ACCELERATING DEVOPS IN THE PUBLIC SECTOR

INDUSTRY PERSPECTIVE

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INTRODUCTION

In the public sector, many programs have historically run slowly and inefficiently. The government's information technology processes and systems are growing more outdated while the public's – and internal end users' – expectations about technology, speed and delivery are rising. As the private sector pushes IT boundaries and experiments with improved delivery methodologies and supporting technologies, the public sector faces challenges from regulations, legacy rules and processes, and constrained financial resources. Additionally, unlike many of the cutting-edge firms in the private sector, the public sector is saddled with legacy technology that needs modernizing. There is now, however, a true mandate to modernize, with demand for increased technical capabilities and lower budgets, and the passage of the Modernizing Government Technology Act in 2018.

Truthfully, federal agencies don't necessarily need to be Google, Netflix, Facebook or Amazon, delivering code to production hundreds to thousands of times per day. But they can't underestimate IT's significance in executing their missions. Today, every organization is a technology organization, regardless of what business they practice, including public service.

Bottom line: Government must deliver technology more efficiently, and DevOps is the best approach.

Fortunately, recent innovations and developments in process, technology and IT management provide opportunities to help the government deliver its technological products more effectively.

Particularly, the public sector has begun looking at DevOps (or DevSecOps), a project management and software delivery approach and mindset, to cope with some of these challenges.

This industry perspective aims to provide you with the tools necessary to start implementing DevOps for your IT project delivery. Although knowing where to start with DevOps can be difficult, it is a clear and common-sense approach to technology that can result in measurable performance improvements, and positive cultural change.

We sat down with Eamon McCormick, Federal Manager for Emerging Technologies at Red Hat, to hear about DevOps and its implications and utility for government organizations. We'll guide you through the basics, and by the end of this industry perspective, you'll have all the essential information to start exploring DevOps at your agency.

DEVOPS: A MORE EFFICIENT APPROACH FOR IT DELIVERY

In their 2016 follow-up to "The Phoenix Project," titled "The DevOps Handbook: How to Create World-Class Agility, Reliability, and Security in Technology Organizations," Gene Kim, Jez Humble, Patrick Debois and John Willis state, "Imagine a world where product owners, Development, QA, IT Operations, and Infosec work together, not only to help each other, but also to ensure that the overall organization succeeds." In a nutshell, that's what DevOps is trying to accomplish – creating cross-functional teams with a shared goal of delivering high-quality, accurate products to end users quickly, consistently and securely.

The phrase DevOps is a shortened, condensed version of the terms development and operations, but it can be challenging to define, and some people think of it differently than others. That's because it's more of a holistic approach that encompasses people and culture, process and technology rather than a specific type of analysis, process or toolset; anything related to culture is also notoriously hard to define. DevOps defies specified boundaries and limits, and seeks to be a more complete approach to delivering technology.

So where to begin? Every DevOps expert and user has their own definition, but most agree on some basic facts about what it is and isn't. Generally, **DevOps is a software delivery method that stresses communication, collaboration, continuous testing and feedback, automation, extensive configuration management, experimentation and integration between software developers and IT professionals.**

Ultimately, this approach is all about delivering software more quickly and effectively to users. DevOps aims to help organizations save time and money by removing the barriers between the development, delivery and operation of software products.

In DevOps, product development is iterative, and there's constant feedback and improvement, no matter where in the process a particular product stands. Each iteration delivers working software that end users can begin using, and that experience allows them to provide feedback to improve subsequent releases. Gone are the days of endless planning and requirements-gathering, only to have projects canceled without ever delivering end user value.

Throughout the process, automation and configuration management are used, enabling increased efficiency by letting computers take over mindless, often error-prone work whenever possible. Automation is especially important when it comes to testing. With software being released so frequently, near-complete test coverage is required to make sure no regressions have been introduced as a result of change.

But more than anything, DevOps is about culture. It's a radical shift from the older approaches to management, which established functional silos, communicating with one another following bureaucratic processes and ticketing systems, each with its own

set of responsibilities. Further, these organizations lacked visibility of the overall product being built and the value it was meant to deliver to the business. DevOps seeks to change both structure and attitudes of product teams. Everyone understands and buys into what is being built, communication among functional groups is encouraged, failure is acceptable and used as a tool for learning, and innovation is celebrated.

"DevOps requires that organizational silos get broken down and that you move to more of a spiraled development methodology where you really, fully embrace agile methodologies," McCormick said. "But there can be an intimidation factor that comes along with that for agencies when they consider breaking down those silos across the entire organization."

In DevOps, separate teams are less distinct. Gradually, the attitude becomes one of everyone in the organization working together on delivering a valuable technological product. Departments and teams are no longer separated physically and technically, but rather the organizational structure fosters cross-communication and interdependence.

"Culture change is a big part of adopting DevOps," said McCormick. "Cultural aspects of DevOps are intimidating to agencies where current organizational boundaries are well-established and accepted. It can be overwhelming to consider adopting an approach that would change how the organization is structured, and how teams interact with end users and communicate with each other. The great thing about DevOps, though, is that by adopting some of the core principles on a single team, the culture actually changes and improves on its own. In other words, culture change doesn't need to be planned; it happens as a result of incremental DevOps adoption."

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DevOps is also strongly connected with open source, given the tendency both have toward rapid delivery, extensive automation, constant improvement and feedback. DevOps relies on a culture of collaboration that values openness and transparency. Implementing DevOps means applying open source principles and practices.

"Open source projects, which are now where most technology innovation is born, have been using Agile development method-ologies and DevOps for years. The lessons learned and cultural values adopted by those projects are a great model for agencies to follow when planning to adopt DevOps," McCormick said.

So where to start? DevOps can be achieved by having a long-term goal in mind, but starting small — demonstrating quick wins, validating those with metrics, celebrating your victories and learning from your defeats.

"What the industry has learned over the past few years, and what's great news for the government, is that you don't need to, and shouldn't, try to adopt DevOps across the entire agency all at once," McCormick said. "The right way to get started with DevOps is to start immediately, start small and do it yourself, with the guidance of a small team of experts. Pick one important but not overly complex project, create a cross-functional team and then start adopting the practices and supporting technologies just within that team."

Taking the approach of starting small allows agencies to enable a core team, learn along the way and experience a quick win. The members of that team, along with additional coaches, can then infiltrate other teams, incrementally improving those applications and creating more expertise and excitement. Over time, all application delivery at the agency will be done using DevOps, and the improvements will be measurable and staggering.

With this increased efficiency, money and time will be maximized. In terms of end users and the mission systems they use, with DevOps, agencies will be able to deliver cutting-edge platforms and services to constituents faster than ever before.

PERCEIVED CHALLENGES TO USING DEVOPS

If DevOps is so valuable, why aren't government officials across the board wholeheartedly embracing it? There are a few perceived challenges that people need to be aware of when dealing with DevOps — but with the right approaches and leadership buy-in, these challenges can be overcome.

FUNDING

First, funding is a major challenge with which all agencies must grapple. Adequate funding in the government is always a point of contention, and in many cases budgets are constant, or shrinking. There's a perception that necessary resources simply aren't available, and this must be considered when implementing DevOps. After all, technology is expensive and can be seen as a strain on an agency's already tight resources. Professionals often view innovative IT management approaches as resource-draining. But years of data and research now prove conclusively that adoption of DevOps helps organizations save money through improved efficiency. In terms of managing IT budgets, DevOps is ultimately the way to go, and delaying a move to DevOps creates technical debt, which costs more to address in the long run.

TRADITIONAL IT SYSTEMS

The government must also work within the confines of legacy IT systems that need upgrading, and an inability to make the optimal modernizations to them immediately. Again, this is because of constrained resources. These old systems take capital to upgrade. While this is almost unanimously a good idea in terms of long-term investment, it can be hard determining the upfront costs and persuading leaders to make such investments an IT budgeting priority – or to stop spending money on outdated IT. "Agencies have made major technology investments over the years, many of which aren't applicable in a DevOps world of rapid iteration and automation. They often feel that they must continue to use those tools until that investment has run its course," McCormick said.

CULTURE

Most of the challenges, however, simply return to the notion of DevOps as a major cultural change. Government tends to be risk-averse because the implications of its work are so wide-reaching. As a result, it can be hard convincing decision-makers to take chances with a new approach — especially one that embraces failure as a part of the process. Changing organizational culture is extremely difficult, and takes time, patience and complete commitment. Successful DevOps projects are proving that it must be done on a small scale initially, and incrementally expanded with leaders supporting those early teams and promoting their success. It requires managers who encourage their employees and communicate with them on how the change is going. Many in government IT are afraid of change, especially if they have been in the business for a long time. Transforming IT systems is the easy part. It takes a great deal more work to reform attitudes and philosophies.

DEVOPS TODAY: IT'S TIME, AND THERE ARE NO MORE EXCUSES

Digitization is sweeping government and the public, creating an intense demand for public sector services that are innovative, intuitive and that deliver information and capability more rapidly. In government today, this ability to increase speed and agility isn't just an afterthought — it's imperative for agencies to succeed in meeting their missions.

In the past, adopting approaches like DevOps in the public sector might have been thought of as too challenging. But the understanding of how straightforward it can be to adopt DevOps, and the methodology's benefits are now scientifically proven, and widespread. The time for government agencies to start their DevOps adoption has arrived, and there are low-risk approaches that make it more feasible than ever.

"It's taken some time, but we believe there is now a mandate to move toward DevOps," said McCormick. "That's coming from industry, open source communities, government contractors and government leadership."

This means that the time for DevOps in the public sector is now. According to a leading book in the DevOps field, "Accelerate: The Science Behind DevOps: Building and Scaling High Performing Technology Organizations":

> The moral of the story, borne out in the data, is this: improvements in software delivery are possible for every team and in every company, as long as leadership provides consistent support — including time, actions, and resources — demonstrating a true commitment to improvement, and as long as team members commit themselves to the work.

And additionally, the authors say that by using DevOps:

> It's possible to achieve these characteristics even with packaged software and "legacy" mainframe systems — and, conversely, employing the latest whizzy microservices architecture deployed on containers is no guarantee of higher performance if you ignore these characteristics.

"At this point it is 100 percent validated that DevOps is something achievable, regardless of industry, the type of applications being built or any legacy constraints. When done properly, it absolutely improves the delivery of software, which in turn improves organizational performance," McCormick said.

In fact, today's high-performing IT teams using DevOps practices deploy code up to 30 times faster, experience 60 percent fewer failures and recover from development issues 168 times faster than their peers.* Basically, every important measurable area of software delivery is improved. Successful teams deliver software more quickly and with fewer failures, but amazingly they recover from those failures significantly faster.

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So what does this mean for the public sector? And what does DevOps look like in practice at agencies? Over at the U.S. Patent and Trademark Office (USPTO), one team applied DevOps on its Fee-Processing Next Generation (FPNG) initiative — a makeover of the agency's fee-collection processing and refund system — to process approximately $3 billion annually in fees. USPTO officials are confident that DevOps will enable them to streamline the fee collection and refund process while reducing manual data entry.

"We think of ourselves as a business, and DevOps is a way to drive that business value," said Simmons Lough, Software Architect at the USPTO. It may sound nearly impossible for other agencies to streamline their development and operations given the realities of bureaucracy, but Lough was encouraging. "We didn't go from 0 to 100 MPH overnight," he said. "The reason we were able to get to the first stage is that most of the technology was ubiquitous. For other agencies, the plumbing and technologies are already there. It's just using those effectively."

To help with compliance requirements – a concern for many government agencies – Lough added, "If we can do DevOps, anyone can. Additionally, our type of automated pipeline allows us to be on the offense with compliance and projects rather than defense."

It's clear that government can't wait any longer before moving IT to a DevOps approach.

CASE STUDY
IMPLEMENTING DEVOPS AT US COURTS

To learn how DevOps is being implemented on the ground in the public sector, GovLoop sat down with Peter Chin, formerly the Application Development and Architecture Division Chief at the US Courts, Department of Program Services. This interview was conducted in 2015.

In the US Courts, Chin's responsibility is developing operational solutions and services to serve judges, clerks of courts, public defenders, and pretrial and probation officers.

"Where DevOps helps me," Chin said, "is in achieving my goal of supporting the US courts system efficiently through eliminating waste, identifying repeatable steps, and automating those steps."

Chin explained that the implementation of DevOps is not necessarily primarily an IT solution. He said rather it almost works backwards. If you can create a culture in a workplace that leads employees to want to try DevOps, that in and of itself is a success, because it means you have worked towards creating a culture where innovation and efficiency are prized.

"Previously as a government executive and also as a private industry consultant, I focused primarily on customer satisfaction and high morale," Chin said. "A couple of years ago the U.S. courts began adopting agile development best practices, and that was put in place primarily to try to get more valuable releases out the door. But along with that, what I wanted to do is really complete the cycle and receive and implement continuous feedback from our customer base. And part of that is implementing DevOps here. We realized that we needed to implement continuous integration and continuous delivery in our practices in order to achieve that. But the initial focus is on people and organization, and not just tools and techniques. We want to actually create a culture where people feel free to innovate."

An implementation of DevOps also naturally leads to more cross-department collaboration, Chin advised.

"What it really means is, we don't want to actually just make changes to production haphazardly," Chin explained. "We want to be able to make changes, but also manage the risk as we're rapidly changing the production environment. Part of building that culture is breaking down silos, and having people realize that there's some common things that people across departments all want to build and test as we're developing a lot a different things."

Chin stressed that even non-technical people can be made to understand the importance and benefits of DevOps, as its implementation can benefit all teams and customers.

"One of the first things I needed to do here when I came on board was to really understand who my audience was, because that was the basis for how and why we needed to implement DevOps," Chin explained. "For the technical folks here, I used different points to sell this concept. One point was that having continuous software delivery through automation meant we'd have less complex problems to fix because there'll be smaller and incremental changes, and also we'll have faster resolution of problems. And then of course I had to sell this to our executive level that was only interested in the business benefits. And I explained that use of DevOps meant faster delivery of features, a more stable operating environment, and more time available to add value, rather than having to fix and maintain things all the time."

Chin ended by explaining that a final reason his agency is implementing DevOps is to break down silos through a reorganization.

"With that reorganization, we're streamlining our application portfolio," Chin said. "After we do that, we want to find ways to get feedback from the customer earlier on. And the way to do that is to have a continuous feedback mechanism through a DevOps implementation."

HOW RED HAT HELPS

Rapid innovation, changing business landscapes and new IT demands force organizations to change quickly. DevOps helps increase business agility through collaboration, communication and integration across different teams in the IT organization. Red Hat supports agency adoption of DevOps through a targeted combination of enablement, consulting and coaching, and open source technology.

Red Hat Consulting offers Open Innovation Labs residencies and dojos. The Labs residency is a dynamic, eight-week program that includes tracks for development, operations (SRE) and security, and introduces and proves out modern software development patterns and technology. Labs utilizes highly innovative Domain Driven Design (DDD), Agile and DevOps techniques and methods to develop repeatable patterns that will enable participating customers to deliver an application, while learning how to adopt DevOps.

The Open Innovation Labs dojo builds on the success of residency, building a framework for ongoing adoption of cultural change that can permeate across all of a customer's programs. The dojo approach allows customers to incorporate lessons from the residency, make them repeatable and scale them out using a "train the trainers" approach for a sustainable crawl/walk/run expansion. Moreover, a metrics-driven outcome approach is used to create lasting, meaningful change. The metrics that Red Hat's Labs teams use were originally proposed by N. Forsgren, J. Humble and G. Kim in "Accelerate: The Science of Lean Software and DevOps."

Open Innovation Labs are executed on a push-button technology platform with OpenShift Container Platform as the foundation. OpenShift is Red Hat's award-winning container platform, built on

Kubernetes, that provides a comprehensive technical environment on which to execute DevOps. The Labs teams incorporate other technologies from Red Hat, other software providers and open source communities that support a comprehensive DevOps approach. With OpenShift as the foundation, customers can improve developer productivity, increase operational efficiency and maximize hardware utilization.

Overall, Red Hat can help your organization deal with some of the inevitable DevOps adjustment processes. "The combination of Open Innovation Labs, supported by technologies like OpenShift and Ansible, is how we help our customers learn how to develop applications, adopt DevOps and develop technology the Red Hat way," said McCormick.

Red Hat has proven that taking this approach can deliver massive organizational and technical benefits. Application delivery teams adopt the open organization principles of transparency, inclusivity, adaptability, collaboration and community. They build capabilities that truly satisfy mission needs, and have the ability to do so quickly, consistently, securely, and accurately – and they love their work. The applications and services they build become cloud-native, and are portable and resilient, able to adapt to changing mission needs and other variable factors.

"In short," said McCormick, "Red Hat helps customers build a modern software factory, able to deliver capabilities faster, more consistently and more securely."

Ready to learn more? Head to Red Hat's DevOps resource page to get up to speed on why your agency needs to be benefiting from DevOps.

CONCLUSION

When agencies start using DevOps, both developers and operations employees gain a better understanding of the product they're working on. Developers get to know the real-world conditions in which their code will operate. Operations teams learn what makes their services tick and why they were built that way. Together, both teams can make better decisions about how to build and deploy services, resulting in a better product overall. And because there are minimal barriers between the development and operations environments, employees can make changes with minimal stress to ensure that applications keep pace with evolving needs and scenarios.

Ultimately, DevOps helps government agencies better serve citizens in the digital age. As users increasingly expect government resources to be provided with the same mobility, agility and utility as private sector services, agencies seek ways to quickly meet those demands. When they turn to DevOps, they're able to deliver those services and meet citizen expectations.

ABOUT RED HAT

Red Hat® is the world's leading provider of open source solutions, using a community-powered approach to provide reliable and high-performing cloud, virtualization, storage, Linux®, and middleware technologies. Today, Red Hat is at the forefront of open source software development for enterprise IT, with a broad portfolio of products and services for commercial markets. That vision for developing better software is a reality, as CIOs and IT departments around the world rely on Red Hat to deliver solutions that meet their business needs. Solutions that provide technology leadership, performance, security, and unmatched value to more than 90% of Fortune 500 companies.

ABOUT GOVLOOP

GovLoop's mission is to "connect government to improve government." We aim to inspire public sector professionals by serving as the knowledge network for government. GovLoop connects more than 300,000 members, fostering cross-government collaboration, solving common problems and advancing government careers. GovLoop is headquartered in Washington, D.C. with a team of dedicated professionals who share a commitment to connect and improve government.

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