn, DevOps strengthens HR managers' efficiency by updating them on each team's progress, and it keeps HR managers abreast of how users' needs are being met and which parts of their own work can be improved.



5. SECURITY PERSONNEL

Security personnel are major players in both DevOps and DevSecOps because of the valuable citizen data they protect. These employees approve agencies' applications, coding, products and software for use once they meet cybersecurity regulations and standards. For instance, the federal government's Federal Risk and Authorization Management Program (FedRAMP) sets cybersecurity benchmarks that all cloud computing providers must meet to sell their products and services to its agencies. Subsequently, as part of DevOps, security personnel must ensure that an agency's cloud services meet FedRAMP standards. DevOps and DevSecOps also keep security personnel vigilant during the design process for potential risks. By spotting possible mishaps earlier, security personnel can keep them from reaching the public and causing cybersecurity failures. Finally, DevOps helps foster trust and collaboration between cybersecurity personnel and other teams, making sure that they understand one another's efforts to keep sensitive information safe.



6. END USERS

End users are an agency's internal employees and external people – this makes them arguably the most important segment of DevOps because agencies aim to serve both groups. DevOps pleases external users because it helps public servants frequently update software for them in real time. End users are also a priority because they expect agencies to quickly deliver the products and services that they're seeking. Through the customer experience (CX) that agencies provide to citizens, DevOps pushes end users to rely more on their governments for quality service delivery. This keeps agencies competing with private-sector CX and winning citizens' patronage from businesses, creating a feedback loop in which citizens are pleased by government employees who are content serving them.

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INDUSTRY SPOTLIGHT

Why Security Is Key to Your DevOps Success

An interview with Brian Dawson, DevOps Evangelist, Product Lead, CloudBees

Technology operations in government have long been dominated by compliance requirements that dictate the security and reliability of federal systems. But in this era of IT modernization and improved user experience, agencies are exploring new ways of continuously improving and delivering better software in government through DevOps.

This cultural shift to adopt DevOps hasn't been swift, but much like a cargo ship approaching the harbor — think slow, steady and cautious — both civilian and defense agencies are investing in collaborative approaches that unite their development and operations teams.

"As part of that modernization, I think there's a reconciliation or a realization that DevOps can enable compliance, security and availability, but also with speed and innovation," said Brian Dawson, DevOps Evangelist and Product Lead at CloudBees, a leading provider of solutions for continuous software delivery. The Defense Department is among the growing number of agencies using the company's CloudBees Core offering, which automates and orchestrates the steps in software delivery by binding them together into logical end-to-end workflows.

CloudBees Core is a key part of DoD's Enterprise DevSecOps initiative, which focuses on enabling automated tools, testing and security to rapidly deliver software capabilities to the military.

In an interview with GovLoop, Dawson explained how DevOps not only helps agencies meet compliance demands, but also exceeds those requirements by empowering more innovative, timely and secure development of critical software. However, **to truly capitalize on the benefits of DevOps, security teams must be an integral part of the transformation.**

"It doesn't matter how much speed we achieve on the development side — or independently on the

operations side," Dawson said. "To truly recognize DevOps, we are going to have to involve security. In fact, security should be a consideration from the onset of your DevOps implementation."

Consider this analogy: **Security is to the government what return on investment is to the commercial sector.** It's with this in mind that CloudBees supports agencies to better manage software delivery in a way that infuses government-grade security, best practices and support for on-premise or cloud operations across geographical teams. CloudBees Core, for example, is built on a popular and well-known open source automation server called Jenkins. This combination gives agencies the best of what open source has to offer while also meeting government's rigorous security and scalability demands.

In addition to DoD, the U.S. Citizenship and Immigration Services (USCIS) and the Centers for Medicare & Medicaid Services (CMS) are two examples of agencies achieving great success with DevOps. At USCIS, in particular, the agency is seeing a higher frequency of software deployments and low failure rates when changes are made to software. Dawson noted that outcomes at USCIS are on par with what top tech companies are experiencing through DevOps.

"DevOps creates the collaborative environment that's needed to automate the rote and tedious tasks throughout the software delivery pipeline," Dawson said. "The efficiency gains in these agencies' software factories are freeing up staff to reclaim time wasted on manual processes and instead focus on mission-critical activities."

TAKEAWAY: Although it may seem daunting, implementing DevOps and DevSecOps enables teams to collaborate and deliver software rapidly, reliably and repeatedly.

How the Air Force Is Implementing DevOps



Lean product development, user-centered design and extreme programming are terms usually associated with Silicon Valley startups, not the Air Force.

Similar to other military branches — and the Defense Department as a whole — acquisition strategies have been notoriously complex, cumbersome and in some cases years long, only to be scrapped without providing value. That was the case with the Air Operations Center – Weapon System (AOC-WS) Increment 10.2 program. AOC-WS is a major automated information system used by the Joint Forces Air Component Commander to plan, execute, monitor and assess air, space and cyberspace operations.

The AOC-WS 10.2 contract was being developed to address application integration problems and cybersecurity vulnerabilities with the previous iteration of the program. But those efforts were scrapped in 2017 after the Air Force spent half a billion dollars over a 10-year period. “[It] really was the impetus behind trying a different way and got us on the path toward Kessel Run,” said Lt. Col. Jeremiah Sanders, Program Manager, Air Operations Center — Weapons System and Deputy Commander of Detachment 12, Kessel Run.

The Kessel Run team prides itself on integrating Agile DevOps into Air Force acquisition practices and describes its work as revolutionizing “the way the Air Force builds and delivers software capabilities.” It does this by taking industry-proven software development practices, such as Agile and DevOps, and empowering airmen to use those practices.

GovLoop recently sat down with Sanders and Steve Wert, Program Executive Officer (PEO), Digital, to discuss what’s new for Kessel Run and the Air Force, tangible outcomes, and Wert’s role in evangelizing Agile DevOps across the department.

The responses below have been lightly edited for brevity and clarity.

GovLoop: Can you talk about the success of Project Kessel Run and how PEO Digital builds on that success?

Sanders: Having inherited the challenge of modernizing the AOC, the opportunity exists now where we’re able to take very small bite-sized chunks of that problem set, as opposed to the big bang, decadeslong approach that was [AOC 10.2](#). We stood up several very autonomous software development teams. We have about 20 teams that are building on specific operational capabilities or outcomes that we have to deliver to the AOC enterprise. We started that primarily with the 609th Combined Air Operations Center in Al Udeid [Air Base in Qatar] because they are fighting the current real fight over there.

And we were able to see significant operational improvements having an impact within a matter of months. We were saving millions of dollars a month, in fact \$13 million a month, in fuel within just a few months, [and] also significantly reducing timelines and increasing validity in the air tasking cycle. And then we were able to expand those capabilities to other geographic air operation centers across the world to the point that now, we’re pushing new capability out of our development operations environment and into real-world operations every 15 hours. And we’re getting faster.

What Agile and DevOps, or DevSecOps, are talking about is really the ability to continuously deliver capability so that we burn down the risk of delivering

the wrong thing. We're able to get feedback from end users and iterate on that capability. The underlying technology infrastructure that allows distributing the software continuously on a worldwide scale, including multiple classification levels, was really a big enabler of what we've been able to do from a war fight perspective. We have subsequently onboarded another 20-plus teams from other activities within the Air Force and [are] also supporting the F-35 [aircraft program].

GovLoop: Can you make the connection between the work you do and how that is leading to fuel savings?

Sanders: The work that we did to create software enabled a much more efficient [approach], both in terms of human capacity and the use of our refueling aircraft for aerial refueling aircraft. And now we've taken that same capability and are using it in the Korean Theater, Pacific Theater and others.

Wert: Col. Sanders, is it fair to say that people are using the time that they would have dedicated fighting an antiquated system to more methodically plotting out how to put tankers where they're needed most?

Sanders: I would say that the software enables what used to be humans doing that on calculators and whiteboards to the point that now there are fewer humans involved. It used to take six people six to eight hours a day to do that plan. Now it takes two people 30 minutes.

Wert: In parallel with the journey that we've been on with Kessel Run, as a Program Executive Officer, I can direct our other software efforts to start transitioning to this Agile DevOps approach. So, we actually now have many examples we can talk about — Personnel Recovery Command and Control, for example, is releasing updates every two weeks.

When we have a downed airman, [the software] is used to report and locate. So that's one way that we've been building on the success of Kessel Run. We're working to apply it everywhere within my portfolio.

The other way we're spreading this is helping other PEOs establish software factories, somewhat akin to Kessel Run. There's a small software factory that's been stood up in Colorado Springs, [Colorado] called Space Camp. There's an organic mobile apps team in place in Montgomery, Alabama, working for PEO Business Enterprise Systems and [also] working to stand up a larger software factory there. And then SMC [Space and Missile Systems Center] is working to stand up a software factory out in Los Angeles.

GovLoop: Are there any metrics you can share that help to quantify the impact?

Wert: I struggled a little bit with that question because we have so many programs and projects. To illuminate that a little bit, though, I have reached the point where I will not approve an acquisition strategy that's not using [Agile DevOps].

GovLoop: Are there clear guidelines for folks, so they understand what you're looking for when you say Agile DevOps?

Wert: I've been reluctant to provide anything like a checklist to define what we're doing because I think we're still experimenting. But I think the key is a focus on continuous delivery. Continuous delivery may mean every two weeks because that's the best we can do. But it's not an episodic delivery that's measured in years.

GovLoop: Anything else you'd like to add?

Wert: What I really like about this is it's more rewarding work for our workforce.

It's definitely more rewarding working directly with end users and better understanding operations and how our systems are used.





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INDUSTRY SPOTLIGHT

How Open Source Powers DevOps Success

An interview with Eamon McCormick, Director, Emerging Technology for Civilian Agencies, Red Hat

Government employees and the constituents they serve want access to modern capabilities, similar to what they use in their daily lives. They expect frequent updates, improvements and same-day responses to security issues.

To meet those expectations, agencies need a more collaborative, automated and transparent approach for delivering the software that powers government services, said Eamon McCormick, Director, Emerging Technology for Civilian Agencies at Red Hat, a leader in open source technology. “The only way for the government to deliver this kind of experience is by adopting DevOps,” McCormick said. In a recent interview with GovLoop, he explained the key tenets for making DevOps adoption a success and the role open source plays in that transition.

Although important, **DevOps success is about more than the technology; the culture is critical.** To be successful, agencies must change in three fundamental areas. They must first create small, autonomous, cross-functional teams to focus on solving specific problems. Second, they must constantly focus on and get feedback from the customer, rather than adhering to dated internal policies and procedures. Finally, they must network these small teams to solve the more complex technology and business challenges, McCormick advised.

Picking a single project and starting small allows teams to learn from their mistakes and readjust. McCormick advised that agencies establish a baseline and metrics around what they want to improve about their delivery capability. Potential metrics include lead time for change, deployment frequency, recovery time and change failure rate.

Open source communities provide a good model from which agencies considering DevOps can learn about collaboration and transparency. Open source

relies on communication, full visibility for everyone working on the project team and prioritization. “Open source projects have fully adopted the DevOps concepts that our customers are now looking to adopt,” McCormick said.

Red Hat itself is an example of a large organization built entirely on open principles. Its understanding of open culture and DevOps is evident in its partnerships with government agencies and the products and services it provides, McCormick said. He explained that Red Hat’s Open Shift Container Platform, along with offerings like the Container Adoption Program and Open Innovation Labs, moves government customers toward a DevOps operation model.

“To fully take advantage of OpenShift as a platform, our customers have to work in small teams, embrace automation, and open communications,” McCormick said. Open Innovation Labs and the Container Adoption program teach federal stakeholders to use Agile approaches, DevOps and modern architectures, such as Linux containers and micro-services. Customers run through multiple Sprints, paired with Red Hat coaches and experts, until they achieve self-sufficiency and the ability to expand beyond initial projects on their own.

“DevOps has now been proven successful across all types of technology projects, whether it’s custom development or commercial off-the-shelf (COTS) adoption, whether it’s legacy or modern technologies,” McCormick said. “It can significantly improve an organization’s culture and create an incredibly positive experience for the participants.”

TAKEAWAY: Successful DevOps implementation thrives on openness and transparency. Start small and consider how open source-based projects can help drive collaboration across teams.

The Benefits of Using DevOps

DevOps is crucial for governments managing application and software projects because it improves the cooperation between their development and operations teams. The products this methodology produces are also higher-quality and more satisfying for the software's end users. Here are some reasons why DevOps is a must-have strategy for you and your agency.

1 BOOSTING YOUR AGENCY'S IT PERFORMANCE

DevOps significantly enhances agencies' IT performance by ensuring that their developers and operators are working closely together. By improving the communications between both sides, products are developed, deployed and improved faster. This is because each team is aligned with the project's functions and goals so that their work is ultimately directed toward the same outcome.

Ultimately, DevOps not only strengthens collaboration agencywide, it also dramatically increases organizational efficiency. For instance, consider the results of a [report](#) about DevOps by Puppet Labs, an IT automation software company. It found that high-performing IT teams using DevOps experience 60 times fewer failures and recover from missteps 168 times faster than their lower-performing peers. These organizations also deploy products 30 times more frequently with lead times that are 200 times shorter than those of their peers without DevOps. Although product failures are unavoidable, a quicker recovery time is essential for meeting citizen demands and achieving mission success.

2 RAISING YOUR AGENCY'S QUALITY ASSURANCE

DevOps also guarantees that faster product and service deliveries don't suffer from lower quality. The DevOps methodology features two attributes that explain why this balance between speed and high standards exists.

First, DevOps gives development and operations teams full visibility into projects. When synced in this fashion, both groups better understand the changes made to their projects. Take updating hosting platforms or altering lines of code: Developers and operators alike see how these moves might impact the greater whole. Legacy project management methodologies, meanwhile, often leave one or both sides blind to the other's actions. In contrast, DevOps means that both development and operations staff are on the same page.

Second, DevOps swaps many human processes involved with development and operations with automation. Automation replaces manual processes with autonomous controls and processes, often enhancing both with less human input. This tool reduces human error without sacrificing quality and security. Eventually, product delivery centers on almost continuously updating and releasing improvements rather than development and deployment.



3 IMPROVING YOUR AGENCY'S END PRODUCTS

Traditionally, the separation between developers and operators has resulted in products that don't meet citizens' needs or advance agencies' missions. Developers typically created code without knowing its real-world impact. Operations staff, meanwhile, frequently received products without understanding how they worked.

DevOps changes this paradigm by helping both teams reach better decisions about how to build and deploy their products and services. For starters, developers coordinate with operators about how their code can best meet the conditions it will live in. Operations teams, meanwhile, learn from developers about how their services work and why they were created the way they were.

The barriers that DevOps reduces between developers and operations workers also decreases employee stress. By ensuring that workers can make changes as needed, DevOps keeps products on pace with shifting needs and situations. For agencies at every level, the outcome is higher-quality, more flexible solutions.

4 SATISFYING YOUR AGENCY'S END USERS

Citizens are accustomed to a fulfilling CX from the private sector, and they'll be disappointed by agencies that don't meet the same standard. Unfortunately, many agencies' development and operations lifecycles are not capable of the agility, mobility and utility present in similar workflows outside government.

DevOps, however, can close the CX gap between the public and private sectors by harmonizing agencies' development and operations efforts. Consider development lifecycles: At some agencies, these processes can take years to produce products and services without DevOps. By allowing continual testing and deployment of coding changes, however, these lifecycles can conclude in mere weeks instead.

Making the collaborative process quicker and more efficient also forges stronger bonds between the various teams most agencies have. For example, DevOps can bring an agency's development and cybersecurity teams closer. Subsequently, agencies with more substantial collaboration have happier employees working together toward a common mission. By enabling quicker changes, DevOps also morphs products into more satisfying experiences for citizens sooner.

5 PREPARING YOUR AGENCY FOR DEVSECOPS

DevSecOps is DevOps taken one step further. This system expands on DevOps by adding cybersecurity to the mix with development and operations. This addition ensures that security is always included in the development and operations lifecycles.

Cybersecurity is top of mind for agencies because they handle and store sensitive citizen data. In the wrong hands, this information can hurt America's economic, strategic and national security.

DevSecOps addresses this challenge by encouraging the mindset that everyone is responsible for cybersecurity agencywide. The goal is safely distributing security decisions at speed and scale during the entire development and deployment process.

Breaking down boundaries between cybersecurity and development prevents vulnerabilities from undermining agencies' products. Removing these obstacles between cybersecurity and operations establishes methods for continuously running IT systems securely.

Overall, DevSecOps enhances security while making agencies more capable of mitigating potential cybersecurity risks.

Best Practices for Getting Started With DevOps

DevOps can make an agency more efficient and free up time for innovation, but pursuing this approach is a long, continuous process. The entire agency must embrace DevOps and be prepared for the journey ahead. The first steps can be confusing and tedious, but the seven tips below will provide practical guidance and useful hints to jumpstart the transition.

✓ Build a strong communications network

The cornerstone of DevOps is collaboration. Multiple teams blend together to work toward a single goal. A strong internal communications system or collaboration app, including finding the right project management tool, makes for a smoother transition. An effective communications network should also include a platform for employees to share which parts of the transition to DevOps are going well and which need improvement.

✓ Know the Agile manifesto

The [manifesto](#) provides guiding principles that any agency can adapt to fit their DevOps goals as their team evolves. Welcoming change, encouraging cooperation, developing sustainably and other Agile sentiments will keep your DevOps team from deviating from the mission. If this is a struggle, try hiring an Agile coach to guide the team through the process.

✓ Invest in prepping your personnel for the transition

Building a DevOps team affects the entire agency, but development and operations units in particular must be [trained](#) on new software and daily functions. A competent staff with qualified leaders can not only help plan the shift to DevOps, they can also troubleshoot unexpected malfunctions along the way.

✓ Start with small projects and changes

New DevOps teams will experience hiccups as they adjust to a new daily routine. Attempting to overhaul the entire system in one day or pressuring a budding DevOps team to take on the biggest project of the

year can crush spirits before the journey begins. That said, be sure to let the DevOps team take on important projects once they find their footing or else the team may not see the benefits of a DevOps approach.

✓ Test even the most minor modifications

Before releasing updates or IT adjustments, the DevOps team should be confident in the quality instead of rushing to launch programs immediately. Confirm that even the smallest tweaks still perform across all platforms.

✓ Include the entire agency

DevOps should not end at the IT department. Instead, the entire agency should be aware of how the transition to DevOps benefits their work and why the agency is making this transition. Break down the silos that separate each department with demonstrations of the DevOps approach and opportunities for critiques to raise awareness about the value of switching to DevOps.

✓ Keep improving

Provide a channel for feedback and [room to fail](#) as the DevOps team finds its footing. Restructuring the development and operations departments can be uncomfortable and lead to shortcomings that affect citizen-facing services. Routine internal and external evaluations, especially if the development and operations teams are reporting to the same lead, can ensure that the new DevOps team is serving its purpose.

For more information about implementing DevOps processes, visit [GSA's DevSecOps Tech Guides](#).

Conclusion

Before agencies dive into the next stages of their DevOps journey, they must understand a variety of technologies, practices and approaches to changing the culture that support the way forward. Implementing DevOps in your organization isn't as simple as buying a tool and making sure everyone uses it. DevOps is more than a person or even a team of resources; it's a culture of constant evolution. In essence, it's not a destination you arrive at; it's a journey of improvement.

We hope this guide, with its tips, interviews and insights into DevOps, has given you a start. Here's to continually improving your software, your services and the way you improve citizens' lives with technology.

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Thank you to Atlassian, Carahsoft, Cloudbees and Red Hat for their support of this valuable resource for public sector professionals.

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