

A CLOUD USER GUIDE FOR THE EVERYDAY PROBLEM- SOLVER



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EXECUTIVE SUMMARY

The foray into cloud computing began as an IT-centric initiative for many agencies. They labored through the nuances of how to buy it, secure it and pay for technology as a service.

In recent years and months, we've seen ownership of cloud-based initiatives migrate from solely IT (a support function) to the departments and offices responsible for carrying out the mission (business functions).

But empowering employees to identify where and how cloud can support their modernization goals and solve tough problems requires a baseline level of tech acumen that speaks to their needs. The purpose of this guide is to provide a common language for IT professionals and nontechnical employees to have thoughtful conversations about cloud computing.

HOW TO USE THIS GUIDE

Throughout this guide, you'll find local, state and federal case studies that illustrate the problem-solving properties of cloud as a tool for government employees. There's a mix of resources for IT and non-IT employees, both of whom play a critical role in successfully solving business problems with technology.

- **As an IT professional**, use this guide to have meaningful conversations about cloud (speak the language of the business) and make cloud computing accessible to the average nontechnical user.
- **As a non-IT professional**, use this guide to develop your baseline knowledge of what cloud can do. Think of it as a resource to help boost your business acumen, or your ability to manage human, financial and information resources strategically. Consider how you might approach problem solving with an added resource in your toolkit: cloud-based technologies.

Cloud computing has become a necessity for government agencies as they seek to connect their workforces with one another and the public. We expect that trend to continue this year, so we included fresh insights from the General Services Administration (GSA) on best practices for cloud adoption. Even if you're not the one buying IT services, knowing the lingo and familiarizing yourself with capabilities is in your best interest.



A SNAPSHOT OF CLOUD COMPUTING IN GOVERNMENT

*“The case for using cloud capabilities in government has been clearly proven — **to drive savings, to improve security, and to deliver mission-serving solutions faster.**”*
— cloud.cio.gov

It’s also a game-changer for employees who are adept at solving business problems with cloud-based tools. Virginia’s former Chief Data Officer Carlos Rivero echoes sentiments we heard while researching for this guide: Agencies must train their employees about how to leverage cloud-based abilities to avoid setbacks. That’s true across job classifications and levels.

“It is the people part that is really sticky and that we need to pay a lot of attention to,” Rivero said. “It is their adoption that is going to make or break whatever innovative solutions we have.”

Here’s a quick look at some of the ways agencies are using a network of on-demand IT resources to expand telehealth, process massive amounts of mission-critical data used for weather prediction models and speed aid to victims of human trafficking.

VA Expands Telehealth to Underserved Communities

In the past two years, the Veterans Affairs Department (VA) has taken advantage of cloud to expand its offering of telehealth services to more veterans than ever before.

Telehealth, which enables veterans and their caregivers to consult with medical professionals online, has been a popular service for many years, both as a way to serve veterans who have trouble getting to VA clinics and to connect veterans with experts who are not in their region.

But demand for telehealth surged during the pandemic. The service was a way to provide a wide range of care without exposing patients and providers to the risk of COVID-19. VA saw a 1,066% increase in telehealth visits during the first three months of the pandemic, from about 41,000 video visits in January 2020 to more than 479,000 in May 2020.

In response, VA increased the capacity of its onsite servers but also expanded its VA Video Connect to the department’s Care2 cloud platform. VA also provided more than 50,000 of its clinicians with telehealth kits — each including a laptop, docking station, keyboard, mouse, headset and two monitors — to connect with remote patients.

This work is paving the way to expand the use of telehealth beyond the pandemic.

In September 2021, for example, former Virginia Gov. Ralph Northam announced a partnership between the Virginia Department of Health and the Salem Veterans Affairs Health Care System to pilot a telehealth service in Martinsville, which is located in the foothills of the Blue Ridge Mountains in southern Virginia.

In the pilot, a registered nurse, hired by the Veterans Health Administration, would conduct health assessments before and during the exam for the physician connected remotely to the veteran patient. The Martinsville clinic is equipped with a telehealth kit deployed by the Salem VA Health Care System.

"As a veteran and a physician, I know the VA provides needed care to veterans," said Northam in a press release. "But sometimes it can be challenging for veterans in some parts of the Commonwealth to access that care. That's why we're excited to announce this telehealth opportunity for veterans in Southside — making it easier for Southside veterans to receive critical health care closer to home."

NOAA Speeds Data to Meteorologists, Civic Leaders

The value of managing data in the cloud — one of the much-ballyhooed cloud use cases — has come into clear focus at the National Oceanic and Atmospheric Administration (NOAA).

In March 2021, NOAA's Joint Polar Satellite System (JPSS) shifted part of its operational data processing ground system from a facility in Suitland, Maryland, to the Amazon Web Services GovCloud.

JPSS satellites, part of NOAA's National Environmental Satellite, Data and Information Service (NESDIS), receive about 400 gigabytes of data a day from various satellite instruments, according to

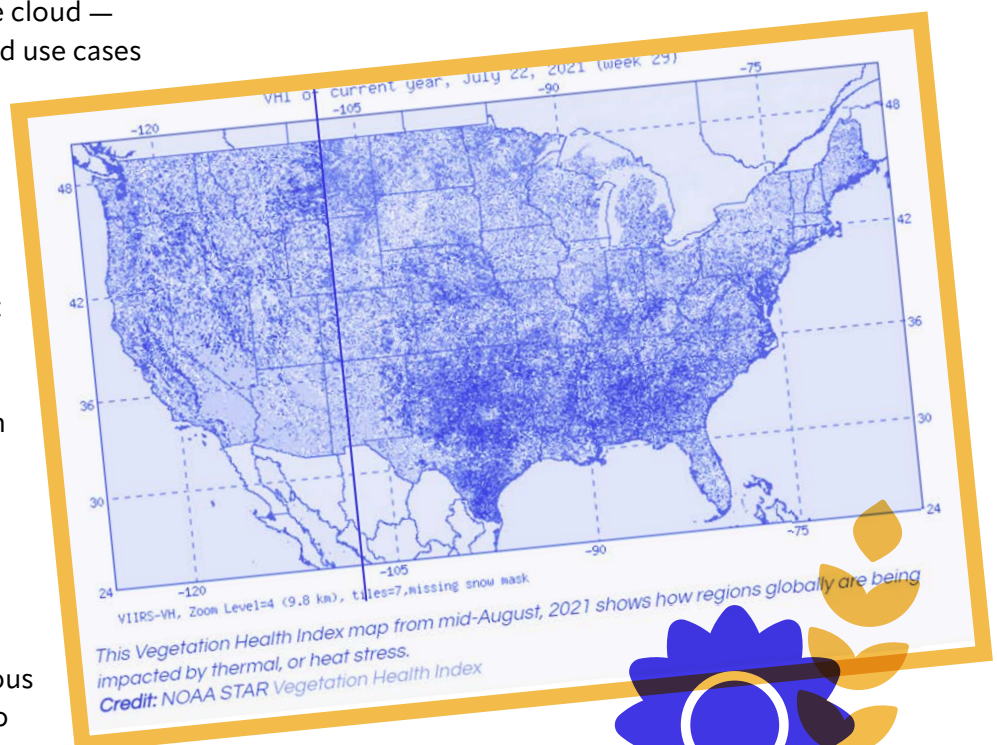
the agency. That data needs to be processed and turned into data products scientists can use or incorporated into weather prediction models.

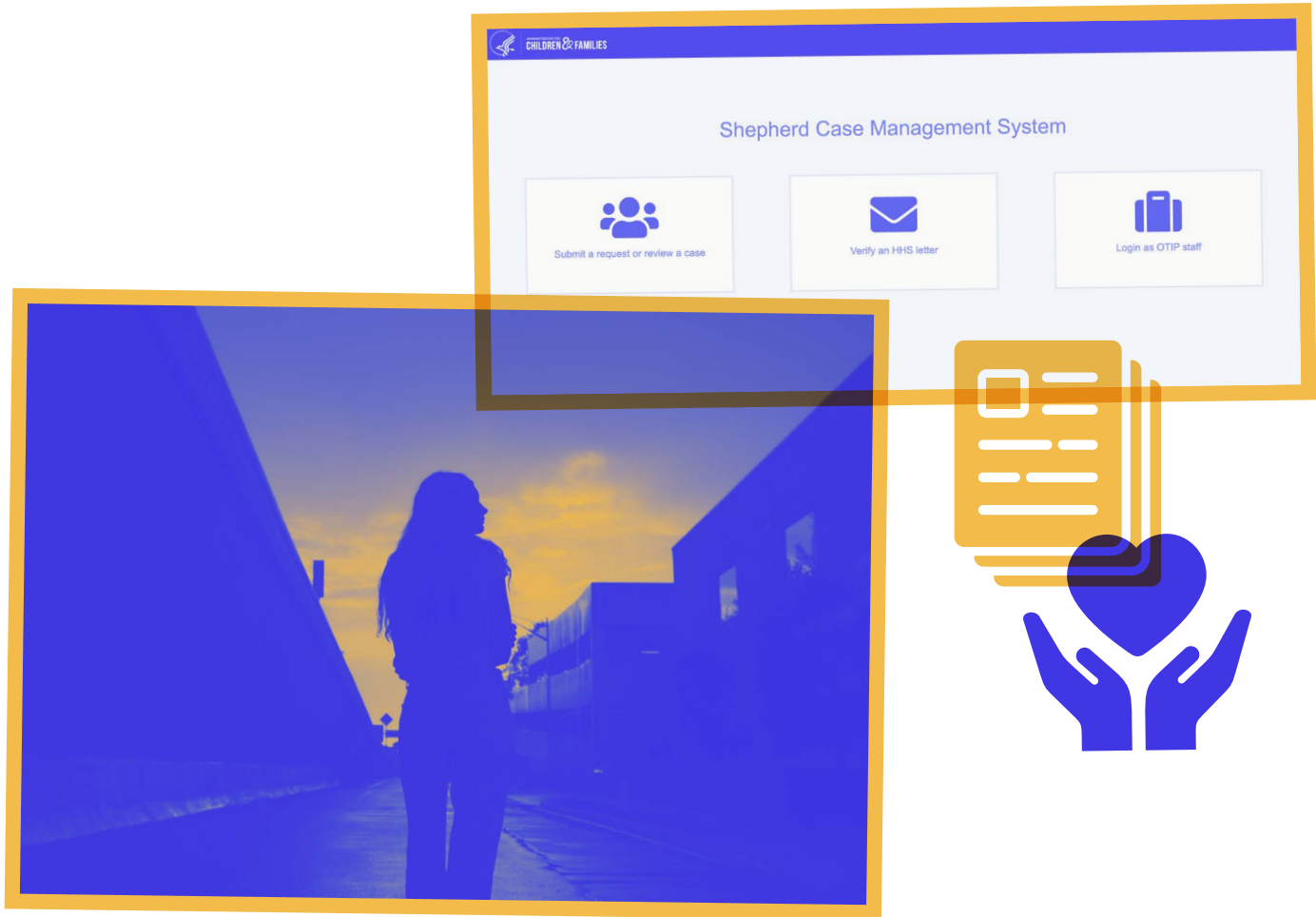
Moving data processing to the cloud gives the agency more agility when it comes to developing and deploying new data products, said Irene Parker, Chief Information Officer at NESDIS.

"We want to invest in mission capabilities rather than hardware," she said. "And if we discover something new and find a better way to create one of our data products, deployment is easier in the cloud. You don't have to physically install new hardware on the system and make sure it's running correctly, you just start a parallel set of cloud services, deploy the updated software and start testing."

One of the programs JPSS supports is the Vegetation Health Index (VHI). This data product, delivered as a color-coded map, helps state and local leaders get a clear picture of crop health in their regions, with a focus on identifying and scoping out drought conditions that could impact the economy and lead to food shortages.

Meanwhile, meteorologists at the Agriculture Department are using VHI to monitor crop production in 35 countries, with a focus on major crops such as corn, wheat, sunflowers and soybeans.





HHS Office Speeds Aid to Victims of Human Trafficking

The connection between cloud computing and customer experience has never been clearer or more compelling than it is with the Shepherd Case Management System.

Deployed by the Office of Trafficking in Persons (OTIP), the system provides a cloud-based solution for managing requests for assistance from victims of trafficking.

The system was designed to streamline the process for applicants, making it easier to submit applications and track progress. The system also improves the process for OTIP employees, empowering them to manage and reducing case processing times.

Previously, the process relied on encrypted emails, password-protected documents and manual processes.

Besides improving the case management process, the Shepherd Case Management System also strengthens data privacy, security and confidentiality protection, according to OTIP.

Here are some of the key outcomes of the system (based on fiscal 2019 data):

- Reduced the time it takes to submit an application by 75%
- Reduced the time it takes to process a case by 10 hours per case
- Decreased OTIP's pending caseload by 75% from the previous year
- Increased the number of certification/eligibility letters by 37%

In 2020, the Shepherd Case Management System received an Emerging Technology Award from the Government Information Technology Executive Council.



HOW REVERE PUTS CLOUD FIRST INTO PRACTICE

What's happening in Revere, Massachusetts, is playing out in cities and departments nationwide. Local governments can't afford to continue carrying the steep burden of antiquated accounting and email systems and closets of rogue servers.

"The reality for a city is that very few voters care what your IT infrastructure looks like," said Revere IT Director Jorge Pazos. "It's not a pothole they're going to hit every day."

COVID-19, however, put the shortcomings of dated government technology on display, forcing governments to revisit delayed upgrades with a fresh perspective.

But what happens when the need for innovation outweighs both the capacity of the IT department and the city's ability to invest in more hardware and people to manage it?

"It's hard to find the funds at some point, to make all the upgrades that are necessary," said Reuben Kantor, the city's Chief Information Officer.

"I wanted to remove all of those headaches from our ability to innovate, our ability to bring technology into every department in the city," Kantor said, echoing Mayor Brian Arrigo's mandate when he took the chief innovation role in August 2016.

In a joint interview, Kantor and Pazos shared why cloud was and is an attractive option and the benefits they considered when choosing a cloud-first approach.

CLOUD FIRST IS A WAY OF OPERATING THAT ENTAILS EVALUATING SAFE, SECURE, CLOUD COMPUTING OPTIONS BEFORE MAKING NEW INVESTMENTS.



Start With the Problem

Before settling on a technology solution, “the initial question always has to be, ‘What problem are you trying to solve?’” Kantor said. “Don’t start with the solution, start with the problem.” Here’s what that looks like in practice:

- **Commit to uncovering the actual problem** and any additional context by asking questions: What are you trying to do? Why do you want to do that? What issue are you trying to address?

What if you already know the problem you want to solve? “I think you’ll find that most of the time you can find that solution in the cloud,” Kantor said. “But if the solution you find is actually on prem, don’t abandon it just because it’s on prem.”

- **Review the pros and cons of each technology option** you’re considering.
- **Find the right solution for your staff**, one that employees can manage and that residents can intuitively use. What’s most conducive to addressing the problem you want to solve?



Listen to Your People

IT departments must work collaboratively with end users, the people on the ground, to ensure they feel comfortable using the technology provided, Pazos said. Adoption shouldn’t be a top-down approach.

- **Partnering with employees**, rather than forcing them to use new technology, can speed the adoption process while simultaneously uncovering new and more efficient ways of working.
- **Skip the jargon**. Most employees don’t care whether technology is being hosted by a cloud service provider or in government facilities. Speak in terms of capabilities and how workflows are supported.



Communicate

“IT people aren’t known for being warm and bubbly,” Pazos said. But being approachable and fostering an open-door policy benefits everyone. “What ends up happening is people won’t be afraid to come to you, and that’s what you need,” he said.

- **Avert headaches by being approachable**. The ideal scenario is employees telling IT they’d like to use a certain tool or try a new capability vs. going it alone.
- **Catch potential problems earlier**. IT can provide perspectives on a tool’s shortcoming or why there might be a better fit for solving a problem, but those insights come only through strong and open communication.

“I don’t think the answer is a technical thing,” Pazos said. “I want to be involved in those conversations, and particularly early, because when you’re not, what you end up often-times getting is a half-baked solution that requires more work than it would have if they had included you earlier.”

Counting the Benefits of Cloud

1 SPEED

Buying and setting up a new application and supporting hardware could take several months, and that was before the pandemic, Pazos said. Having a cloud-first approach shortens that product lead time because employees and residents can begin using new applications and services sooner.

2 ACCESSIBILITY

In 2019, the city began making serious capital investments in its IT infrastructure. "And then in the middle of it all ... COVID hit," Kantor said.

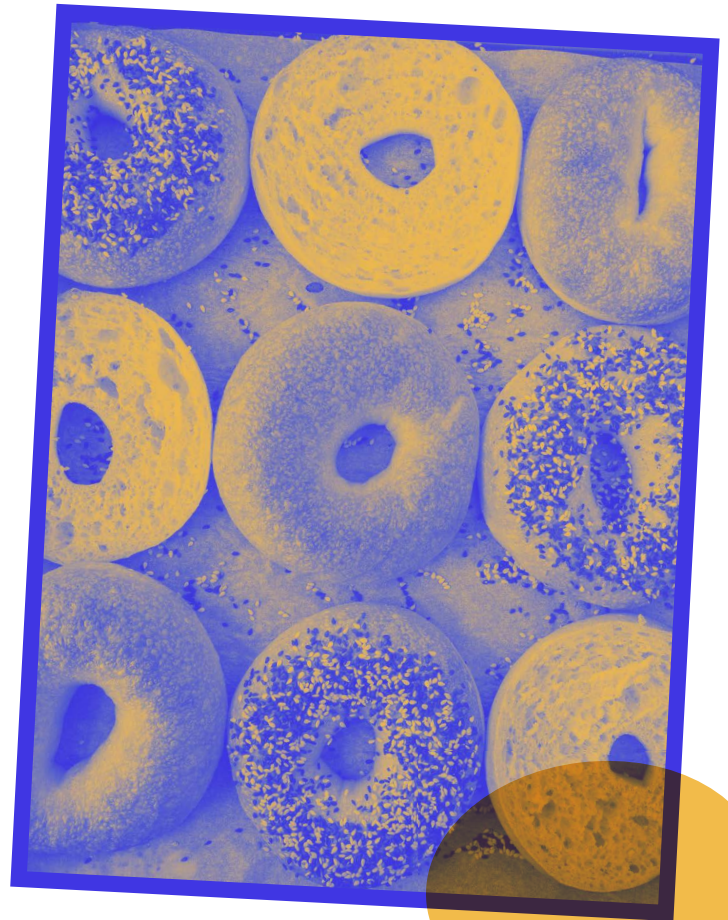
"The more things that we had as-a-Service that you could access, it required fewer people to have to log in, or use a virtual private network (VPN) to get into the city systems," he said. "You could actually just access a lot of the work remotely pretty easily."

For example, installing a cloud solution empowered Building Department inspectors in the field to access ticketing and inspection information remotely — streamlining their work. No solution is perfect, but partnering with the vendor, Revere can update the software as needed and spur continuous improvements. Guiding employees through change is even harder, though.

3 COST

"We have very little infrastructure here onsite," Pazos said. "We have two servers onsite for survivability; everything else is cloud-hosted with our managed service provider."

These investments have significantly boosted the city's ability to regain standard IT service levels in the event of a disaster and quickly recover from any downtime. "I cannot even begin to tell you what that would have cost if we were to do that independently," he said. It would be a nonstarter and cost prohibitive.



Food for Thought

Pazos soft launched a casual meetup for employees in the IT office but put the gatherings on hold because of COVID-19. They started with bagels and donuts and morphed into a potluck gathering with themed days, Hawaiian shirts and crockpots of mac and cheese. Even the mayor was a regular.

"The accessibility of the IT office to staff is no longer a mystery," Kantor said, joking that the only things missing are hot pots and a kitchen. "Everyone's walking through."

These informal gatherings have also helped connect employees across departments, including the chief of infrastructure and the transportation planner. "They literally had a 30-minute conversation in my office, and they called somebody in and solved a problem because they came in for bagels," Pazos said. "So, I think it works."

WASHINGTON STATE IS DEVELOPING A CLOUD-NATIVE WORKFORCE



The average age of Washington Technology Solutions (WaTech) IT employees is mid-50s. It's a number that state CIO and WaTech Director Bill Kehoe thinks about often.

"We have a large portion of our workforce that's going to be eligible to retire," Kehoe said. "And the majority of that workforce has not worked in the cloud. They've been developing and supporting more homegrown, on-premises-type applications."

According to Economic Modeling Specialist International, a labor market data company, Washington had 165,486 unique cloud job postings in 2020, with 88,642 of those jobs going unfilled.

"We have to increase our pool of employees coming into the state, to replace those that are eligible to retire, or we're going to be in big trouble," Kehoe said. His comments came on the heels of a new statewide education initiative with Amazon to certify 2,500 K-12 students in cloud computing skills within the next three years.

"We want to bring in the new generation of Washington state employees," he said. "And if we can bring them in and they've been through a program like what Amazon is offering, all the better, because they're going to come in with some skills that they can apply immediately."

Training Potential and Current Employees

The goal is to provide high school students with technical training and education mapped to in-demand skills that pave the way for careers in tech. Exposing students to cutting-edge cloud training deemed necessary and relevant by industry standards was an attractive offer for the state. (You can read more about that partnership [here](#).)

"We expect that in all courses, there's an element of academic alignment, that there's an element of the industry skillset building and then there's leadership and employability skillset building," said Becky Wallace, the state's Assistant Superintendent of Secondary Education and Postsecondary Pathway Preparation. A select number of educators will have access to technical training and certification exams. In turn, they teach cloud computing courses to students.

As a potential employer, Kehoe sees these graduates as essential to the state's cloud-first agenda. "We're transitioning a lot of our applications to the cloud, a lot of our services to the cloud, and we don't necessarily have the workforce right now to do that and accelerate that. We're going to be retraining our staff as well, and so we're hoping to partner with Amazon in that. But we want to prepare for the next generation to come in and help us continue this legacy of moving to the cloud."

Making Cloud a Cross-Functional Skillset

Washington is hungry for talent in key areas:

- **Application developers adept at DevOps** to help with coding needs as the state transitions legacy applications to the cloud
- **Architects** to ensure that new solutions are crafted with the cloud in mind as opposed to traditional onsite solutions
- **Data scientists** to quickly ingest data into cloud platforms and perform analytics, create dashboards and produce actionable reports

Kehoe is also looking for business analysts and project managers with some cloud expertise.

"I think it hits every single skillset that we have, even communications," he said of cloud computing. "So, we all need to be more cloud literate."

So what's driving the need for greater cloud literacy in government?

Going forward, there will be less separation between IT and the business, Kehoe said. "I think you're going to see a tighter coupling, a tighter integration. And the skillsets for our business folks, they're going to have to be much more cloud-savvy in their approach to solving business problems," he said.

Kehoe sees a future where business units won't just turn over the technology reins to IT. Instead, there will be a strategic partnership, and having knowledge about cloud capabilities will be important for all job classifications.

Developing a Cloud-First Mindset

We asked Kehoe what a cloud-first mindset looks like in practice. He described it as a transformational value and principle. Here's how that mindset is playing out in the state:

- Look to the cloud first whenever you have an opportunity to transform a service, whether that be a public service or a back-office function.
- Rethink how to solve business problems with greater speed and agility.
- Transform legacy systems and infuse innovation into old ways of operating.

"The more that we're aware, and the more we learn about the capabilities and the art of the possible, if you will, the more this cloud-first mentality is going to take hold," he said.

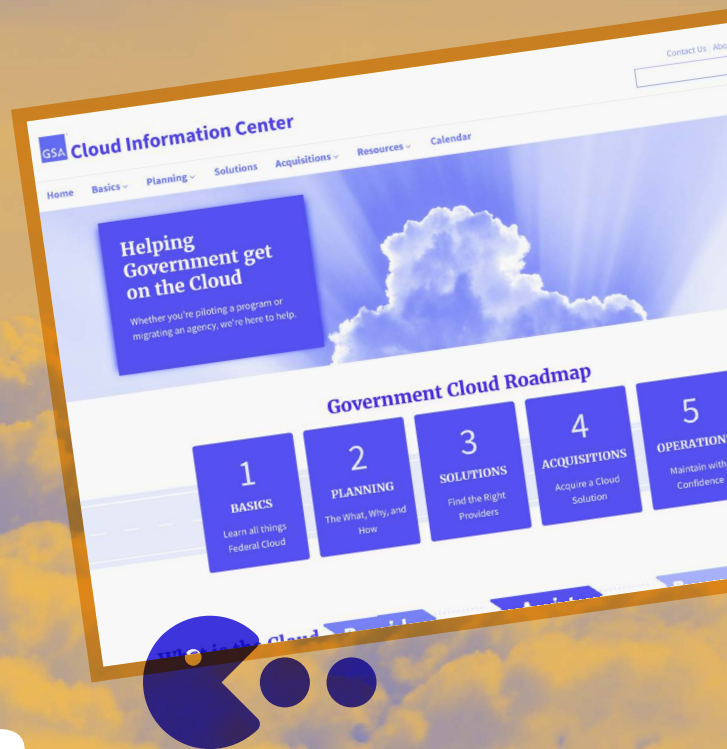
Partnering on Your Cloud Literacy Journey

"As part of economic recovery, you can't wait, right?" Wallace said. "You have to push forward, you have to innovate, you have to look ahead. And so in knowing that, and knowing that we want Washington to continue to be a great place to learn and earn and live, it means we need to create more opportunities." Her advice, particularly to educators:

- Search for opportunities, lean in and have conversations.
- Ensure that your education system is being as responsive to business needs as possible without losing sight of what your students need.
- Understand what skillsets are lacking in your community, and partner with employers on continuous improvements.



GSA'S BEST PRACTICES FOR CLOUD-HUNGRY AGENCIES



One of the leading proponents of cloud in the federal government is the Cloud Adoption Center of Excellence (COE).

The COE's mission is to help smooth the path to the cloud for federal agencies. The center offers services to support the full life cycle of cloud adoption, from developing cloud solution architecture and cybersecurity to planning migrations and developing business applications and digital capabilities. Those services are based on best practices and use cases, in both the public and private sectors.

The center also shares a wide range of resources that agencies can use to guide their efforts, including checklists and the [Cloud Adoption Playbook](#), all of which can be found at the [GSA Cloud Information Center](#).

In some cases, agencies are looking for a partner to help launch a new initiative. In other cases, they are just looking for resources that can help them accelerate their work.

"The No. 1 page visited at that website is the page that contains the cloud requirements templates that agencies can go in and ... clip and cut, paste — whatever they want from those templates into their own cloud solicitation," said Skip Jentsch, Cloud Products Manager at GSA.

The following pages include some best practices that GSA commonly shares with agencies.

9 Steps to Developing Cloud-Based Services

The Cloud Adoption Playbook guides readers through nine basic steps that agencies can follow in delivering digital services through the cloud:

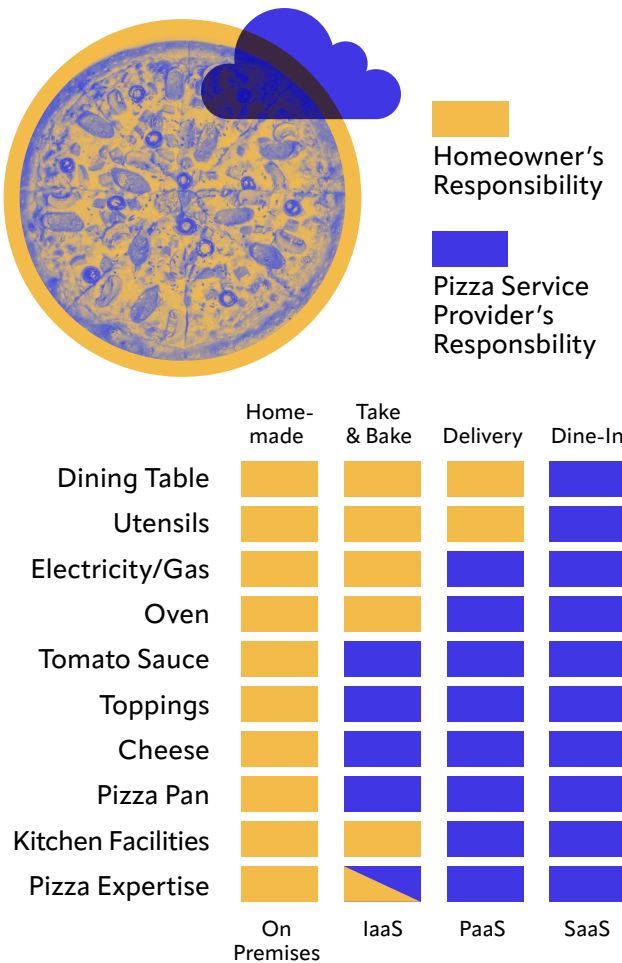
- 1. Create business alignment:** Successful cloud adoption requires aligning business value with a technology transformation strategy and agile implementation plan.
- 2. Align and engage stakeholders:** Before they can work together more effectively, agency stakeholders must agree on the high-level goals, aligned with business objectives and the overall agency mission.
- 3. Identify an empowered leader:** In a small agency, this might be an individual; in a larger agency, this will need to be a cloud team with a leader who has significant support from senior leaders.
- 4. Inventory systems and rationalize application:** Reviewing current systems, their cost footprint, end of life, security and customer satisfaction scores can help create an iterative modernization plan based on organizational priorities.
- 5. Develop a cloud adoption plan:** The plan should weigh opportunities and risks — and define specific outcomes expected of cloud adoption.
- 6. Develop new cloud capabilities:** To successfully procure cloud services, you must have clear requirements, and create service-level agreements that reflect these requirements.
- 7. Use strategic communications:** Agencies require a targeted communications strategy to help staff understand how and why more IT systems will move into the cloud.
- 8. Pilot solutions:** Using an Agile approach reduces risk and increases quality. You deliver working code with real value in every sprint.
- 9. Iterate:** As your implementation becomes more sophisticated, you can focus on utilization, efficiency, improving performance and refactoring.

3 Cloud Service Models

When adopting a cloud model, you need to choose which of three basic approaches to take:

- **Software as a Service (SaaS):** A software application delivered via the internet, accessible with just a computer or smartphone browser
- **Platform as a Service (PaaS):** A pre-built application environment hosted on a rented cloud-based server that might be configured with an operating system, languages, libraries, etc.
- **Infrastructure as a Service (IaaS):** A rented “bare metal” cloud computing capability including perhaps central processing units, memory and storage

To help people understand the differences, cloud experts often use the “Pizza as a Service” analogy. Anytime you want a pizza, you need to decide exactly how much of the meal prep you want to take responsibility for.



Contracting for Cloud Services

For many agencies, the most challenging aspect of cloud is procurement. Contracting for cloud services simply requires a different way of thinking.

Here are some of the best procurement practices that GSA recommends:

- Draft a broadly defined statement of objectives, not a performance work statement or statement of work that might restrict how your objectives might be achieved.
- Draft the requirements as capabilities-based, not performance-based.
- Understand where your data might be stored. If a cloud service provider (CSP) stores data in a foreign jurisdiction, its servers may be subject to the laws of that jurisdiction and therefore risks seizure of government data by a foreign government.
- Ask for direct access to CSP usage and billing/utilization reports, rather than receiving a single line item of cloud charges.
- Consider awarding to a reseller that works with more than one CSP. That provides a choice of providers without the need for a multiple-award blanket purchase agreement.

The Innovation Sandbox

The COE recommends that agencies support the development of innovative ideas by using an innovation sandbox — a scalable cloud environment used specifically to build prototypes of new solutions before adopting them. That's the approach that the COE takes with agencies, said Calvert Smith, Director of Cloud Adoption at the Cloud Adoption COE.

"A lot of times when our partners want to move to the cloud, they may not already have cloud space, or they may have innovations or technologies within a cloud, but they're not quite sure how they work," he said. "Our innovation sandbox gives us the tools to come right in, jump into a cloud environment, or cloud-native services, help prototype new services, new applications within the cloud, with our partners, so that they can actually see something tangible, take a look at that new cloud service that they were thinking about."

The sandbox gives teams a chance to get up to speed on a particular technology or solution, which often accelerates the implementation phase.

A sandbox is also a great learning platform, Smith said.

"A lot of times when we come in and there's new technology that we all want to learn together, we'll use that environment to help speed along that learning process," he said. "We'll jump in, we'll do workshops and we'll bring in industry partners and they help show us new technologies."

The COE's Cloud Adoption Playbook recommends that agencies consider the following questions when developing prototypes:

- What were the key takeaways from prototyping?
- How can business practices and technological implementation improve with every iteration?
- What steps can you take to ensure a development team can deploy to a production environment as quickly as possible?
- Can your agency automate security and compliance?



TECH ACUMEN CORNER

Innovation is happening in the cloud. That is, the most innovative companies and tech experts are focused on developing solutions for the cloud, not for legacy platforms. When agencies adopt cloud as a platform, they are able to tap into a larger ecosystem of solutions that can help them tackle their toughest problems and deliver new services or old services in new ways.

In this section, we share insights from six industry subject-matter experts at AWS partner companies. The topics include:

- Securing data through privacy-enabling technology
- Modernizing legacy systems
- Improving emergency response through real-time location data
- Factoring risk management into planning
- Leveraging predictive intelligence



MODERN PRIVACY MEANS PROTECTING DATA-IN-USE



Ellison Anne Williams, Ph.D., Enveil

The language of IT often includes four-syllable words that seem divorced from everyday understanding. One exception is the friendly acronym PETs, or privacy-enhancing technologies — tools that help agencies enable, enhance and preserve the privacy of data throughout its life cycle. When agencies use sensitive data in digital environments, PETs can help protect this information in addition to the interests and intent of the person using the data.

PETs have been around for 30 to 40 years, said Ellison Anne Williams, founder and CEO of Enveil, a firm that provides modern-day PETs. Interest in PETs has grown in the past few years and now several industries are using them for a few reasons.

Advancing Breakthroughs

In past decades, PETs were too slow to be useful. They could encrypt sensitive data searches, but the process was “completely impractical for any kind of real-world use case,” said Williams. In the past six years, there have been dramatic breakthroughs in PETs capabilities, and they are now faster and more logical data protection options.

Subsequently, a market has formed around them, thanks primarily to three movements:

- A growing worldwide demand for data privacy
- An increased need to share data electronically
- A more widespread perception that data is an asset

Tech Snapshot: Keeping Encryption Secure

A key to modern PETs is homomorphic encryption. Basically, homomorphic encryption secures data-in-use by allowing computations to occur in the encrypted or ciphertext domain.

In contrast, traditional practice requires taking that data out of the vault every time it needs to be used or processed — for example, to perform a search or apply analytics. This exposure leaves the data and the operation vulnerable. Homomorphic encryption allows these actions to happen within the vault, according to Enveil, ensuring the interaction and the corresponding results remain protected.

“What does it mean to secure the usage of data? Well, if you think about it, the way that business or governmental organizations will most meaningfully process data to extract its insights or intelligence is by running some kind of search or analytic,” Williams said. “So, when we talk about securing the usage of data, we mean being concerned about the security and privacy posture of that analytic, as it’s being performed.”

HOW ENVEIL HELPS

Enveil provides PETs-powered solutions that allow for the secure usage, collaboration and monetization of data while organizations work with or process it — an approach that is the “holy grail” of data encryption, Williams said. Enveil’s solutions allow organizations to securely derive insights from, cross-match, search and analyze data without revealing the contents of the search itself or compromising the security or ownership of the underlying information.

Learn more: www.enveil.com/faq

LEGACY SYSTEMS SHOULD NOT BE AN INNOVATION ROADBLOCK



Tom Zlockie, Stromasys

When companies and governments first venture into the cloud, it can feel like they are entering a wilderness with numerous tests and trials.

"In the cloud, we don't have clear, sunny days made for the beach," said Tom Zlockie, Director of Aerospace, Defense and Government Sector at Stromasys. "We have the wilds of legacy applications that are still built on fragile hardware and third-party software."

Three Paths

These legacy systems are often the main impediment to innovation. But it's almost impossible to update and modernize each one. So, what are agencies' options? Zlockie offered three:

1. Agencies can keep the status quo. But this is hardly an option when the goal is putting innovation into action. As Zlockie said, "if you want to innovate, you better do something. The status quo will not cut the mustard."

2. Agencies can rewrite and refactor their applications. But this is an expensive proposition — not only in terms of cost, but time. Many agencies have hundreds of interconnected applications. To reengineer one may require reengineering others, stretching a modernization project into months or even years.

3. Agencies can rehost their legacy apps in the cloud via cross-platform virtualization. This offers the least disruption for a low overall ownership cost and a high return on investment. Emulation technology "lifts and shifts" agencies' data without the need for writing new software or requiring fresh user training. Subsequently, agencies don't have to rip and replace when modernizing their legacy systems. Through emulation, mission-critical apps can be mission-ready within days.

It's almost impossible to update every legacy system in government. But that doesn't mean modernization is impossible. Emulation is one way to bring legacy systems into a new era.

Emulation can give agencies "the ability to introduce new innovation without having to go back in time" and start over on their legacy systems, Zlockie said.

Tech Snapshot: How it Works

Here is a brief overview of how the emulator works:

- Charon software emulates legacy hardware such as SPARC, VAX, Alpha, PDP or PA-RISC systems. Each emulator creates a virtual legacy environment on a standard Windows- or Linux-based host system, with or without VMware ESXi hypervisor configurations.
- Charon creates accurate hardware models of emulated systems in software for the Intel X86-64 platform, including all types of peripherals used on each different architecture.
- Subsequently, a hardware abstraction layer replaces the legacy systems, enabling the original, complete operating system and user application to continue to run unmodified.

HOW STROMASYS HELPS

Stromasys is a leading provider of enterprise-class, cross-platform virtualization solutions for legacy systems. The Stromasys-AWS emulation solution Charon helps agencies migrate legacy applications to a modern platform. Using a lift and shift process, it negates the need for application recertification or retraining of end users. Stromasys can help agencies extend the life cycle of mission-critical applications through virtualization.

Learn more: go2.stromasys.com/govloop-AWS



stromasys
legacy server emulation

HOW REAL-TIME LOCATION DATA CAN SAVE LIVES



John South, Patrocinium Systems

Three seconds is all it took to locate roughly 75,000 devices on 100-plus floors in a 9/11 re-enactment at the new World Trade Center in New York City. In this scenario, emergency responders wasted no time gathering insights to save lives. Those in danger, meanwhile, received instructions within seconds about getting to safety.

This is the power of hyper-contextual technology, which stitches together real-time location data and communication capabilities to respond to unpredictable emergencies such as terrorist attacks as they unfold.

A Clearer Picture

"Historically in government or public safety, we've used multiple tools, and we try to use them at the same time. What ends up happening is we can only focus on one at a time to get real results," said John South, CEO of Patrocinium Systems and a former law enforcement officer.

Hyper-contextual solutions allow agencies to use multiple capabilities at once. These tools carry out real-time communications while integrating with other data feeds like location. Agencies can even use 3D modeling with some solutions to get a clearer picture of an event, South added.

"What that does from a first responder standpoint is you can hyper-focus on your response to reduce loss of life at the end of the day," South said.

Safety First

The system is used only for emergencies — that is reflected in how the intellectual property is built and how Patrocinium works with Google and iOS.

"So I can't see anybody's information — we use the location data that already exists on a device related to an application, and that information is accelerated based on our IP to provide location awareness for the responder," he said. "But at the same time, the

end user can see it. So there's this mutual understanding that if something's wrong and it's near me, I want to be aware of it. ... When things go wrong, everybody wants to be safe first."

Tech Snapshot: Visualization in Action

Hyper-contextual technology can serve both first responders and people in danger. For example:

- **For first responders**, Patrocinium provides ArcLive, a visualization dashboard with geo-temporal 4D visualization, situation modeling and playback capabilities. It can draw on numerous data feeds, including cameras, access control points, social media and weather information.
- **For individuals**, Patrocinium provides the ArcAngel app, which will alert users when they are in danger, display their location in relation to the incident and provide real-time updates as they move to safety.

HOW PATROCINIUM SYSTEMS HELPS

Patrocinium stitches together disparate systems and location assets in real time to reduce risk, decrease response times and lower liability in emergency scenarios. It started with the simple but innovative idea of empowering people near danger with information from a common technology: smartphones. Patrocinium's platform can provide the public and responders with a flexible, cloud-based tool that reduces recovery time, cost and loss of life.

Learn more: <https://www.patrocinium.com/>



HOW RISK MANAGEMENT CAN DRIVE SMARTER SECURITY



Baan Alsinawi, TalaTek LLC

Agencies are entrusted with the public's private information, so the pressure to protect details such as tax records and personally identifiable information is immense. Yet government security is growing harder. Agencies must frequently learn about new tools and regulations while their workforces are geographically dispersed.

Risk management can give agencies the insights they need for innovative security. This process helps agencies effectively manage their resources by identifying and prioritizing risk. "Think of risk management as a bigger, ongoing solution rather than a one-time fix for the problem," said Baan Alsinawi, Founder and Managing Director of TalaTek, an integrated risk management firm.

Get Focused

Not all assets are equal, and the same holds true for risks. For agencies at every level, strong risk management involves deciding which risks to their assets they can tolerate. Take data, for example. Medical data is more sensitive than publicly available data, and both resources deserve different management. Risk management can help agencies determine the best way to protect their most critical information.

"You can look at your critical risks across the board and say, 'This is where I'm going to focus my efforts for the next six months,'" Alsinawi said.

The Compliance Conundrum

Regulatory compliance adds another wrinkle to risk management. If agencies do not comply with the latest regulations, their critical data may face escalating risks. Consider the need for the Federal Risk and Authorization Management Program (FedRAMP), which mandates which cloud computing services can host federal data. Without that certification, an entity may be in violation of their required compliance requirements.

Much like security pitfalls, risk management can also help agencies avoid compliance challenges.

Tech Snapshot: The Risk Assessment

Risk management begins with a risk assessment, which will highlight the threats, vulnerabilities and impacts to an organization's mission and operations. In short, the assessment will look at what attacks are likely and what damage they might cause.

But an assessment also will deliver other insights that can help an agency strengthen its security:

- The criticality and sensitivity of data being processed and what regulations might apply (e.g., FedRAMP, FISMA, etc.)
- The organizational architecture, including its assets, ingress/egress points, types of data, external interconnections, etc.
- The risk management strategy needed to meet key data protection requirements
- The potential costs of security fixes, including remediation, architecture modification and continuous monitoring

HOW TALATEK HELPS

TalaTek's risk management services can ensure that agencies have a handle on issues such as potential compliance red flags. Using real-time data, TalaTek can help agencies measure risk and then factor it into their operations for the best possible business outcome through its TiGRIS solution. With customizable risk scoring tailored to each agency's unique risk appetite and mapped to system-specific, inherited and hybrid security controls, TiGRIS is designed to help determine an agency's residual risks.

Learn more: talatek.com/contact-us



TALATEK LLC
COMPLIANCE THROUGH RISK MANAGEMENT

HOW PREDICTIVE INTELLIGENCE CHANGES DECISION-MAKING



Stuart Booth, Cogility

Digital transformation is the umbrella that seamlessly marries innovation and real-time data. Consumers and producers benefit from this transformation because of improved operational performance, user experience, organizational agility, reduced costs, improved security and increased mission effectiveness.

This is especially true for intelligence community (IC) professionals. They're tasked with making sense of massive amounts of fragmented data — often through a patchwork of manual steps — and informing decision-makers.

"We want to change their lives in terms of their ability to do their jobs efficiently [and] effectively," said Stuart Booth, Chief Operations Officer at Cogility.

Reducing Friction to Insight

For the IC, digital transformation is synonymous with continuous intelligence, or the ability to proactively monitor all data, gain insights, track trends and mitigate risks. Cogility partners with agencies to reduce the friction that silos create and embrace the power of cloud-based tools and platforms that enhance analysts' performance.

"We're so connected that speed is becoming the driver in terms of making timely decisions so you can affect the outcomes or mitigate risks," Booth said. "Reducing the silos and these barriers to collect that information, to understand it and make informed decisions is becoming time-sensitive. And, therefore, these kinds of solutions are necessary in order to make that happen."

The first step is to define the mission and intelligence outcomes needed to better inform enterprise decision-makers. For example, federal agencies have used predictive intelligence to counter insider threats by continuously monitoring personnel and contractors for warning signs.

The approach also has been used to monitor millions of cybersecurity events and block the malicious ones.

Tech Snapshot: Hierarchical Complex Event Processing

The key to advanced predictive intelligence is hierarchical complex event processing (HCEP), according to Booth. This approach takes into account multiple dimensions and factors that by themselves might have limited meaning, but taken in combination and context could provide critical insights.

In traditional complex event processing, the number of combinations that need to be considered can quickly become overwhelming — what's known as combinatorial explosion. HCEP makes it manageable by allowing different aspects of an event to be considered individually and then combined at a higher level of abstraction. This hierarchy of event processing leads more quickly to actionable intelligence.

HOW COGILITY HELPS

Cogynt, Cogility's software solution, fully embraces the digital transformation movement by delivering an advanced predictive intelligence platform providing real-time situational awareness and decision support that agencies can easily adapt for intelligence missions. Cogynt is unique in that it continuously monitors the evolution of behaviors at the human or entity level, delivering real-time risk and opportunity assessments. The Cogynt platform is a highly flexible, scalable and tested continuous intelligence platform that the Defense Department currently uses.

Learn more: [cogility.com](https://www.cogility.com)

COGILITY

DATA MANAGEMENT IN A DIGITAL WORLD



Rick West, Progeny Systems

There is an unfathomable amount of data that resides in the digital universe, sitting on individual servers and passing from one network to another. Keeping track of this information, especially for an entity as vast and complex as the federal government, is challenging.

Records management is a critical topic that doesn't get enough attention, said Rick West, Business Development Manager at Progeny Systems and 12th Master Chief Petty Officer of the Navy. Most organizations lack a standard process for handling their information, and that negligence comes a cost.

For instance, West noted that employees waste a large portion of their work weeks searching for records. Companies without a records management system, meanwhile, misfile or mislabel up to 20% of their records. These statistics are concerning when considering the quantity of the records and data that agencies are responsible for safeguarding.

"Poor records management results in financial, legal, productivity and data loss," said West. Organizations cannot afford to do nothing, but that's what many of them do.

A Multitude of Benefits

An enterprisewide content management system offers multiple benefits, including improved efficiency, reduced costs, mitigated risks, enhanced customer service, easier collaboration, faster turn-around times and competitive advantages.

There are various reasons why records management is complex, besides the cumbersome nature of sifting through millions of digital documents. Data security, federal guidelines and security classifications also come into play.

A comprehensive, robust content management system "allows organizations to easily interact with, monitor and manage all aspects of compliant records governance, while reducing hardware infrastructure and providing significant savings across the organization," West said.

"You're talking about increased tasking and workflow efficiency and visibility of records," he said. "You're talking about increased annual savings through advanced analytics ... and allow[ing] organizations a lot of flexibility as they operate."

Tech Snapshot: A Unified Solution

To manage content at scale, agencies can't just think in terms of managing documents. Instead, they need a unified solution that includes task management, workflow, document configuration management and records management.

This is the approach Progeny has taken with its TRACKER solution, which provides these benefits:

- Web-based capability with automation of task, records and document management processes
- The ability to "manage in place" — that is, to allow content to remain in native storage until it must move based on workflow or business rules
- Support for deployment both onpremises and in a FedRAMP-compliant commercial cloud
- Implementation either as a suite of modules for a full range of capabilities or as separate modules for meeting specific requirements

HOW PROGENY SYSTEMS HELPS

Progeny Systems develops and produces hardware, software and technology solutions for DoD and other government and commercial organizations. The company's TRACKER tool helps entities electronically manage tens of millions of records, case files, documents and emails in a high-availability, cloud-based system. The product consists of five modules: task and workflow management, document management, records management, reporting, and search.

Learn more: www.progeny.net

CONCLUSION

Regardless of your function or agency mission, our goal with this guide is to help you understand how cloud computing fits into your world and your work. We used this guiding prompt that can help you in your conversations about how cloud computing can support your agency goals:

*Cloud computing facilitates the democratization of _____
(data, training, secure and equitable services, automated processes, etc.).*

Use this statement and resource as a starting point to glean ideas, explore ways to strengthen ties between business units and IT departments and to rethink the future of work.



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 crossgovernment 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.

For more information about this report, please reach out to info@govloop.com.

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Author

Nicole Blake Johnson, Managing Editor

Designer

Kaitlyn Baker, Creative Manager



About AWS

Amazon Web Services (AWS) is the world's most comprehensive and broadly adopted cloud platform. Millions of customers, including government agencies, are using AWS to lower costs, become more agile, and innovate faster while powering infrastructure and providing reliable, mission critical services.

For more information please visit aws.amazon.com.

Thank You

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