From Talk to Action:

Best Practices and Lessons Learned from the Digital States Survey

Best Strategies for the Cloud Journey

Considering a move to the cloud as part of your IT modernization? The journey could be easier with the right strategies and partner.

Strategy #1:
Define Success in Terms of Mission

The success of cloud adoption shouldn't be determined solely by reduced costs, but also by improvements in how your agency performs its mission. This perspective shift will help your agency make more effective use of cloud resources and realize more benefits for operations and service delivery. With Deloitte's service breadth and technical depth, we can help identify where to best leverage the cloud for both modernization and mission.

Strategy #2:
Help the Organization Adapt to a New Reality

Cloud brings new applications, capabilities and ways of working — and your organization will need to be ready to embrace these changes. Moving an application to the cloud is an opportunity to streamline underlying business processes. Policies may need to change, especially to support data sharing that produces better information while maintaining security, privacy and compliance. And IT employees will need new skills to work with cloud applications and infrastructure. Deloitte specialists can help you solve the challenges that come with those changes.

Strategy #3:
Tap into an Innovation Ecosystem

Cloud makes it easier for government to connect with the latest innovations in commercial technology. With a cloud-enabled ecosystem, finding the right technology can be as simple as searching in an app store.

Strategy #4:
Create Governance Structures That Promote Cloud Innovation

IT governance principles may need updates to reflect the new choices and issues that come with use of cloud infrastructure and applications. Yet if these updates are too restrictive, they can impair a government's ability to use cloud for achieving innovation goals.

Learn how Deloitte's services and experience can benefit your organization's cloud journey:

http://www2.deloitte.com/us/en/pages/public-sector/solutions/federal-cloud-services.html?id=us:2pm:3ad:cldaderep:eng:abt:080119

Deloitte.

INTRODUCTION

In recent years, states have made significant gains in addressing some of their most stubborn technological challenges. In the latest biennial Digital States Survey conducted by the Center for Digital Government (CDG), 17 states improved their overall ratings, while only a handful lost ground.

State technology leaders are making headway not by chasing the latest and greatest technologies, but by taking practical approaches to address longstanding priorities, including modernizing aging systems, protecting sensitive information from cyberattacks and ensuring citizens can interact with government in better ways.

"Talk is turning to action," says CDG Executive Director Teri Takai.

At the same time, public sector technology leaders must balance present-day priorities with emerging challenges, not all of which are technical. States are grappling with new issues such as election security, the opioid crisis and marijuana legalization — and every state ultimately will have to confront disruptions to traditional workforce practices at all levels. CDG experts analyzed Digital States Survey submissions from all 50 states to identify five key trends for today, as well as five challenges for the future. This report looks at strategies, best practices and lessons learned across these areas, as the role of CIOs and other state technology leaders continues to evolve.

STATE TECHNOLOGY TRENDS:

1. Maturing cybersecurity strategies
2. Comprehensive approaches to user experience
3. Workforce reinvention efforts
4. 'Cloud smart' modernization
5. Procurement innovation

FIVE FUTURE CHALLENGES:

1. Securing emerging technologies
2. Coping with evolving privacy expectations
3. Using tech to solve new public challenges
4. Addressing broadband's 'last mile'
5. Managing long-term workforce disruption

STATES ARE MATURING THEIR
CYBERSECURITY STRAT

While cybersecurity threats continue to grow with real consequences — consider the ransomware attacks that crippled Baltimore earlier this year — there's a growing sense the response is becoming more sophisticated.

"States are taking this on," says CDG Senior Fellow Dugan Petty. "They are reacting in a more mature, structured way."

Many states are adopting the NIST cybersecurity framework, which provides a comprehensive collection of best practices.[1] Others are creating security operations centers. And in states like Idaho, cybersecurity concerns are a driving force behind IT centralization. The state launched a cabinet-level Office of Information Technology Services in 2018.[2]

States also are pooling resources to address vulnerabilities and launch new capabilities. For instance, the Georgia Technology Authority (GTA) introduced a CISO-as-a-service offering earlier this year to help smaller state agencies meet a new requirement that all executive branch agencies have an information security officer. Agencies now can procure a share of a security professional's time through the Georgia Enterprise Technology Services (GETS) brokerage platform.[3]

In California, the state's security operations center, launched in 2017, is operated by a team of state civil service staff and active-duty members of the California Military Department (CMD), which includes the National Guard and other organizations. The CMD's own dedicated cyber network defense team also leads independent security assessments of state agencies under state law. And the CMD collaborates with the state's Department of Technology, Highway Patrol and Office of Emergency Services on the California Cybersecurity Integration Center (CAL-CSIC), which coordinates information sharing with local governments and other organizations.[4]

Stronger Together: Forging Partnerships

A key element of the maturing public sector response to cybersecurity threats is the proliferation of partnerships supporting local governments and key industry sectors.

States are providing security resources to cities and counties, many of which are too small to staff dedicated cybersecurity professionals. Wisconsin created regional cyber response teams, funded in part by a grant from the U.S. Department of Homeland Security. Comprising state, local and tribal employees trained and certified by Wisconsin's Division of Enterprise

more than 300 attendees, focused on education and public-private partnerships. It was co-sponsored by the Idaho Office of Emergency Management and the Pacific Northwest Economic Region's Center for Regional Disaster Resilience.[6]

Michigan is another state with formal structures to foster ongoing collaboration among cybersecurity stakeholders.

"I think of it in layers — relations with law enforcement; then you've got local governments, counties, cities, municipalities; then partnerships with lifeline sectors and critical infrastructure," says Chris DeRusha, Michigan's chief security officer.

To that end, the state relies on a "kitchen cabinet" composed of representatives from each sector, which first developed the state's cyber response plan in 2015 and continues to have conversations about common challenges.

Michigan has also stood up industry-specific collaborations, such as the Michigan Healthcare Cybersecurity Council Inc. (MiHCCi), a public-private partnership between the state and major health care providers.[7] MiHCCi launched its own health care-specific security operations center, which promotes information-sharing and best practices among its health care partners.

In both cases, the biggest challenge was creating structures that can persist once the original players move on, according to DeRusha.

"Sustaining them is the hardest thing," he says. "There has to be some constant derived value for people to see these as avenues for moving their organizations forward. You only get that when you have purposeful planning."

TEGIES

Technology, the teams address threats reported by local governments and help train their workers.[5]

Michigan's volunteer Cyber Civilian Corps (see sidebar) plays a key role in the state's plans to respond to widespread cyberattacks. The state also piloted a local-focused CISO-as-a-service (CISOaaS) program where state security experts provided maturity assessments and implementation plans for 13 counties and cities. Michigan now plans to make the CISOaaS model permanent and scale services through common frameworks and best practices — a must for a state with more than 2,000 local IT operations.

Another important security trend is greater collaboration among public and private sector stakeholders, often convened by state technology leaders. Idaho has held annual cybersecurity summits since 2014. The most recent event, which drew

Launched in 2013, Michigan's Cyber Civilian Corps (MiC3) has emerged as a national model. Staffed by more than 100 highly skilled and vetted volunteers, MiC3 responds to widescale cyberattacks and educates local governments, schools and businesses.[8]

Roughly 80 percent of MiC3 volunteers come from Michigan companies. Chris DeRusha, Michigan's chief security officer, stresses the importance of these local ties.

"They're from the community and have relationships we don't," he says. When others question whether MiC3 competes with commercial security vendors or the National Guard's own cyber protection teams, DeRusha is quick to point out the scope of the challenge. "Nothing's enough," he says.

One key to the program's success, DeRusha says, is ensuring volunteers have liability protection that shields them and the state from lawsuits related to their volunteer service — something that didn't happen in Michigan until a law was passed by the legislature in 2017.

"You don't need to wait for that to start your own volunteer program, but get the statutes and liability protection in place," he says. "You'll find that you can't deploy without them."

STATES ARE GOING DEEPER ON
USER EXPERIENCE

The idea of creating an Amazon-like experience for citizens and businesses through one-stop portals and other services has pervaded much of government in recent years. But increasingly, state technology leaders understand the real work takes place behind the portals and focuses extensively on back-office business practices, says Takai.

"It's not can we do it, but how and why?" she says.

In growing numbers of states, the "why" is a mandate from elected officials — and that mandate can give technology leaders an opening to help agency leaders rethink business practices across the enterprise.

As Maryland's Department of Information Technology sought to support Gov. Larry Hogan's emphasis on improving citizen services, it developed Business Express, a site that compiled information and services about starting a business in the state.[9] But the state's broader strategy involves putting more complex services on its one-stop portal, says Secretary of Information Technology Michael Leahy. Doing so will require agencies to rethink how they handle all citizen services.

Last year, for example, Maryland began offering all business licenses, permits and certifications online — and it added a search engine to help users determine who to contact. But, Leahy says, agencies need to go beyond providing access to PDF forms for users to download and fill out for manual processing. Along with digitizing these back-office processes, the state needs to make it easy for citizens to apply for local licenses and permits through the state portal.

"Citizens don't think of dealing with the federal, state, or local government or a particular agency," Leahy says.

Chatbots and other means of providing automated assistance represent another opportunity to improve citizen service. While several states offer automated chat support on their portals or other sites, call centers represent an emerging opportunity for these technologies. Arizona, for example, operates 90 call centers, and state

DAVID KIDD

❝ It's important to 'humanize the process' when working with agencies on technology needs by discussing their challenges, not the technology that addresses them.

— Michael Leahy, Secretary of Information Technology, Maryland

How **Modern Infrastructure** Helps IT Leaders Manage Their **Biggest Priorities**

State and local government leaders recognize that legacy three-tier data center architecture is ill-suited to address their agile service delivery, security and citizen engagement priorities. Maintaining legacy IT infrastructure with separate silos for compute, storage, virtualization and networking is too slow, too costly and requires too much IT specialization. These silos have become a barrier to change and progress, adding complexity to every step. There is a better way: Hyperconverged Infrastructure (HCI), pioneered by Nutanix, is a modern, software-defined solution that natively integrates all IT resources to run any application at scale while delivering true consumer-grade simplicity that makes infrastructure management effortless.

Because HCI provides a simple, high-performance strategy for data center modernization, it can help state and local government IT leaders more effectively work to solve complex public sector challenges and address some of their biggest priorities, such as:

CYBERSECURITY:
Complexity is a key enabler of cyber vulnerabilities. Nutanix uses a Defense-in-Depth approach to incorporate security best practices and governance from initial solution design, development, deployment and operation. Advanced machine learning and artificial intelligence, built into the Nutanix unified management interface, Prism, helps government leaders analyze their IT environments to make more informed decisions about where to run infrastructure most effectively and securely.

CLOUD:
IT leaders are looking for hybrid cloud solutions that combine the simplicity and scale public cloud offers. Nutanix facilitates the transformation from traditional data centers to IT-as-a-Service. With this architecture in place, agencies can make data-driven decisions on optimal application and service deployment within their hybrid enterprise cloud for more efficient and secure IT operations.

WORKFORCE:
Modernizing the workforce is a priority for all government agencies, yet sustaining a complex legacy data center requires multiple, highly skilled staff just to maintain the various aging component silos. With HCI and unified management tooling, Nutanix simplifies operational complexity and frees IT staff to be more proactive in partnering with agency business teams to deliver new services and a better constituent experience.

NUTANIX™
Your Enterprise Cloud Platform

For more information, please visit
www.nutanix.com

officials are identifying areas where automated assistance can be tested in ways that scale.

Utah first offered Alexa-like virtual assistants online to provide information about driver's license requirements and fishing locations. Now the state's Alexa-powered app answers citizen questions about local election information, localized down to sewer districts, on smart speakers.[10]

Changing Business Practices

As states shift their attention to experience, technology leaders are consulting with departments and agencies to help them rethink business processes and modernize technologies that underpin citizen-facing services.

"The back end is where the heavy lifting is done," Leahy says.

On a superficial level, Leahy says technology leaders can make the case for change with internal customers using experiments such as seeing how many pages of searching it takes to determine who to contact for a specific business license or permit. But on a broader level, he says, it's important to "humanize the process" when working with agencies on their technology needs.

"We've attempted to build partnerships on a very basic level," he says. Doing so, Leahy says, involves respecting agency staff as subject-matter experts and "explaining that we don't intend to control their business or contain their authority. We're merely providing them with expertise on the application of the tools to a subject they know far more about than we will."

These plain-English conversations, Leahy says, "strip the issue of 'my vendor told me x.'" At the same time, Maryland is looking to new methodologies to provide more transparent decision-making (see sidebar).

IN MARYLAND,
TBM FOR TRANSPARENCY

For Maryland, a key element of the customer experience involves transparency, and a new framework is helping provide a better lens for both agencies and the public to understand how IT funds are being spent.

Maryland's Department of Information Technology adopted Technology Business Management (TBM), a framework that emphasizes business-aligned decisions and provides methods to calculate the true value of tools and processes.[11]

"Instead of talking about what it costs to buy a particular router or black box, we're talking about the efficiencies garnered with specific tools," Leahy says. TBM lets agencies see their IT budgets in real time and compare multiple options.

As the state moves to a chargeback model for IT funding, Leahy says TBM will also be used to weigh options such as outsourcing technology services and functions.

"If someone comes to me and tells me they have found a private entity that can provide the same services at a lower price or [another] metric, I'm likely to look at the service and swap out what we're doing," Leahy says.

Advanced Protection for Cities in the Age of Ransomware

Ransomware attacks on U.S. states, cities and counties are on the rise:

♦ In 2018, a ransomware attack took down multiple municipal systems in Atlanta, costing the city $17 million.

♦ In May 2019, Baltimore fell victim to the RobbinHood ransomware attack, which took down all the city's online services for multiple days.

♦ In June 2019, a ransomware attack forced the Riviera Beach, Fla., Police Department to replace all its hardware at a cost of more than $600,000.

Ransomware attacks and their variants are rapidly evolving to counter preventive technologies, but there are steps agencies can take to mitigate threats. One of the most important steps is to ensure all computers and devices are protected with advanced, comprehensive security software.

How California DWR is Fighting Ransomware

The California Department of Water Resources (DWR) recently upgraded to McAfee security solutions after a malware incident highlighted deficiencies in the agency's legacy security solution.[1] DWR purchases, deploys and provides multitenancy security solutions for 30 departments within the California Natural Resources Agency. In all, DWR is charged with safeguarding 16,000 endpoints, so ransomware protection is critical.

"We needed a higher level of protection," says DWR Chief Information Security Officer Richard Harmonson.

McAfee security solutions use a unique, predictive capability that enables users to stay one step ahead of the next wave of file less attacks, viruses, malware and other threats.

"The amount of damage that threats like ransomware can do in a very brief time is significant," says Harmonson. "Since we rolled out Endpoint Security, we have been detecting and blocking threats we didn't see before."

Harmonson's team can also now see exactly how a threat may have affected them — for instance, what it changed in the registry or how it modified specific files — and determine what action to take.

"One of the greatest benefits … is the ability to have information we trust so we can make the right decisions in a timely manner and subsequently reduce risk within the organization," explains Harmonson. "With McAfee Endpoint Security, we remediate faster, have less business disruption, make better decisions and protect neighboring workstations and our overall environment — instead of focusing all our attention on an infected workstation while another one gets hit."

McAfee
Together is power.

For more information about how to defend against ransomware, visit
www.mcafee.com/enterprise/en-us/security-awareness/ransomware.html

[1]https://www.mcafee.com/enterprise/en-us/assets/case-studies/cs-california-department-water-resources.pdf?_ga=2.182979174.1148997561.1559779313-1600660344.1557951392

STATES ARE TRYING TO
REINVENT THEIR WORKFORCES

As technology needs and workplace trends continue to shift dramatically, states are moving beyond longstanding handwringing over the so-called "silver tsunami" of retiring employees and looking at new solutions to recruit, reskill and retain IT workers.

"Structural changes in how states deliver services require different workforce solutions," Takai says.

It's well recognized that states are moving to the cloud and as-a-service models, and they're seeking employees with new skillsets — including project managers, business analysts and developers — to support the transition. Other roles, including those tied to cybersecurity and high-paying specialties such as cloud architects, can be difficult to staff.

But for most states, the greater challenge is that the transition is in flux — and it will be for quite some time. Most public sector technology officials say hybrid IT environments will be the long-term norm for many government agencies. Therefore, IT leaders will perform a balancing act that keeps critical legacy systems operating while steadily moving appropriate workloads to the cloud.

"We have to look at what we need to run the legacy systems we have today and the modern systems we're going to run tomorrow," says Hawaii CIO Douglas Murdock.

Rewriting the Rules

Facing stiff competition for talent, many state leaders are rethinking how they recruit and hire IT workers. In Hawaii, for example, leaders are examining job requirements such as

> ❝ The most important quality in an IT workforce is the ability to learn.
>
> *— Douglas Murdock, CIO, Hawaii*

college degrees and adjusting pay bands to attract and retain skilled workers. At the same time, Murdock says the state's digital workforce group recognizes that these steps are not enough to meet future needs.

"The most important quality in an IT workforce is the ability to learn," Murdock says.

To that end, Hawaii partnered with LinkedIn Learning, which provides online courses in a broad range of technology fields, to allow IT staff

Driving Change
at Scale in State and Local Government

There are many reasons organizations adopt cloud. Whether it's increased agility, cost savings, reliability or scalability, cloud allows organizations to innovate. Adopting cloud improves access to competitive services at a lower cost. Consumers can access services with a few clicks on a screen, delivering a better experience than previous time-intensive processes.

For public sector organizations, IT decisions should remain centered on two things: meeting constituent needs and staying competitive with modern service delivery.

Hardik Bhatt, Amazon Web Services' (AWS) leader for digital government, has encountered these challenges from both the private and public sector perspective. As CIO of the state of Illinois, Bhatt took on a technology environment with components created over four decades ago. Over time, the systems became outdated and costly.

"It is constituents who lose out on benefiting from the power of their governments," says Bhatt.

Outdated systems are a pressing challenge for governments. How can governments keep residents satisfied with services that don't meet modern standards? How can they attract top IT talent without access to innovative technology this talent seeks? How can they keep private information secure? How can they make data-driven decisions without the analytics and tools to understand the data they have?

"When governments continue to maintain outdated systems, it leads to out-of-balance cost structure, security vulnerabilities and sub-par service," says Bhatt.

More than 5,000 government agencies trust AWS to build innovative services, improve constituent services and help constituents work with their governments.

Through his experience, Bhatt has extracted five key steps for successful digital transformation:

1. **Keep the constituent at the center**
2. **Enable innovative, borderless culture**
3. **Build a clear transformation strategy and execute it**
4. **Jump-start and deliver continuous wins**
5. **Keep an eye on the future**

If government skill sets and services don't adapt with these changes, it becomes difficult to keep up with constituent demands and hire a workforce that meets users' expectations. To provide effective and efficient services, governments can leverage the power of technology to digitally transform.

For more information, please visit:
aws.amazon.com/stateandlocal

aws

to upgrade skills in areas of interest. The state also uses contractors and vendors to train staff and "get people excited about new technology," says Murdock, who has taken online classes on Linux APIs to bolster his own skills. But more must be done, he adds, including moving beyond tweaks to existing policies and preparing for the more dramatic workforce shifts presaged by the gig economy, hypercompetition for key roles and other macro trends.

"We need to look at all the rules and see which ones we want to change or break," he says.

Beyond IT

Workforce challenges aren't just an IT issue — they're impacting state governments across the board. In many states, technology executives are leading initiatives to help agencies and departments streamline staff functions to improve the productivity of existing employees.

Michigan, for example, rolled out a universal caseload system in 2018 to better support health and human services caseworkers and ensure greater continuity and flexibility among agencies.[12] And in Ohio, a self-service push began with a portal for state employees before the launch of citizen-facing portals.[13]

Streamlining back-office business functions is an important goal of these kinds of projects, as illustrated by Florida's decade-long approach to modernizing its human resources operations. That initiative culminated in a portal-like experience for a wide range of employee and manager functions across all state agencies (see sidebar).

IN FLORIDA,
PUTTING PEOPLE FIRST

Florida's People First team — which manages the state's human resources, hiring and performance management systems — serves more than 230,000 employees and retirees using technology that was developed over more than a decade as part of a broader reorganization of back-office functions. But the 2018 launch of a revised employee portal reflected the need to simplify processes for internal staff. The new portal lets employees submit time sheets, choose insurance plans and perform other self-service functions online. The changes improved employee satisfaction while saving money and strengthening standardization across the enterprise, according to state officials.

Regular employee surveys have been one driver for system changes, leading to better user acceptance. Satisfaction levels increased from 59 percent in 2007 to 72 percent in 2010 and 78 percent in 2017.

"Years ago, customer-centric systems could get away with a portal being somewhat difficult to use and not pleasing to look at from an aesthetic standpoint, as long as the system effectively performed as designed," David DiSalvo, former People First director and current director of retirement for the state, wrote in a paper about the system.[14] "Customer expectations have changed. Never focus on form over function, but form does matter."

A BETTER SOLUTION
FOR USER DEVICES

Do we really need to own everything? IT is asking this question as infrastructure elements reach their refresh point and the ownership model is replaced by subscription-based services.

Now, IT teams can ask that question about one of their biggest management challenges: user devices. When an agency owns these devices, the work of provisioning, tracking, updating and maintaining them can be a resource-intensive task for IT staff, and financial budgeting is difficult for agency leaders.

Device as a Service (DaaS) solutions from SHI offer a simple and appealing alternative to this costly burden of device ownership, offering management with fixed, predictable costs.

MAKING DEVICES EASY

Government needs a variety of user devices — from desktop and laptop PCs to tablets, desk phones and mobile phones — and a DaaS solution from SHI can cover it all.

Delivered as a monthly subscription with a single, all-inclusive cost, DaaS provides a flexible, preconfigured user device, with managed services that support warranty services and accidental damage replacement. SHI's DaaS subscription can be tailored further to include services like custom configuration, monitoring , troubleshooting and patch management. Instead of a separate purchase expense and ongoing service support costs, the DaaS solution has a single, predictable monthly or quarterly fee for a defined term.

BENEFITS ACROSS THE BOARD

DaaS offers:

- Clear, all-inclusive and predictable costs
- Flexible financial models — either operational or capital models available
- A broad choice of devices to support each job or work function
- Increased employee productivity with up-to-date devices and a modern user experience
- Reduced security risk with the latest hardware and software
- Improved operations and increased productivity with faster device deployment, repair and replacement
- Proper end-of-life device handling through recovery, data destruction, recycling and audit reporting
- More time for IT staff to work on high-value projects

SIMPLER DEVICE MANAGEMENT STARTS NOW

Is your agency ready for device refresh, or is it difficult for IT staff to keep up with device management due to limited resources? Whatever the case, it's easy to start by exploring how DaaS can benefit your security, operational and budgetary goals.

Learn more: https://www.publicsector.shidirect.com/

STATES ARE MOVING FROM 'CLOUD FIRST' TO 'CLOUD SMART'

States increasingly are making good on "cloud first" initiatives and executive orders, but their approaches are evolving.

"There's a growing recognition that lots of states have been doing cloud executive orders, but not providing support to help agencies make the transition," says CDG Senior Fellow Patrick Moore.

While strategies vary by the level of centralization, a common thread involves efforts to provide single points of access to cloud services. In California, for example, establishing a single enterprise cloud service contract "gave the department the ability to adopt these services safely because it improved our cybersecurity posture," says Marlon Paulo, deputy director of the California Department of Technology.

In Texas, the state's federated service broker model has evolved from a single portal to purchase services in 2012 into a complex hybrid model integrating five different commercial cloud environments and the state's own private cloud. Leaders now are working to "corral all of the cloud sprawl into more of a continuous managed environment where [agencies] can leverage scale," says Todd Kimbriel, the state's CIO and deputy executive director of the Texas Department of Information Resources (DIR).

Governance is proving critical to state cloud computing efforts. On the operational level, using common tools to assure that cloud instances include security patches and monitoring toolsets helps address security and cost concerns.

On the strategic level, the Texas "owner-operator" governance model, which clearly delineates the roles and responsibilities of both DIR and the agencies it serves, "has profoundly impacted customer satisfaction and how we deliver," Kimbriel says.

The state's multi-tier model includes senior officials, IT leaders and solutions groups organized into functional partner groups which tackle issues at different organizational levels. The structure allows agencies to "be completely engaged in not only daily tactical decisions, but also the strategic decisions," Kimbriel says.

Texas and other states also are borrowing language and strategies from the federal government, which has shifted its own guidance from "cloud first" to "cloud smart."

"We're trying to align use cases with the cloud where it makes sense," says Murdock.

In Hawaii, for example, one priority for cloud services involves disaster recovery for key government services.

Modernizing at Scale

The shift to "cloud smart" thinking is driven by a broader realization: It's difficult to move beyond what Kimbriel calls "broad but shallow" cloud adoption — mail and other shared office functions — into true system modernization.

"Our cloud providers have not done us a service by saying it's easy to adopt cloud," Kimbriel says. "Once you're there it's easier, but the problem is getting there."

Texas is taking steps to educate agencies on what — and how — to move more critical business processes to the cloud (see sidebar). As a result, the state is seeing cloud adoption double year-over-year, according to Kimbriel. In Hawaii, technology leaders are standing up cloud-based development and test environments to help agencies gain experience with using and scaling cloud services.

"You can run three [development tests] one day and 15 the next, and it's pretty efficient," Murdock says.

States also are using cloud to support incremental modernization of large systems. Hawaii's small IT staff was charged with overhauling the state's tax and payroll systems, some of which relied heavily on paper-based processes. Together, these systems represent most

functions of a full-scale ERP, but technology leaders took on a multi-phase approach, adding HR, payroll, and time and attendance functions over time, followed by modernizing financial management systems. In similar fashion, tax modernization efforts were broken into five phases, four of which are now complete.

"We have to look at the resources we have available and break things down into smaller transactional systems," says Murdock. "That way, as teams roll off one project, they can move to another."

Successfully using the approach requires educating agencies about the benefits of building systems in a modular fashion, but it also demands compromise — particularly with the emphasis on configuration over customization in modern cloud-based systems.

"Each party has to be willing to give up some things and compromise on what's in the system, especially when we're having to walk back some of the customizations and technical debt," Murdock says.

IN TEXAS, TAKING THE CLOUD TIGER BY ITS TAIL

While the cloud is often touted as "plug and play" technology, the complexity of identifying which workflows to move to the cloud and how to integrate them with the legacy processes is anything but.

Texas created a "Tiger Team" earlier this year to help agencies make the transition. The team, which consists of cloud architects from the state DIR and one of the state's cloud service providers, works with agencies to identify cloud-ready workflows and transition them to cloud platforms.

To date, five agencies have worked with the Tiger Team. In addition, DIR created a sandbox environment in which state agencies can experiment with cloud-based projects.

Providing these resources is critical to cloud adoption because many state agencies lack the capability to do it themselves, Kimbriel says. "You have to be deliberate and focused on how to educate people on what's the right workload and method to move to the cloud."

> ❝ You have to be deliberate and focused on how to educate people on what's the right workload and method to move to the cloud.
>
> *— Todd Kimbriel, CIO and Deputy Executive Director, Texas Department of Information Resources*
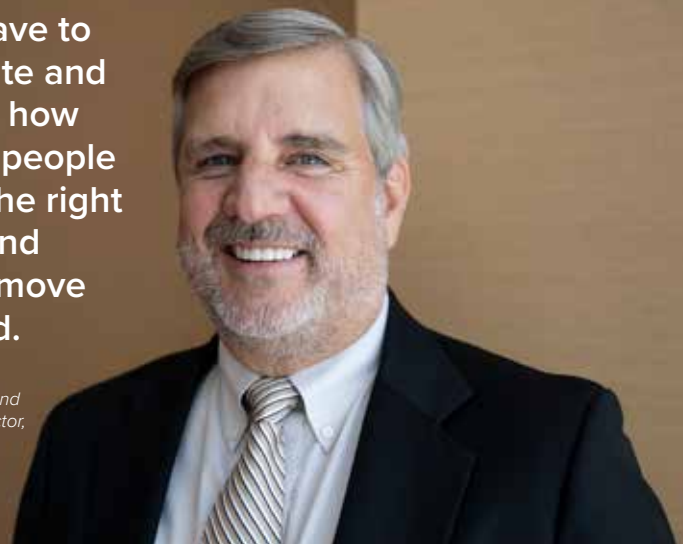
STATES ARE DISRUPTING LONG-STANDING PROCUREMENT MODELS

As the broader technology universe shifts to as-a-service models and more flexible methodologies, states are altering longstanding procurement models to match the new reality. Doing so, state technology leaders say, means involving procurement officials more deeply in projects.

"Procurement shouldn't be an afterthought," says Paulo. "It should be brought into the initial planning so [procurement officials] can advise the effort and be well prepared to come up with strategies with the technologists, IT leaders and program leaders."

Agile Approaches

At a basic level, California's enterprise cloud service contract "eliminated the repetitive process of procurement for every department

" Procurement shouldn't be an afterthought. It should be brought into the initial planning so [officials] can advise the effort and be well prepared to come up with strategies with the technologists, IT leaders and program leaders.

— Marlon Paulo, Deputy Director, California Department of Technology

that needs the cloud," says Paulo. But the state also is working to improve vendor selection and procurement for development projects among its agencies.

Agile and other incremental methodologies represent a potential boon for multiyear government projects, which often confront costly and time-consuming changes in legislation or business priorities. To that end, the California Department

of Technology has worked to streamline the process of qualifying and contracting with agile developers (see sidebar on page 18).

Agile and incremental DevOps methodologies, Paulo says, also "require a little more finessing on the financial side." It's important that procurement officials remain involved throughout the development process so they can help manage contracts and

Preparing for the 5G Future

Although fifth-generation cellular wireless (5G) networks have only recently been introduced into a few U.S. neighborhoods, industry experts forecast that 5G will become the leading mobile network technology in the country by 2025.[1] It won't be long before 5G devices and intelligent 5G-enabled applications begin to revolutionize what state and local government organizations can do with data, citizen services and more.

The main advantages of 5G over 4G networks are greater speed, lower latency and the ability to connect to many devices simultaneously. These capabilities will enable organizations to finally bring to fruition some of the highly sophisticated use cases promised by the Internet of Things (IoT), artificial intelligence, augmented reality, virtual reality and other advanced technologies. Additional transformative applications are yet to be imagined.

Getting Started

With mass adoption of 5G just around the corner, it's a good time to prepare for 5G within your organization.

Invest in your ecosystem. Ensure you have the infrastructure to support the bandwidth-intensive applications 5G enables. In addition, incorporate the best of 4G and complementary technologies such as IoT infrastructure, SD-WAN, smart buildings and intelligent phone systems so you'll be ready to quickly take advantage of 5G.

Build out workforce mobility. Help your staff become more productive wherever they are. Make sure you have a strong security credential system in place and add other options such as enterprise-level broadband, wireless video data capabilities, secure cloud connectivity, fleet tracking and productivity apps.

Leverage data. Be prepared to take advantage of 5G's high-bandwidth capabilities to perform analytics and develop innovative processes related to edge computing, autonomous vehicles, smart city projects, artificial intelligence and more.

Using 5G Strategically

When the time comes to invest in 5G, remember that not all 5G service is the same. Verizon's Ultra Wideband 5G offers extremely fast download speeds, shorter latency and, in the near future, capacity to support millions of users and billions of connected devices.

For more information, visit:
https://www.verizonwireless.com/5g/

verizon√

1. GSMA. The 5G Era in the United States. Accessed June 2019.

vendors as projects hit milestones or encounter backlogs, he adds.

New Models

Beyond finessing, some states are exploring new models for procurement. Georgia's GETS, for example, requires integration sessions and shared service level agreements (SLAs) that hold all vendors providing integrated IT services responsible for common outcomes "so the end customer is seeing a consistent set of service offerings," Georgia CTO Steve Nichols said earlier this year.[15]

Competitive proofs of concept, in which smaller contracts fund pilots ahead of a full project, also are becoming more common.

"They allow vendors to demonstrate the capability and integration of the product and how well the system integrator can handle all the specific scenarios we can throw in during the product life cycle," Paulo says.

In addition, the approach helps the agency or program leadership understand the limitations and tradeoffs to specific changes or requests, he adds.

States also are trying procurement methods that involve vendors in identifying solutions. Instead of traditional statements of work, which can have hundreds or thousands of pages of requirements, California has experimented with sharing problem statements — sometimes consisting of just a few paragraphs explaining the state's needs, according to Paulo.

"That allows vendors to propose a solution that meets the need of the state instead of us prescribing a solution that may or may not work," he says. "It opens collaboration, discussion and dialogue in procurement."

IN CALIFORNIA,
AN AGILE VENDOR POOL

As agile methodology has grown in popularity, California agencies have found themselves with no shortage of agile developers offering their services.

"Vendors have been eager to get into agile not really knowing the rigor," says Paulo. "We only want the mature and advanced firms we know can deliver."

To make agile methodology work for California agencies, the California Department of Technology developed a prequalified vendor pool, or PQVP. To qualify, prospective vendors had to prototype a shopping cart function using the agile methodology. They were then graded on "the maturity of agile development," and only vendors scoring an A- or higher were added to the pool.

The department now repeats the prequalification process as often as possible to allow large and small vendors to compete. This effort comes with a different development challenge — including an emergency alert system and a learning management tool. Only 33 vendors have qualified to date, according to Paulo.

"Having this firsthand exercise of what the state is looking for makes vendors realize they may not be up to scale yet to perform to the level of [statewide] projects," Paulo says. "But when we recognize the mature vendors, we can confidently say they can relate."

Putting the Citizen First

Modern governments put the citizen at the core of every interaction. By delivering citizen-focused applications and services, governments can ensure effective and engaging interactions. More than this, a person-first approach builds a stronger citizenry and ultimately a stronger society. When people can conduct their government business smoothly and easily, it frees them up to be more positive and productive individuals.

Best in Class

NIC has been helping federal, state and local government agencies deliver citizen-centric services for the past 27 years. Its partners are consistently recognized for how effectively they provide innovative and intuitive digital services.

*Mobile service **Gov2Go** enables citizens to interact with multiple agencies from a single interface where and when it is most convenient for them.*

- Partners such as Colorado, West Virginia and Maryland worked with NIC to launch a service that makes it easier to understand and navigate the requirements around starting a business. Instead of tracking down information from multiple agencies, prospective business owners can now find all relevant information at a single source. The MyBizColorado and West Virginia Business Startup Wizard have been recognized for their innovative approaches to what is typically a complex process. The state of Maryland and NIC leveraged an intelligent chat bot to better aide businesses as they navigate these resources.

- Nebraska, Arkansas and Colorado, in partnership with NIC, continue to lead in delivering a range of digital services such as property tax payments, driver's license renewals, vehicle registration and recreational permits. A mobile service, Gov2Go, presents all these services in a single, intuitive engagement. This simplified application acts as an intelligent personal assistant that enables citizens to interact with multiple agencies from a single interface where and when it is most convenient to them.

Shared Effort

It has been historically difficult to break down silos between government agencies and streamline services either intra-agency or cross-agency. Data sharing has been limited and often difficult to achieve, due to both technical and cultural barriers.

NIC is working with states to implement innovative digital platforms that enable data sharing and support a shared focus on the citizen experience.

The next step in the citizen-centric journey calls for states to enable a form of federated identity. The ability to establish and manage a comprehensive digital identity across agencies will be crucial to the long-term success of digital initiatives. End users should be able to see a comprehensive digital picture of their interactions with state agencies.

The citizen-first model enables states to better fulfill their regulatory and enforcement requirements. More importantly, states are better positioned to meet their basic obligations: **To provide information and deliver necessary services to constituents.**

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WHAT'S NEXT:
FIVE FUTURE CHALLE

1. Securing Emerging Technologies

The Internet of Things. Blockchain. Artificial intelligence and machine learning. Much has been written about the potential of these emerging technologies in government, but less attention has been paid to how technology leaders will ensure they are secure and used for their intended purposes.

The big takeaway, says CDG Chief Innovation Officer Dustin Haisler, is that "cybersecurity is transitioning to a community function."

"The CISOs of the future will need to think beyond the systems that are in their direct control," Haisler says. "They're going to have to look at how community infrastructures, including IoT sensors and myriad other things they may not have installed themselves, could be hijacked and used against the public interest if not properly safeguarded."

The cross-sector collaboration discussed earlier in this report represents a starting point for this changing role. State technology leaders also must focus on stronger oversight of the supply chain and procurement. The technologies states must manage and secure are becoming smaller and easier to purchase — think drones and smart televisions — which will require new oversight or purchasing standards to govern.

"The procurement organization becomes the backstop — not so much on stopping the agency, but raising awareness," says Takai.

2. Ensuring Privacy

Both the impact of the European Union's General Data Protection Regulation (GDPR) and practices of internet giants like Facebook are raising the profile of the issue of ensuring public privacy. Growing public awareness is "giving legislators an opening with which to act," Takai says.

California, Colorado and other states have passed or are considering GDPR-like consumer data privacy acts that give users more control over how their data

NGES

is used. More than 300 state and local bills involving privacy have been introduced this year, creating a complex privacy landscape.

State technology leaders must be more involved in complying with these regulations. Ohio's Department of Administrative Services, for example, created the Ohio Office of Information Security and Privacy, which oversees state laws and policies regarding information breaches and privacy, including privacy impact assessments required of all state agencies.[16]

Beyond compliance, CIOs should inform broader decisions about the privacy implications of new technologies such as artificial intelligence and increased data sharing among government organizations.

"They should take the ethical lead on questions," Takai says.

3. Leading Solutions to New Public Challenges

As states continue to grapple with new challenges ranging from the opioid crisis to affordable housing and infant mortality, technology leaders should play integral roles in shaping policy and practice.

"Even if the CIO isn't part of the governor's cabinet, they need to think like they are," says Takai.

Data sharing and analysis plays a critical role in addressing many of these complex problems. In Arizona, the state technology department pulled together siloed data from health services, public safety, corrections and medical boards as a way to identify proposed solutions to the opioid crisis, ultimately landing on policy recommendations to eliminate automatic prescription refills for these substances.[17] In Ohio, creating a data lake helped policymakers understand infant mortality issues. And in Delaware, the state's technology department is developing an integrated data system to help inform the coordination of services across a range of state agencies.[18]

> **"The need out there [for broadband] is much greater than what the FCC maps show.**
>
> — *Calvin Rhodes, CIO, Georgia*

Election security also is becoming an increasingly important topic for CIOs, who are collaborating with secretaries of state and other senior officials, according to Takai.

"The fact that these officials are coming together on election security is bringing them together in other ways," she adds. "All leaders in government should be using these [strategies] as a template for how technology can change government for the future."

4. Covering Broadband's 'Last Mile'

States continue to struggle with closing the gap on high-speed internet access. CIOs can facilitate partnerships that help improve coverage in underserved areas.

"The need out there is much greater than what the FCC maps show," Georgia CIO Calvin Rhodes said earlier this year.

To that end, Georgia is mapping the entire state to identify underserved areas down to the address level. Even in small, heavily wired states like Delaware, rural areas remain isolated. The state is using public-private partnerships to offset capital costs for fiber infrastructure and piloting wireless service.[19]

With other stakeholders like education and first responders also heavily engaged in broadband rollout — and often with dedicated funding sources supporting them — collaboration will be key to finishing the job.

"Progress has been made on broadband availability, but it hasn't kept pace with the growing need for every citizen to have access everywhere, all of the time," Takai says. "CIOs need to reach out to other groups and make it more of a community effort."

5. Coping with Workforce Disruption

The challenge of finding skilled workers to help states meet their needs will only continue to intensify.

Four of the five largest emerging public sector jobs — data analysts/scientists, artificial intelligence/machine learning specialists, general/operations managers, and software/app developers and analysts — are technical, according to the World Economic Forum's Future of Jobs report.[20]

"There will need to be different approaches, and they're going to be disruptive," says Takai.

In part, government leaders need to consider new models that have roiled other sectors.

"While 1099 contractors have always had a role in government, that business model is bumping up against the gig or sharing economy in interesting ways," Haisler says, noting that public-private partnerships may help meet evolving needs. "There is the same discipline in the name of public accountability, but more flexibility on the execution in getting the right talent for the right job at the right time."

Even as state technology leaders deal with their own workforce challenges, they must determine how new technologies such as AI will change workforce requirements across all government agencies. At first, these technologies won't replace employees, but support government functions in more subtle ways, such as managing energy consumption and identifying trends.

Collaboration among CIOs and forward-thinking line-of-business agencies will be key to implementing AI effectively.

"A smart CIO is going to work with the folks trying to fill the gaps, not the ones afraid of it being disruptive," Takai says.

CONCLUSION:
TRANSFORMING GOVERNMENT

Trends identified in this report show how state governments are responding to key priorities and challenges. Technology leaders are making real progress on strengthening cyber protections, improving user experience, transforming government workforces, refining cloud strategies and disrupting cumbersome procurement processes.

Each priority area has its specific strategies and solutions. But when considered as a whole, the public technology landscape requires leaders capable of managing not only change, but also marshalling support and resources across the entire enterprise of government to solve shared challenges.

"Prepare for the real complexity at the intersection of organizational collaboration, institutional collaboration and technological innovation — all in service to the citizen," advises Haisler.

The pace of change will only accelerate in the years to come, as disruption continues from both beyond and inside government. Technology leaders must help government navigate that disruption, reinforcing the oft-stated idea that their role has changed to that of a broker, thought partner and change manager.[21]

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