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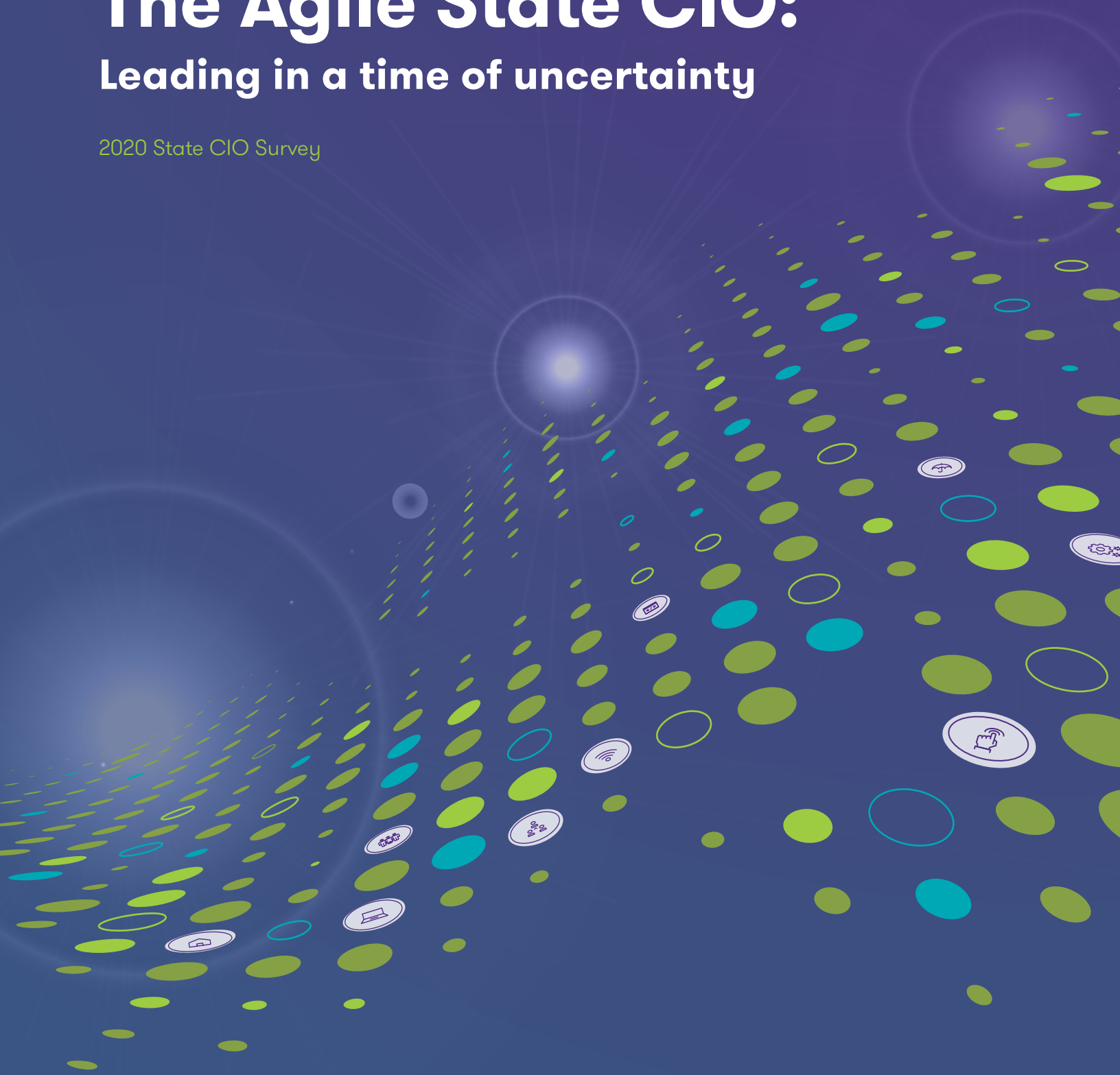
The Agile State CIO:

Leading in a time of uncertainty

2020 State CIO Survey



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Executive Summary

2020 is a year that has undoubtedly been defined by the COVID-19 pandemic. In this eleventh annual state chief information officer (CIO) survey, we received the perspective of 47 state and territory CIOs on the extraordinary and unprecedented challenges they faced this year. In addition to directly addressing the issues and lessons learned by CIOs in responding to the pandemic, we also received updates from CIOs on many of the traditional topics covered by the survey, including CIO organization business models, digital government, adoption of cloud and emerging technologies and state and local collaboration. As might be expected, there was not a single topic area where the pandemic did not impact state CIO experiences in some way. The continuing work to address the immediate challenges of COVID-19 and to prepare for the long-term impacts to state and citizen work and personal lives is reflected throughout this year's survey.

COVID-19

By March, the COVID-19 pandemic had significantly disrupted the United States federal, state and local governments and, like the rest of the world, state CIOs were forced to act and adjust with stability, resiliency and flexibility. In this year's state CIO survey, we asked CIOs about the COVID-19 issues that they have faced, lessons they learned and what CIOs think will be here to stay in a post COVID-19 world. To be expected, all state CIO respondents are involved in their state's COVID-19 response and recovery in some form or fashion, including many who serve on the governors' pandemic leadership team. As one CIO commented, "the governor and so much of the legislative and executive leaders just found out that the CIO is not the computer guy. There is a whole new understanding that we enable the business of government."

One of the most significant lessons learned has been that remote work does, in fact, work. Prior to the pandemic, only a few states had implemented robust remote work polices and work from home was not widespread. The pandemic has proven that remote work can be successful without negatively impacting the business of state government. Whether or not remote work is here to stay for all who have worked from home in 2020 remains to be seen, but all state CIOs agree that there will be significant and long-lasting changes to government and their workforce.

Digital Government

This year we sought to gauge the impact of the COVID-19 pandemic on how states were looking to change their interactions with citizens, visitors, businesses and employees. Participants were asked, "what is the biggest driver to establishing digital services?" Almost all participants agreed improving the online experience for citizens was the number one priority. As one CIO stated "government is now expected to be fully digital. Unless you need to be somewhere in person, like getting a driver's license / REAL ID photo, you will do it online and we need to make that happen." More than two-thirds agreed that increasing public participation and optimizing operations and lowering costs were also top priorities.

State and Local Collaboration

This year, we asked what services state CIOs are offering to local governments. We changed the wording of this question from 2019 when we asked which services state CIOs provide to local governments. We made this decision based on our conclusion that there are a number of services that states offer to local governments that many local governments are not utilizing. The top three responses to this question remain consistent from last year: security and infrastructure services; network services and data center hosting. It is important to note that nearly half of states report a plan to expand services to local governments in the next year.

Broadband

This year's survey included questions on broadband, which, as the COVID-19 pandemic response has demonstrated, is becoming more crucial in the everyday lives of Americans. Broadband has consistently been one of the top ten priorities CIOs identified in the State CIO Top Ten Policy Priorities; however, when asked in this year's State CIO Survey to rank what they believed would change the most as a result of COVID, CIOs ranked investment in broadband expansion/adoption in the top five.

CIOs understand the importance of broadband in supporting many of their needs stated in the previous sections of this report. From creating digital government channels and remote work solutions to providing education and healthcare opportunities for their citizens, they know that they need a reliable broadband network to make these needs accessible and successful. The COVID-19 pandemic response has only heightened those needs, which is why this year, 81 percent of respondents said that their states will now accelerate the implementation of their broadband strategies in light of COVID-19.

COVID-19

2020 has undoubtedly been defined by one thing: COVID-19. In the early months of 2020, much of the world had only just heard of a new virus, few would have predicted the impact it would have as the year progressed. By March, the United States federal, state and local governments had been disrupted and, like the rest of the world, state CIOs were forced to act and adjust with stability, resiliency and flexibility. State CIOs were facing enormous challenges like how to make wide-spread remote work manageable and secure.

Since March, information technology systems and services have been front and center in the response to the COVID-19 pandemic. However, the health crisis also exposed gaps in digital government services and citizen experience, the fragility of legacy systems and lack of investments in broadband. In this year's state CIO survey, we asked about these issues, lessons learned and what CIOs think will be here to stay in a post COVID-19 world. Keeping that in mind, CIOs were poised to give us a lot of information surrounding their role and the role of information technology in response and recovery efforts. To be expected, all state CIO respondents are involved in their state's COVID-19 response and recovery in some form or fashion, including 38 percent who serve on the governors' pandemic leadership team. One CIO commented "after so many years, CIOs have finally gained a seat at the table. As fast as this pandemic situation hit us and the work at home orders, we were not only at the table but chairing the meetings."

First, we asked about automation solutions and emerging technologies that were first introduced in response to the pandemic. Overwhelmingly (76 percent), CIOs showed that chatbots (virtual agents) were being introduced. This is consistent with data collected in the June 2020 NASCIO white paper Chat with Us: How States are Using Chatbots to Respond to the Demands of COVID-19. In that publication, state CIOs first reported widespread use of chatbots or virtual agents. Where previously CIOs indicated they were seeking the right business case for use of chatbots, COVID-19 presented the ideal opportunity because of the tremendous surge in online transactions. Mobile apps for contact tracing/exposure notification came in second place at 53 percent, followed by voicebots to support call center interactions at 40 percent.

While the survey answers in this section supplied empirical evidence, the real wisdom from this section was the open-ended responses. Put simply, we wanted to know what CIOs were thinking—what lessons learned did they have from COVID-19 and what did they think would change post-pandemic. Most responses focused on some key overarching themes.

In your state government, what automation solutions and emerging technologies were first introduced in response to COVID-19?	**Introduce**
Chatbots (virtual agents) for citizen service inquiries (online citizen service inquiries)	**76%**
Mobile apps for contact tracing/exposure notification	**53%**
Voicebots to support call center interactions	**40%**
Automated body temperature scanners/sensors	**24%**
Automated fraud detection using predictive analytics	**20%**
Other	**11%**
Blockchain to track COVID-19 cases	**2%**
Wearable social distancing devices/wristbands	**2%**
Virtual/Augmented Reality	**2%**

First, remote work does, in fact, *work*. Prior to the pandemic, only a few states had implemented robust remote work polices for employees (for example, Tennessee and Virginia), but work from home was not widespread. Many leaders in state government have, for years, touted the idea that allowing the state government workforce to work from home would result in a dramatic disruption to state business and low productivity. The pandemic has proven that remote work can be successful without negatively impacting the business of state government. Whether or not remote work is here to stay for all who have worked from home in 2020 remains to be seen, but all state CIOs agree that there will be significant and long-lasting changes to government and their workforce.

While most CIOs had continuity of operations and disaster recovery/business continuity plans in place prior to COVID-19, many said that they wished they had reviewed and updated them more regularly. Like the rest of the world, few truly considered how a worldwide pandemic would affect every aspect of life and state operations. And as will be reported in the disaster recovery section of this publication, a small number of states had a pandemic annex in their disaster recovery plans.

One CIO shared that, "I'm a relatively new CIO and while there have been disaster recovery plans and business continuity plans in place for years, I decided to test them about six months ago and we discovered they were old and not realistic. This is something I will tell the person after me to do and encourage others in government and the commercial world to do. Regularly test the plan!"

Further, CIOs detailed supply chain disruptions that mirror what has been widely reported across the rest of the country. However, CIOs were quick to point out that, in most cases, the temporary suspension of procurement rules and regulations (due to governors declaring states of emergency) have resulted in procurement processes being "streamlined without apparent degradation of service or integrity."

CIOs also reported that they learned the importance of cross-training employees on legacy systems; good vendor partnerships; centralized operating models that aided in quicker response times; and the CIO as broker model which is here to stay.

As far as what is projected to change post COVID-19, the top CIO responses centered around the general theme of this 2020 CIO survey: making IT operations work more efficiently for the state workforce and citizen experience. Not surprisingly, expanded work from home was ranked as the top business process, practice or investment here to stay post COVID-19 with collaboration platforms/remote meetings taking the number two spot. Put simply, state CIOs think expanded telework is around for the long haul and they will need to make it as easy as possible for the state workforce.

On the citizen experience front, increased attention on digital government and citizen experience ranked third overall for what will change post COVID-19, with investments in broadband ranking fourth and increased priority in legacy modernization fifth.

What business process, practices or investments do you believe will change post COVID-19?

6. Expanded cloud services/SaaS deployment

7. Accelerated use of data analytics

8. Changes to state government facilities, reduction of office space and configuration

9. Broader adoption of artificial intelligence/automation

10. Investments in business continuity and operational resilience

Business Models

In the 2019 State CIO Survey we reported that "the shift of state CIO organizations towards a broker of services model continues." In 2020, based on responses we can confirm that the CIO as broker model continues to grow and evolve. This is shown in the lessons learned reported in the COVID-19 section of this survey and in the responses detailed in this section.

When we asked CIOs to describe the current role of the state CIO organization, we found that the top three responses were consistent with the responses when we last asked this question in 2018: have a voice in state agency strategy and strategic initiatives; drive stabilization of operations; and drive innovation or modernization programs.

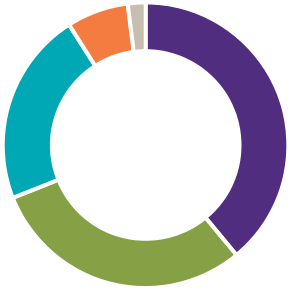
How would you describe the current role of the state CIO organization?	
Have a voice in state agency strategy and strategic initiatives	**83%**
Drive stabilization of operations	**65%**
Drive innovation or modernization programs	**63%**
Proactively identify and remove obstacles that improve the delivery of projects and services	**35%**
Link, monitor and report IT spend versus value delivered	**24%**
Improve program/project delivery metrics	**17%**

We probed state CIOs on what business models and sourcing strategies their organizations currently use. The majority of respondents reported that they use an IT shared services model for some or all IT operations (83 percent). This was followed by outsourcing some of its IT application and services (74 percent); owning and operating a consolidated data center (70 percent) and outsourcing some of its IT infrastructure operations (61 percent). It is important to note that owns and operates all state IT assets and operations was chosen only by 20 percent of respondents. This last indicator is down significantly from when we asked the question in the 2016 State CIO Survey (31 percent). Clearly, states are migrating away from "owning and operating" to "renting" and utilizing X-as-a-Service and third-party cloud solutions.

What business models and sourcing strategies does your state CIO organization currently use?	
Uses an IT shared services model for some or all IT operations	**83%**
Outsources some of its IT application and services	**74%**
Owns and operates a consolidated data center	**70%**
Outsources some of its IT infrastructure operations	**61%**
Owns and operates multiple data centers	**57%**
Uses a managed services model for some or all IT operations	**50%**
Owns and operates all state IT assets and operations	**20%**
Other	**4%**

We also asked CIOs if they planned on changing the operating model of their organization with the majority (52 percent) reporting that they are currently employing or are exploring a modernized business structure. Thirty-nine percent reported no changes by stating that the current structure enables the CIO organization to run effectively and efficiently.

Is there a plan to change the operating model of the state CIO organization?



No, we run effectively and efficiently under the current structure	39%
Yes, we are modeling a new structure	30%
We are beginning to explore a modernized business model	22%
Yes, we have modeled a new structure and looking for governor's/administration's consent	7%
No, there is a desire, but not the support to make the change	2%

We are always curious about future plans within the CIO organization. Unsurprisingly, further consolidation and centralization were big themes in their responses. These advances have been consistent in prior surveys. When we asked how the CIO organization is moving to deliver services to agencies, consolidation of infrastructure was the clear favorite with 78 percent. Of the CIOs who selected this response, 46 percent reported that consolidation of infrastructure was complete; 51 percent reported the move was in process and three percent reported the move to be planned. Centralization of IT project management, oversight under the CIO organization (57 percent) and responsibility for technology procurement within the CIO organization (50 percent) round out the top three service delivery moves. It is also noteworthy that more federation or decentralization of IT roles and personnel to agencies was at the very bottom of the stack (seven percent).

How is the CIO organization moving to deliver services to agencies?

Consolidation of infrastructure	78%
Centralization of IT project management and oversight under the CIO organization	57%
Responsibility for technology procurement within the CIO organization	50%
Consolidation of IT personnel under the central technology organization	41%
Consolidation of applications	35%
Consolidation of technology budget under a central IT organization	30%
Divestiture of technology procurement responsibilities	11%
More federation or decentralization of IT roles and personnel to agencies	7%

One CIO commented, "this shutdown and work at home situation has changed everything for us. It also provides an opportunity to re-engineer the delivery of IT systems in the state in a model that is better, more secure and more cost efficient. The pandemic has created an environment that is allowing us to re-invent so much of what we do to bring us to the modern standards."

In a survey question posed for the last decade, we asked CIOs about their three-year plan to deliver or obtain IT services. CIOs continue to report expanding outsourcing, managed services and as-a-service models and downsizing state-owned and operated data centers. Interestingly, this year 11 percent of CIOs reported expanding state IT staff as compared with 26 percent reporting an expansion in the 2019 State CIO Survey.

Changes to the business model may take several years and must overcome key challenges. We asked about the drivers for increases in the use of brokered services and obstacles CIOs face in acting as a broker for IT services. Cost effectiveness (49 percent); business outcomes (42 percent) and flexibility (38 percent) were the top three strategic or operational issues driving the increase in the use of brokered services. For obstacles to the CIO acting as broker of services, the top three roadblocks were the current funding or recovery model (46 percent); concerns over ability to deliver highly specialized needs of various state agencies or departments (37 percent); and obtaining staff that are experienced in managing services and vendors (30 percent). This is a change from 2019 when the majority of states cited change management and the evolving role of traditional workforce as the top obstacle.

How does your state CIO organization plan to deliver or obtain IT services over the next three years?	**Introduce**	**Maintain**	**Expand**	**Downsize**
State-owned-and-operated data center(s)	**0%**	**47%**	**11%**	**42%**
Outsourcing service model	**9%**	**40%**	**49%**	**2%**
Managed services model	**7%**	**33%**	**60%**	**0%**
IT shared services model	**4%**	**37%**	**57%**	**2%**
"As-A-Service" models (e.g. SaaS, PaaS, IaaS, etc.)	**7%**	**2%**	**89%**	**2%**
State IT staff	**0%**	**70%**	**11%**	**20%**

Finally, in this section we asked about adoption of Technology Business Management (TBM) and software-as-a-service (SaaS). Twenty-eight percent of state CIOs reported having a program such as TBM to measure the cost of enterprise technology at the enterprise level. Thirty-eight percent reported that individual systems/programs (e.g. ERP) are measured while 41 percent have no such program in place.

The importance of understanding the drivers of IT cost was reinforced by a CIO who said, "with the many changes that are taking place, we are absolutely going to need to focus on better understanding the cost of delivering technology. It's not about the lowest cost, but about the best use of resources in this new model that has been thrust upon us. And by the way, it's here to stay, so we need to figure out what this is going to do to our budget and planning."

Seventy-eight percent of CIOs reported that the acceptance of cloud and SaaS-based application delivery has increased the ability and acceptance of using the state CIO organization as a broker and facilitator of service delivery (22 percent said it has not). We also received a few open-ended comments including one CIO who reported that, "consolidation has increased the role of CIO as a service broker for agency requirements." However, another CIO warned that, "agencies enjoy the benefits of having easy to consume cloud contracts managed by our office, however, the implementation of single, enterprise-wide cloud initiatives face many of the same governance concerns as on-prem systems." Another CIO reported, "we implemented several SaaS solutions without doing very much planning or due diligence. This is giving agencies a false sense of confidence about not needing to plan for cloud rollouts." A new challenge arrives with the advent of cloud services. One state CIO also reported that large agencies are "pursuing establishing their own cloud presence." As the CIO as a broker model continues to mature, we should anticipate challenges for the state CIO achieving the promised gains of quality and price control; efficiency and productivity gains; process integration and process optimization. More information on the CIO as Broker Maturity Model can be found on NASCIO's website.

Does the state CIO organization have a program such as Technology Business Management (TBM) in place to measure the cost of enterprise technology on an ongoing basis?

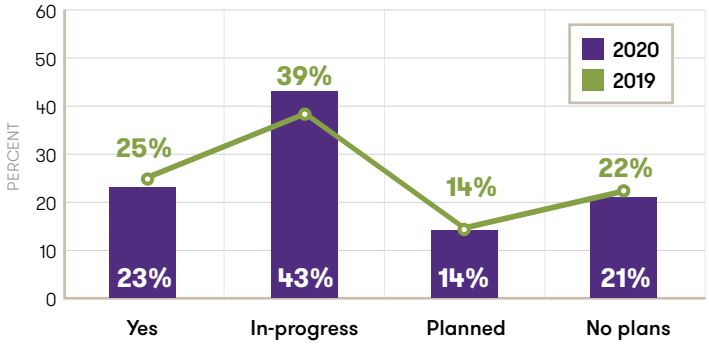
Yes, at the enterprise level	28%
Individual systems/programs (e.g. ERP) are measured	28%
No	41%
Other	2%

Cybersecurity

Cybersecurity remains at the top of state CIO priorities with no sign of changing in the near future. As evidenced in the state and local collaboration section of this publication, states are increasing the interaction and collaboration with local governments with regard to cybersecurity and so we first asked about the whole-of-state approach to cybersecurity. As one CIO commented, "the situation of nearly the entire state workforce working from home has created the need for enhanced security. When you have tens of thousands of people suddenly working from home or the local coffee shop, the vulnerabilities are too numerous to think of."

We define the whole-of-state approach to cybersecurity as collaboration among state agencies, local governments, utilities, private companies, universities, healthcare and others. States are making some incremental progress in this area compared to the last time we asked in 2019: 23 percent have adopted a whole-of-state-approach (25 percent in 2019); 43 percent are in progress (39 percent in 2019); 14 percent have such an approach planned (14 percent in 2019); and 21 percent have no plans (22 percent in 2019).

Has your state adopted a whole-of-state approach to cybersecurity with collaboration among state agencies, local governments, utilities, private companies, universities, healthcare and others?



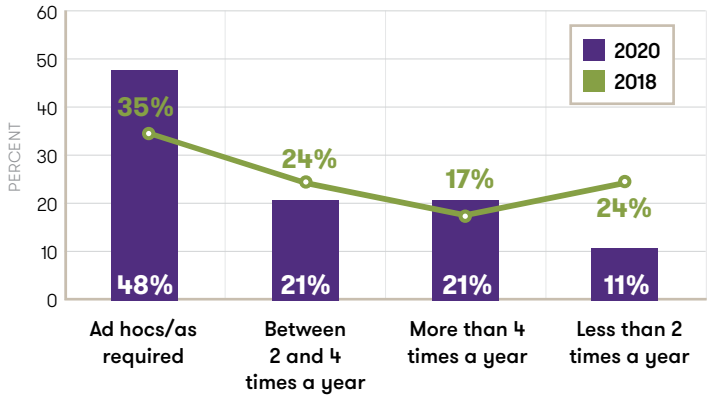
We also asked state CIOs about specific cybersecurity programs currently implemented in their states. As was the case when we asked in 2019, developing security awareness training for workers and contractors took the top spot (96 percent); with acquiring and implementing continuous vulnerability monitoring capabilities (89 percent) and establishing trusted partnerships for information sharing and response (89 percent) rounding out the top three. It is important to note that adopted a strategic plan is down dramatically from previous years: 66 percent this year compared to 74 percent in 2019 and 85 percent in 2018. We have had a significant turnover of state CIOs since the 2019 State CIO survey responses were collected which may account for this discrepancy. Many of the new CIOs this year may not have *personally* adopted a new strategic plan during their tenure. Additionally, the percentage of those who have adopted a cybersecurity framework is down 14 percent and we believe that our clarification of adding NIST to the response is the cause of the decrease (there are other frameworks like FISMA, ISO and CIS that some states have adopted).

Characterize the current status of the cybersecurity program and environment in state government.

Developed security awareness training for workers and contractors	**96%**
Acquired and implemented continuous vulnerability monitoring capabilities	**89%**
Established trusted partnerships for information sharing and response	**89%**
Adopted a cybersecurity framework, based on national standards and guidelines (based on NIST)	**80%**
Created a culture of information security in your state government	**77%**
Developed a cybersecurity disruption response plan	**66%**
Adopted a cybersecurity strategic plan	**66%**
Obtained cyber insurance	**55%**
Documented the effectiveness of your cybersecurity program with metrics and testing	**52%**
Used analytical tools, AI, machine learning, etc. to manage cyber security program	**41%**

Finally, we asked CIOs about how often they communicate with legislators concerning business risk and their state's ability to protect against external cyberattacks. As was the case when we last asked in 2018, ad hoc/as required was the highest response with 48 percent (35 percent in 2018). More CIOs reported communicating between two and four times a year and more than four times a year while there was a decrease in the number of CIOs reporting communicating less than two times per year.

How often do you communicate with legislators on the level of business risk and your state's abilities to protect against external cyber attacks?

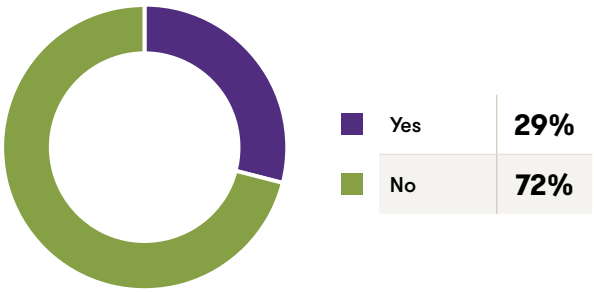


Privacy

For the first time since 2015, we asked state CIOs about privacy. Although the topic of privacy has always been on the mind of states, the implementation of the European General Data Protection Regulation (GDPR) in 2018 and the California Consumer Privacy Act in 2020 have brought the issue more to the forefront. So, we first asked about privacy legislation in the states. While we know that a few states have introduced sweeping privacy legislation (California and Washington, for example), only about one quarter of states have introduced legislation specifically addressing citizen data privacy that would affect operations of the state CIO organization.

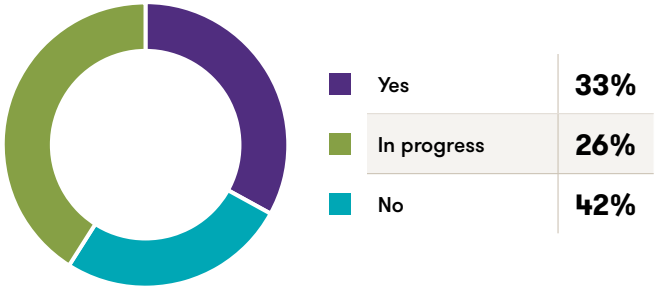
From comments received, it seems that CIOs are somewhat divided on the importance of privacy legislation and policies. One CIO responded that, "it slows down or even stops high value projects." Another CIO wrote, "its increased workload in order to facilitate transparency in data breach reporting and public requests for information." However, in our in-person interviews, the importance of privacy was underscored by one CIO who stated, "privacy is a bigger issue today than it was last year and I suspect – as do my peers – that it will be even bigger next year. Government is all about data and we need to protect it."

Has your state passed legislation specifically addressing citizen data privacy that would affect the operations of the state CIO organization?



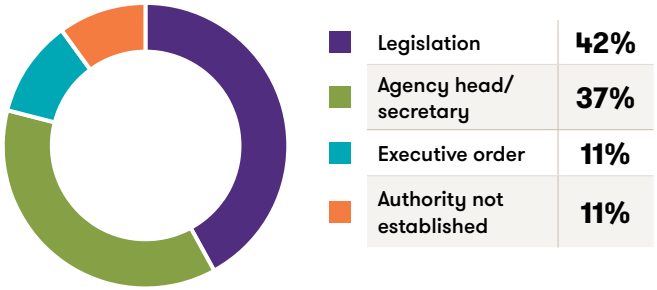
Even with the absence of a legislative mandate, state CIOs are largely implementing additional enterprise-wide data privacy policies. Nearly 60 percent of states have or are in the process of implementing additional enterprise-wide data privacy policies. Forty-two percent are not.

Has your state implemented additional enterprise wide data privacy policies?



With the rise of discussions surrounding privacy in state government, many states have created and filled a chief privacy officer (CPO) position. Forty-four percent of states reported having a CPO or equivalent position. Anecdotally, we know that only around a quarter of states have a standalone CPO position established but many more have privacy responsibilities assigned to someone else within the state. Fifty-six percent of states reporting do not have a CPO. Of those states with a CPO or equivalent, we asked how the position's authority is established and the majority of states reported that authority is established via legislation (42 percent) or agency head/secretary directive (37 percent).

If you have a state Chief Privacy Officer (CPO) or equivalent position, how is the position's authority established?



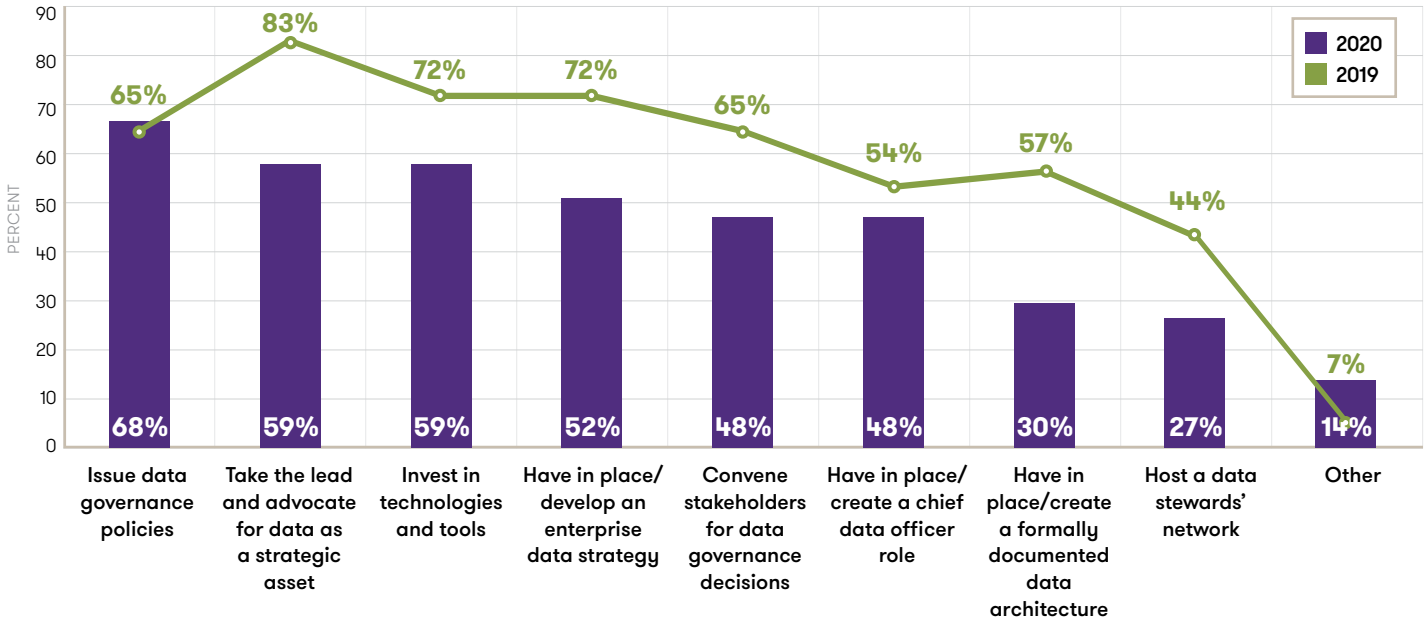
Data Management and Analytics

Increasingly, data management and analytics are playing a central role in decision-making and service delivery for state governments with CIOs often taking the lead. And we anticipate even more emphasis on necessary insight enabling analytics employed across all state agencies as they formulate their mitigation strategies in light of the 2020 pandemic. This year's survey again asked about the role of the CIO in enterprise data management, as well as questions to better understand how CIOs service the data analytics needs of their customers and in what areas of government states are currently employing data analytics.

One CIO commented, "our stakeholders are now coming to understand what can be done and how we can manage with more and better data. The paradigm has changed from just having a single system of record with all the data in one place. It's now about the analytics of that data and using it to inform our decision-making process."

Perhaps the most notable results surfaced from the question regarding the current and planned role of the state CIO in enterprise data management. When asked about the CIO's current or planned role in enterprise data management, CIOs taking the lead and advocating for data as a strategic asset saw the sharpest decline (59 percent in 2020 compared to 83 percent in 2019). There were similar declines in other aspects of data management including the development of data strategy (52 percent in 2020 compared with 72 percent in 2019) and investments in technologies and tools (59 percent in 2020 compared with 72 percent in 2019). These differences may reflect that much work was completed in 2019 and less investment in time and other resources is required in 2020. Note that issuing data governance polices is sustaining in level of effort from 2019 to 2020 at about 68 percent. This may be due to the increased need for insight enabling analytics which required solid data governance over the input stream to those analytics. While it is not clear what the causes are of the decreases we see in some of the aspects of the CIO role in enterprise management, some respondents indicated that their agency did not have purview over this policy area or that their plans in this area were on hold due to COVID-19.

What is the current or planned role of the state CIO organization in enterprise data management?



While CIO roles in enterprise data management appear to be narrowing in some areas, the 2020 survey results indicate that the CIO role as it relates to providing and enabling data analytics continues to grow. When asked to identify which aspects of a data management and analytics program are most important to them, 61 percent of CIOs indicated that analytics and visualization tools/methods are useful and productive means for decision-making. Of the other program features to rank, only data security (75 percent) scored higher.

State CIOs were again asked to share how they service their customers' data analytics needs. In addition to continuing to prioritize providing the tools (56 percent) and procuring needed solutions (47 percent) for customers, CIOs are increasingly promoting the use of insight enabling analytics (51 percent) and defining enterprise policy (53 percent) for their customers. Of those CIOs responding in 2020, only nine percent indicated they currently were not providing data analytics services to their customers in comparison to 20 percent of respondents from 2019.

An aspiration shared by one CIO was, "I am hoping that a positive outcome of all of this (COVID-19 shutdown) is that we are able to provide analytics into the services the state delivers to the citizens. I always use data to measure my organization's effectiveness, and hopefully citizen service agencies will understand the importance of proper data management and the power of analytics to provide better services to our constituents and those most in need."

As the role of the CIO continues to evolve to increasingly provide and enable data analytics for customers, this year's survey asked respondents to provide insight on how their states are currently using these tools. The vast majority of CIOs (73 percent) indicated that these tools are utilized to promote transparency and accountability for citizens as well as to create enhanced dashboards and inform data-driven policy making (also 73 percent). It would seem that many states are in fact in a good position to exploit a solid analytics capability in evaluating enterprise-wide strategies for the near and mid-term future. Such a future is expected with the realities of constrained budgets, expanded digital services (such as unemployment insurance processing), preemptive analysis to surface the next set of issues related to the global pandemic and, of course, program outcomes for the many agencies served by the state CIO. These will include human services, education, public health and public safety.

In which of the following areas does your state currently utilize data analytics?

Transparency and accountability to citizens	**73%**
Creating enhanced dashboards and meaningful reports	**73%**
Data-driven policy making	**56%**
Ease of combining data from multiple sources	**44%**
Surfacing insights from the data, or insight-enabling capabilities	**42%**
Workforce planning and analytics	**36%**
More efficient public service delivery	**36%**
Performance-based budgeting	**31%**
We do not use data analytics	**4%**
Other	**4%**

Agile and Incremental Delivery Methods

Use of Agile and incremental software delivery approaches continue to progress in state governments. When we first asked CIOs in 2015 about their use of these approaches, most CIOs reported limited use, or pilots occurring on certain projects. Five years later, 39 percent of CIOs reported widespread use of Agile software delivery approaches that are not subject to centralized oversight or guidelines. While this is an increase of 18 percent since 2015, we see little change year-over-year in CIOs reporting widespread use that is subject to centralized oversight or guidelines and no significant change of CIOs reporting limited or uncoordinated use. This may suggest states are becoming more open to adopting Agile methodologies generally, but less inclined to prescribe a centralized approach.

It is notable that CIOs that have implemented Agile or incremental software development methods continue to provide consistent responses regarding their success. Responses have not varied since the question was first asked in 2015. CIOs continue to favor Agile development over traditional waterfall software development with 47 percent indicating that Agile is a superior approach. When asked to characterize the success of Agile in their state, CIOs shared varying perspectives. While some shared their success with waterfall in terms of budget savings and project management, others questioned the overall opportunity cost and benefits. Lack of client readiness, limited budget and staff time and resources were all mentioned as barriers to successful use of Agile. Several CIOs, however, commented that they experienced success employing a hybrid approach to mitigate procurement, staff and budgetary hurdles.

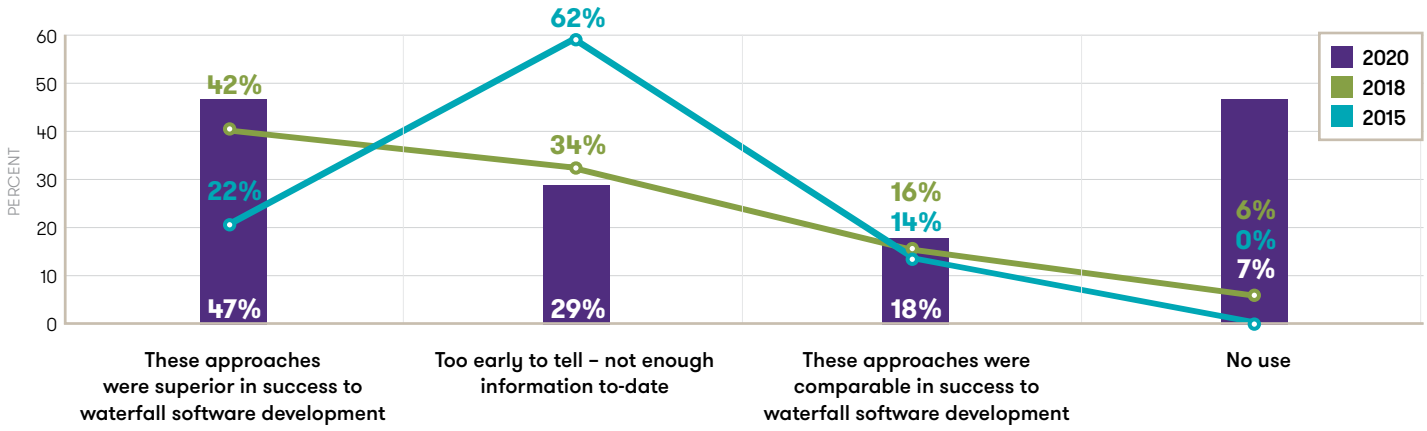
One CIO commented, "I am hoping the lack of ability to congregate at work forces the more widespread use of Agile. We all know it's better and faster to do it this way, but sometimes hard to convince those that have been doing it 'this way' for so long."

How would you characterize the use of Agile or incremental software development approaches within your state?	2015	2017	2018	2020
Widespread use, but not subject to centralized oversight or guidelines	21%	37%	28%	39%
Limited use, uncoordinated	34%	17%	22%	22%
Widespread use, subject to centralized oversight or guidelines	9%	10%	18%	17%
Pilot/trial adoption on certain projects	32%	34%	26%	15%

Most notably in this year's survey, 38 percent of CIOs indicated that their state's procurement policies fully support the use of Agile and incremental software development practices, which represents a notable shift from 2017 when this question was last asked (20 percent). Forty-seven percent of CIOs indicated that their state's procurement policies partially support these practices.

Only 16 percent indicated that the state's procurement policies are averse to moving towards an Agile approach. A range of comments from various CIOs indicate that each state is unique in both the successes and challenges faced when trying to implement Agile methods of software development.

To the extent that Agile or incremental software development approaches have been followed on projects in your state, how would you characterize their success?



Finally, there is a rather dramatic change in the utility of Agile. Those CIOs who responded "too early to tell" regarding the success of Agile has moved from 62 percent in 2015 down to 29 percent in 2020. And in parallel, those CIOs that responded "... superior to waterfall" has moved from 22 percent in 2015 to 47 percent in 2020. This trend is expected to continue. Many states face statutory challenges, procurement and regulatory hurdles or lack of interest to adapt to such a new model. With that said, several CIOs have seen success in adapting to an Agile approach and strategically implemented Agile on targeted projects where there are less hurdles to implement.

How well do your state's acquisition/procurement policies and processes support the use of Agile and incremental software development approaches?

Fully support them now	38%
Partially support them now	47%
Do not support them at all	16%

Digital Government

This year we sought to gauge the impact of COVID-19 on how states were looking to change their interactions with citizens, visitors, businesses and employees. Participants were asked about the biggest driver to establishing digital services. Almost all participants (98 percent) agreed improving the online experience for citizens was the number one priority. More than two-thirds agreed that increasing public participation and optimizing operations and lowering costs were top priorities. This suggests making government work in a remote work environment and social distance setting are top priorities. As one CIO stated, "this isn't even a question at this point. Government is now digital. Our world is now going to be all, or very largely digital."

What is the biggest driver to establishing digital services

Better online experience for citizens	98%
Optimizing operations and lowering costs	73%
Increased public participation and engagement	64%
Better collaboration among state agencies	52%
Providing more opportunities for innovation	48%
Empowering frontline government employees to collaborate and increase productivity (employee engagement)	32%
Leveraging data analytics to identify new service opportunities	32%

The point was reinforced by another respondent: "our citizens need to interact with government. What we are painfully finding out is that we were not as strong as we thought in some areas, i.e. unemployment insurance systems. We are adjusting very quickly, adapting and now adopting new business models. They will change as we figure this all out, but make no mistake, it's here to stay."

Have you seen any benefits from your digital transformation efforts?

Yes, our digital efforts are having a positive impact	65%
It is too early in the process to measure the impact	30%
We have not started	5%

A natural follow-up to the question on what is driving a state's digital transformation is asking about the benefits from digital transformation efforts. A resounding 65 percent reported that digital efforts are having a positive impact, while 30 percent said it is too early to tell. We asked our respondents to comment on their digital transformation efforts. Their observations were quite telling:

> **"Consistent look and feel for citizens ensuring all sites are WCAG accessible ensuring all sites are mobile friendly."**

> **"Research and user behavior activities have shown solid measurable improvements in many areas"**

> **"Most recently our governor's office recognized the effort of the digital team in improving our coronavirus site."**

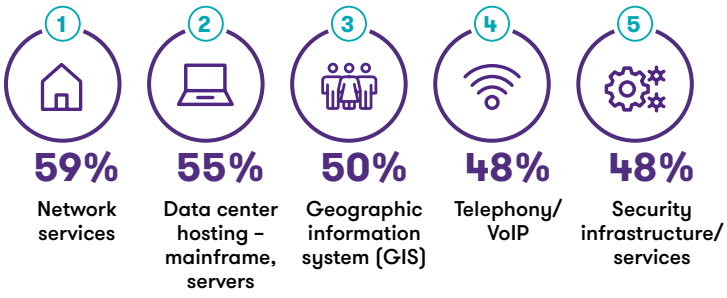
State and Local Collaboration

2019 has been referred to by some as the year of ransomware. High-profile cyber incidents including the August 2019 attacks on local governments in Texas, the coordinated attack on Louisiana public schools and the Baltimore cyber disruption have been widely publicized. Because of the publicized—and many more unpublicized—incidents, states in 2020 are increasingly collaborating with local governments to enhance their cybersecurity posture and resilience. In fact, the vast majority of CIOs (76 percent) in 2020 reported increased collaboration and communication with local governments in the last year.

Specifically, in this section, we asked what services state CIOs are *offering* to local governments. It should be noted that we changed the wording of this question from 2019 when we asked which services state CIOs *provide* to local governments. We made this decision based on our conclusion that there are a number of services that states offer to local governments that many local governments are not utilizing. We believe this change clarified CIO responses and is the reasoning behind the decline in several service categories. However, even with the percentage changes, the top three responses to this question remain consistent from last year: security and infrastructure services; network services; and data center hosting. It is important to note that nearly half (49 percent) of states report a plan to expand services to local governments in the next year (no plan: 36 percent; do not know: 16 percent). As one CIO commented, "we will continue to do what we can to work with local governments. We are essentially the big brother to the counties and cities and need to help however we can."

We also questioned CIOs about their specific interaction with local governments. An even split of CIOs reported that local governments are consulted prior to issuing a solicitation on the acquisition/procurement process for contract vehicles available to local governments. This was a change from 2019 when only 42 percent of state CIOs reported that local governments are consulted prior to solicitation. Additionally, there was a small increase of states who have a formal marketing awareness campaign to promote state offerings to local governments: up to 36 percent in 2020 from 31 percent in 2019.

What services does the state CIO organization offer to local governments?



Cloud solutions/hosting	43%
Co-location	43%
Business continuity/disaster recovery	41%
Backup services	39%
Digital government services/portal	39%
Email/office productivity	39%
Video/web conferencing	36%
Storage	34%
Database hosting/maintenance	34%
Website hosting	32%
Business intelligence/data analytics	30%
Cellular phone service	30%
Digital archiving and preservation	25%
Identity and access management	23%
Imaging/file retention	23%
IT training	23%
Mainframe services	23%
Applications development/support	23%
Records management	18%
Other	18%
Enterprise Resource Planning (ERP)	16%
Mobile apps	14%

Cloud

Frequent viewers of business and financial news outlets often hear how COVID-19 has accelerated the move to the cloud in work and personal life. With a huge surge of online shopping during the pandemic, sellers have relied on cloud services to meet demand and scale solutions. State governments faced similar spikes in online transactions. With the pressure on legacy systems, respondents were asked about a strategy to migrate legacy applications to the cloud. Forty-one percent of respondents have a cloud first strategy for new applications and another 17 percent have instituted or are in the process of instituting infrastructure-as-a-service. With the impact of the pandemic, this is a trend that is likely to continue.

Does your state CIO organization have a strategy to migrate legacy applications to the cloud?

We have a cloud first strategy for all new applications deployed to the cloud (when feasible)	41%
There is no statewide cloud migration strategy, but agencies are encouraged to leverage the cloud	29%
The state is moving or has moved to Infrastructure as a Service or third-party data center hosting, however applications are still managed by the individual agencies	17%
No cloud migration strategy planned or in place	14%

In addition to "how" states are managing their migration to the cloud, there is the question of "what" is being migrated. When asked to rank the top five categories of services for migration to the cloud, the services most popular in cloud migration were email, disaster recovery, office productivity applications, ERP systems and security services/monitoring. This suggests some combination of a start small approach and take on bigger projects as the organization grows in maturity, combined with letting a third party handle the maintenance and operations. The impact of the COVID-19 pandemic on migration to the cloud was clear for several CIOs:

> **"We have been able to significantly speed up our cloud migration activity due to the pandemic. I want to move everything possible to the cloud as fast as possible. We have already told landlords we are not renewing leases at our data center."**

> **"We have a cloud-smart approach. There are new considerations to be taken into account with what is likely to stay a largely remote workforce and we are adjusting our approach to take this into account."**

With cloud becoming more accepted as part of everyday operations, the question remains, how are these efforts managed and coordinated? What's the governance structure? We asked respondents about statewide standards and/or best practices for agencies to follow and more than 80 percent said they are providing support and governance. Additionally, 60 percent are establishing standards for security and identity management. And less than half of respondents have a statewide strategy for application, platform or infrastructure. This could be interpreted as states providing a limited view of standards but not driving a centralized approach.

What categories of services are your top priorities for migration to the cloud?

It is also important to recognize that cloud strategies are a significant enabler of the state CIO as broker operating model and must be managed as a significant component of any state CIO business model. The CIO as broker model depends on a "plug and play" capability.

Which of the following are statewide standards and/or best practices for agencies to follow in your state?

We provide support and governance for agencies migrating applications to the cloud	**84%**
We have standards for cloud security and identity and access management	**64%**
We have a cloud strategy for new investments in platform(s) for hosting and web	**43%**
We have a cloud strategy for new investments in infrastructure-as-a-service and third-party data center hosting facilities	**39%**
We have a cloud strategy for all new applications and software-as-a-service and native application development software	**34%**
There are no statewide standards and agencies may make decisions in their best interest	**18%**

Emerging Technology

The responses from this year's survey on emerging technology continued many trends from the 2018 and 2019 surveys and also added valuable insights into why CIOs are deploying advanced technology. COVID-19 was definitely seen as an accelerator of adoption of emerging technology by a number of CIOs:

> **"The need to use emerging technology has been thrust upon us. I think this is the first real-life time an absolute use case has been made for AI."**

> **"People are now seeing the need and helpfulness of things like chatbots. We are using them widely and people are accepting it more and more as the norm."**

CIOs were asked the top three reasons why they are interested in automation. Seventy-seven percent chose improving citizen services and 75 percent selected improving service for internal government processes. This is a slight but consistent change from 2019 and suggests CIOs are more focused on using technology to improve business value and solve business problems.

What are the strategic or operational issues that are driving the interest in the use of automation software?

Improve citizen services with faster and more accurate response time	**77%**
Remove defects, reduce time, and improve the quality of services for internal state agency processes	**74%**
Improve staff morale by eliminating low-value, repetitive tasks, and allowing staff to focus on strategic projects	**44%**
Increase volumes of data and documents read and processed	**30%**
Lower overall total costs of business	**28%**
Eliminate need for staffing for routine work	**21%**
Institute and enforce business processes for an agency or department-wide	**14%**

While the survey was conducted several weeks after the start of the COVID-19 pandemic, we were hoping responses would shed insights on how CIOs are leveraging emerging technology. Continuing last year's trend, CIOs ranked artificial intelligence as the most impactful emerging technology in the next three to five years. We added a response option of low-code application development and, as a first-time option, one third of CIOs chose it as the most impactful emerging technology. A key observation is the continued drop off in interest around the Internet of things (IoT) with only two percent of CIOs ranking it as the most impactful new technology, compared to the 2017 CIO survey, when IoT took first place at 43 percent. This could reflect the widespread adoption of IoT in the states and the perception that it is no longer considered an emerging technology by respondents.

What emerging IT area will be most impactful in the next 3-5 years?

AI (machine learning, RPA, chatbots)	61%
Low-code application development	33%
Internet of Things (IoT)	2%
Connected/Autonomous Vehicles	2%
Other	2%

A new question we asked gauged the preferred method for deploying emerging technologies and CIOs were able to select all that applied. The consistent theme among the respondents was a decentralized and start small approach. Seventy-five percent encourage agency pilots and more than half (53 percent) organize vendor demonstrations. It should be noted that 54 percent of CIOs indicated they do not have a single statewide approach, with agencies selecting technologies instead based on their needs.

What is your preferred method for deploying emerging technologies?

We encourage pilot initiatives among the agencies	74%
We organize vendor demonstrations to showcase how emerging technologies can solve agency challenges	54%
There is no single method. Agencies select technologies based on their needs	54%
Identify in enterprise architecture	33%
We have established an innovation center	16%

Disaster Recovery and Business Continuity

We surveyed CIOs to learn about their approaches to IT disaster recovery (DR) and business continuity (BC) in state government. In addition to characterizing their general approach, CIOs were asked if they had written crisis communication plans, what role the CIO plays in helping their state respond from disaster and if they had a DR/BC plan prior to COVID-19. A majority of respondents (61 percent) indicated that they employed a federated approach to IT disaster recovery and business continuity, meaning that they leveraged a mix of agency and CIO organization responsibilities to respond to the disaster. Around one fourth of CIOs (23 percent) responded that they employed centralized DR/BC services, making the CIO fully responsible for disaster response. Only 11 percent of CIOs use a decentralized strategy, indicating that all responsibility for disaster recovery services fell to each individual government agency.

Please characterize the general approach to IT disaster recovery and business continuity in state government.

Federated – a mix of agency and CIO organization responsibility for disaster recovery/business continuity	**61%**
Enterprise/centralized – CIO delivering all disaster recovery/business continuity services	**23%**
Decentralized – agencies responsible for their own disaster recovery/business continuity	**11%**
Other	**5%**

When asked about the CIO role in state response and recovery, the top three roles performed by CIOs were to maintain a robust, reliable and secure infrastructure (96 percent), coordinate with other state officials (91 percent) and restoration of communication services (84 percent). This indicates that CIOs see their role as focused on continuity of operations as opposed to provision of new or enhanced services while states recover from a disaster.

We also asked about written crisis communication plans and the majority of CIOs (82 percent) either have a plan or are in the process of creating one. Only 14 percent indicated that no plan was in place.

Finally, CIOs were asked to indicate whether the state CIO organization had a pandemic annex as part of the DR/BC plan prior to COVID-19. Only 32 percent had one in place, while 68 percent indicated that no pandemic annex was present prior to COVID-19. It is expected that the COVID-19 pandemic will change this outlook, and, in the future, more CIOs will advocate for a pandemic annex as part of the DR/BC plan. Several of the CIOs interviewed said they had just tested their disaster recovery plans and adjusted.

What is the state CIO's role in helping the state respond and recover from a natural or man-made disaster?	
Maintain a robust, reliable and secure infrastructure	**96%**
Coordinate with other state officials	**91%**
Restoration of communication services	**84%**
Assist in developing delivery work around processes while DR/BC implementations occur	**66%**
Update state website with status reports, alerts and notifications	**66%**
Providing portable communication services	**46%**
Coordinate business process analysis in support of services restoration	**43%**

Broadband

This year's survey included questions on broadband, which, as the COVID-19 pandemic response has demonstrated, is crucial in the everyday lives of Americans. Broadband has been one of the State CIO Top 10 Priorities, however, this year's survey has reflected its growing importance for CIOs. Reaching hard-to-serve populations is being recognized by CIOs as a particular challenge.

CIOs understand the importance of broadband in supporting many of their needs stated in the previous sections of this report. From supporting remote work solutions to providing education and healthcare opportunities for their citizens, they know that they need an expansive and reliable broadband network to make these needs accessible and successful. The pandemic has only heightened those needs, which is why this year, 81 percent of respondents said that their states will now accelerate the implementation of their broadband strategies in light of COVID-19.

However, the management, elements and development of broadband strategies varied among respondents. Seventy-five percent of states have developed broadband strategies, while 25 percent have not, or have not fully developed strategies. Of those states with strategies, 79 percent updated them within the last year, while others updated them one year ago (nine percent) or two or more years ago (12 percent). Most respondents stated that plans are updated every year (27 percent) or every two years (22 percent). Twenty percent said that no updates were planned for the coming year.

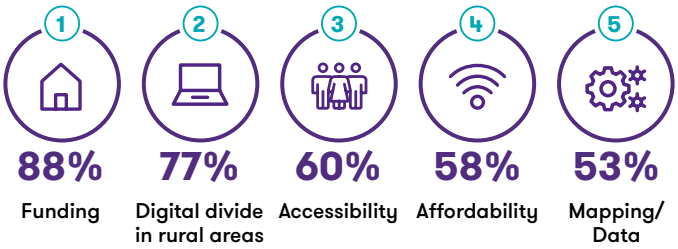
What role does the state CIO play in the state's broadband strategy?

Member of statewide team involved in strategic planning	73%
Contract oversight of broadband providers	28%
Leading strategic planning	23%
Implementation	23%
Other	23%
Network security	18%

The role of CIOs in a state's broadband strategy was overwhelmingly described by respondents as part of a larger team (73 percent). Only 23 percent said they lead strategic planning. Other roles they play are implementation (23 percent), network security (18 percent) and contract oversight of broadband providers (28 percent). Several respondents said that their roles will be further defined when "mapping" and "strategic plans" are completed.

We also asked CIOs to choose their top five most important elements in their state broadband strategies and the top choice was funding (88 percent). As one participant noted, "we don't have legislative consensus on how to fund…." Another said, "lack of meaningful funding has made it hard to make progress."

What were the top five most important elements in their state broadband strategies?



> **"There is a challenge to help kids in rural areas connect to their classrooms. I imagine we will become more involved in helping to solve that issue."**

> **"Bandwidth has not been the problem we thought it may present. The real challenge is establishment of service to the lower population areas of the state."**

Conclusion

2020 has been an extraordinary year. State CIOs have had to be enormously agile as the normal slate of CIO challenges have been compounded by the unprecedented demands of responding to the COVID-19 pandemic. In addition to requiring shifts in near-term priorities, with topics such as broadband expansion and adoption becoming much more pressing, the response to the pandemic has also accelerated change in a number of areas where state CIOs were already achieving incremental progress. In particular, the digital provision of citizen services and the adoption of remote work by state employees has by necessity leapt forward and achieved a degree of change that would in normal circumstances have taken multiple years. While no one can predict with certainty how processes and patterns of behavior will change once the immediate crisis of the pandemic has passed, all the CIOs we spoke with felt that at least some of the changes that have occurred this year will become permanent.

It remains to be seen how we will look back on 2020 and assess the long-term impact to state information technology and the role of the state CIO. However, it seems certain that this year will be remembered as a demonstration of the continued ability of the state CIO community to lead through uncertainty, and as a reminder of the critical role CIOs play in the provision of essential services and the continuity of government.

List of states participating in the survey

State of Alaska
Bill Smith
Chief Information Officer

State of Arizona
J.R. Sloan
State Chief Information Officer

State of Arkansas
Yessica Jones
Chief Technology Officer and Director

State of California
Amy Tong
Chief Information Officer and Director

State of Colorado
Theresa Szczurek, PhD
Chief Information Officer and Executive Director (former)

State of Connecticut
Mark Raymond
Chief Information Officer

State of Delaware
James Collins
Chief Information Officer (former)

District of Columbia
Lindsey Parker
Chief Technology Officer

State of Georgia
Calvin Rhodes
State Chief Information Officer and Executive Director

State of Hawai'i
Doug Murdock
Chief Information Officer

State of Idaho
Greg Zickau
Chief Information Officer

State of Indiana
Tracy Barnes
Chief Information Officer and Director

State of Iowa
Annette Dunn
Director and Chief Information Officer

State of Kansas
DeAngela Burns-Wallace
Chief Information Technology Officer

Commonwealth of Kentucky
Ruth Day
Chief Information Officer

State of Louisiana
Richard Howze
State Chief Information Officer

State of Maine
Fred Brittain
Chief Information Officer

State of Maryland
Michael Leahy
Secretary of Information Technology

Commonwealth of Massachusetts
Curtis Wood
Secretary and Chief Information Officer

State of Michigan
Brom Stibitz
Chief Information Officer

State of Minnesota
Tarek Tomes
Commissioner and Chief Information Officer

State of Mississippi
Craig Orgeron, PhD
Chief Information Officer and Executive Director (former)

State of Missouri
Jeff Wann
Chief Information Officer

State of Montana
Tim Bottenfield
Chief Information Officer

State of Nebraska
Ed Toner
Chief Information Officer

State of New Hampshire
Denis Goulet
Commissioner and Chief Information Officer

State of New Jersey
Christopher Rein
Chief Technology Officer

State of New Mexico
John Salazar
Chief Information Officer

State of New York
Jeremy Goldberg
Interim Chief Information Officer

State of North Carolina
Tracy Doaks
Secretary and Chief Information Officer (former)

State of Ohio
Ervan Rodgers
Chief Information Officer and Assistant Director

State of Oklahoma
Jerry Moore
Chief Information Officer

State of Oregon
Terrence Woods
Chief Information Officer

Commonwealth of Pennsylvania
John MacMillan
Deputy Secretary for Information Technology & Chief Information Officer

State of Rhode Island
Bijay Kumar
Chief Information Officer/Chief Digital Officer

South Carolina
Keith Osman
Chief Information Officer

State of South Dakota
Jeff Clines
Chief Information Officer

State of Tennessee
Stephanie Dedmon
Chief Information Officer

State of Texas
John Hoffman
Chief Technology Officer/Interim Chief Information Officer

U.S. Virgin Islands
Rupert Ross
Director and Chief Information Officer

State of Utah
Mike Hussey
Chief Information Officer

State of Vermont
John Quinn
Chief Information Officer and Agency Secretary

Commonwealth of Virginia
Nelson Moe
Chief Information Officer

State of Washington
James Weaver
Director and Chief Information Officer

State of West Virginia
Josh Spence
Chief Technology Officer

State of Wisconsin
Trina Zanow
Chief Information Officer

State of Wyoming
Gordon Knopp
Chief Information Officer

Acknowledgments

We thank state CIOs for participating in this year's survey – the response rate was excellent. We also acknowledge the support and contributions of the sponsoring organizations and the time and expertise of the individuals listed below. To obtain copies of this report go to any of the websites listed below.

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