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NAS CIO

2023 Capitals in the Cloud

Volume 2

Changing the cloud conversation

October 2023

Changing the conversation about cloud

Over the past two years, states have accelerated their adoption of cloud based services and solutions. Some of this adoption is out of necessity. The pandemic-related surge in demand for programs and information like unemployment assistance and public health tracking required swift expansion of scalable constituent services. In hindsight, many states now understand that had key systems been cloud based[1] to begin with, the response to constituent needs would have been more efficient. Today, state CIOs understand that technology investments including cloud are less impactful if not coordinated and integrated with a strategic vision for the organization's business needs. Are you looking to modernize an enterprise resource planning (ERP) system or a new customer relationship management (CRM) system? If so, you will be challenged to find a modern solution that is not based in the cloud. Cyberthreats and the need

for increased security are also driving many states to choose cloud over on-premises infrastructure.[i]

In this way, governments and private sector organizations are alike. Business and IT leaders across the globe reported an increase in the volume and/or scope of their cloud initiatives since 2020.[ii] Survey results from NASCIO and Accenture's new research indicates that 88% of state CIO respondents are expediting cloud adoption across programs, operations and service delivery.

Cloud, however, is not an end in and of itself. It is a means to a modern mode of operation that is more adaptable to constituent needs and market forces and can help organizations become more resilient. Decisions to utilize cloud-based solutions must be driven by customer experiences, improved services and better outcomes. States recognize this and are aligning cloud usage and

decision-making with organizational goals and business strategies. Thirty percent of respondents have completed a cloud strategy or roadmap, and the remaining 70% are actively developing strategies to optimize the cloud's potential. A substantial 60% of organizations have also incorporated cloud adoption into their enterprise IT governance process. This is essential, as cloud services require new ways of funding, as well as managing and monitoring usage and providers. The promising potential from democratization of data and increased cooperation and sharing via cloud-based platforms is necessitating new governance and partnership models.

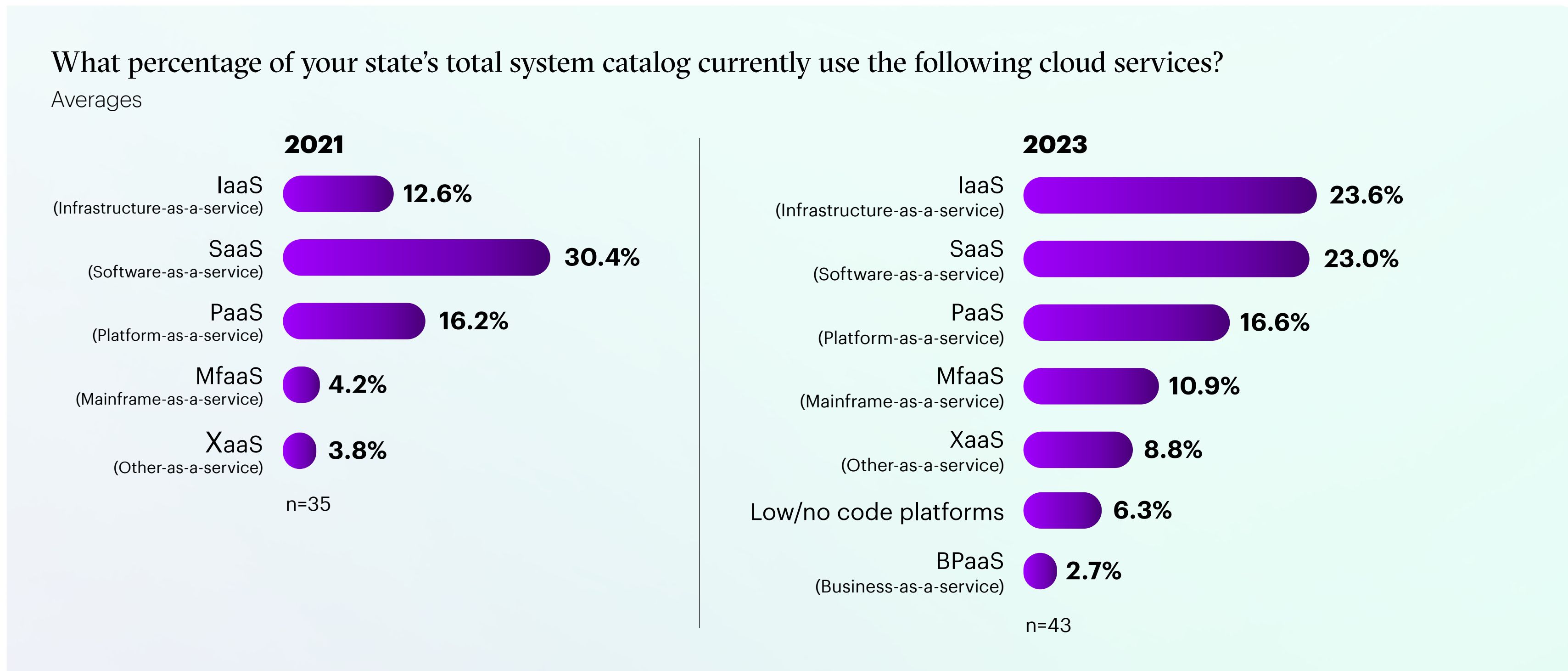> "Cloud is becoming the water we swim in; it's just the way we do business."
>
> **Alan Fuller**
> Chief Information Officer
> State of Utah

[1] Throughout this report, cloud computing is defined as a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications and services), according to NIST.
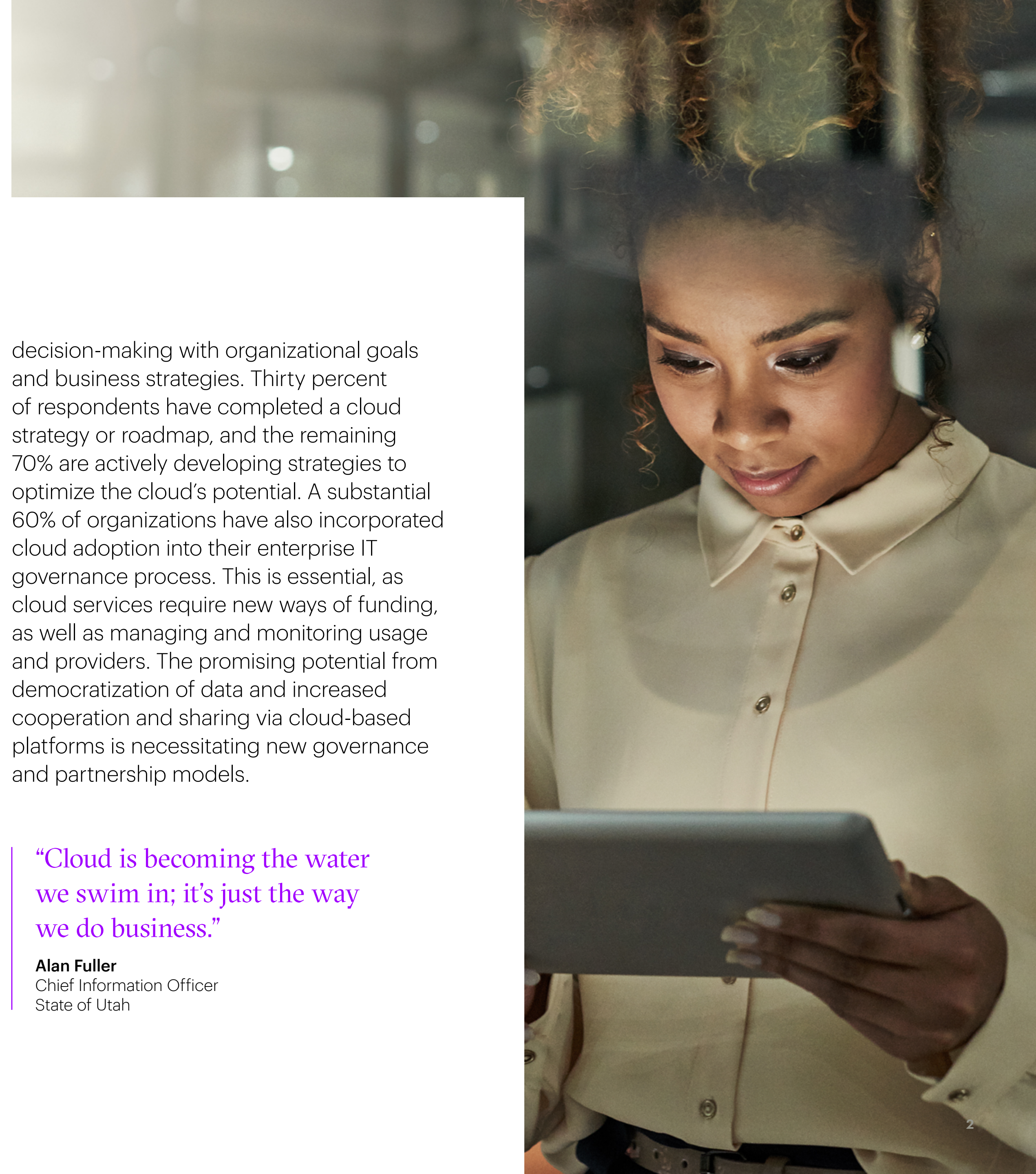
State CIOs have ambitious targets for cloud adoption. According to survey respondents, **the average target for cloud adoption in their state is set at 71% of the total system catalog.**

When it comes to getting to the cloud, hybrid and multi-cloud environments are the new normal. Approximately 23% to 24% of states' total system and application catalogs utilize Infrastructure as a Service (IaaS) and Software as a Service (SaaS) models. Notably, there has been a remarkable surge in investments in IaaS and Mainframe as a Service (MFaaS). Compared to 2021 data, CIOs report that both categories have doubled their presence in the total system catalog, at 24% and 11%, respectively.

What percentage of your state's total system catalog currently use the following cloud services?

Averages

2021

IaaS (Infrastructure-as-a-service)	12.6%
SaaS (Software-as-a-service)	30.4%
PaaS (Platform-as-a-service)	16.2%
MfaaS (Mainframe-as-a-service)	4.2%
XaaS (Other-as-a-service)	3.8%

n=35

2023

IaaS (Infrastructure-as-a-service)	23.6%
SaaS (Software-as-a-service)	23.0%
PaaS (Platform-as-a-service)	16.6%
MfaaS (Mainframe-as-a-service)	10.9%
XaaS (Other-as-a-service)	8.8%
Low/no code platforms	6.3%
BPaaS (Business-as-a-service)	2.7%

n=43

"We were one of those states that did not have a modern unemployment insurance system, and we were crippled under the volume during the pandemic. Had we been in the cloud, we would have been able to process claims, and spin that down when we don't need it. It would have been cost effective. That highlighted the benefits of the cloud to the legislature."

Interviewed State CIO

"We were two years into our cloud adoption journey when the pandemic hit. Because our department was web cloud based, we were able to scale when claims went from 10,000 to 2 million – we didn't suffer what other states did."

Interviewed State CIO

A necessity, not a choice

State CIOs understand the direction cloud technologies have taken and the solutions states and state agencies must consider when modernizing government services. NASCIO's 2023 State CIO Top Ten Priorities[iii] list demonstrates the interdependencies between cloud technologies and other objectives. Digital government and digital services (#2) and legacy modernization (#4) are almost entirely dependent on cloud services (#6). As state CIOs work with agencies and elected officials to deliver modern customer experiences, they must consider cloud technologies as viable options (if not the only options) and convince stakeholders of the same. In other words, cloud is a necessity, not a choice.
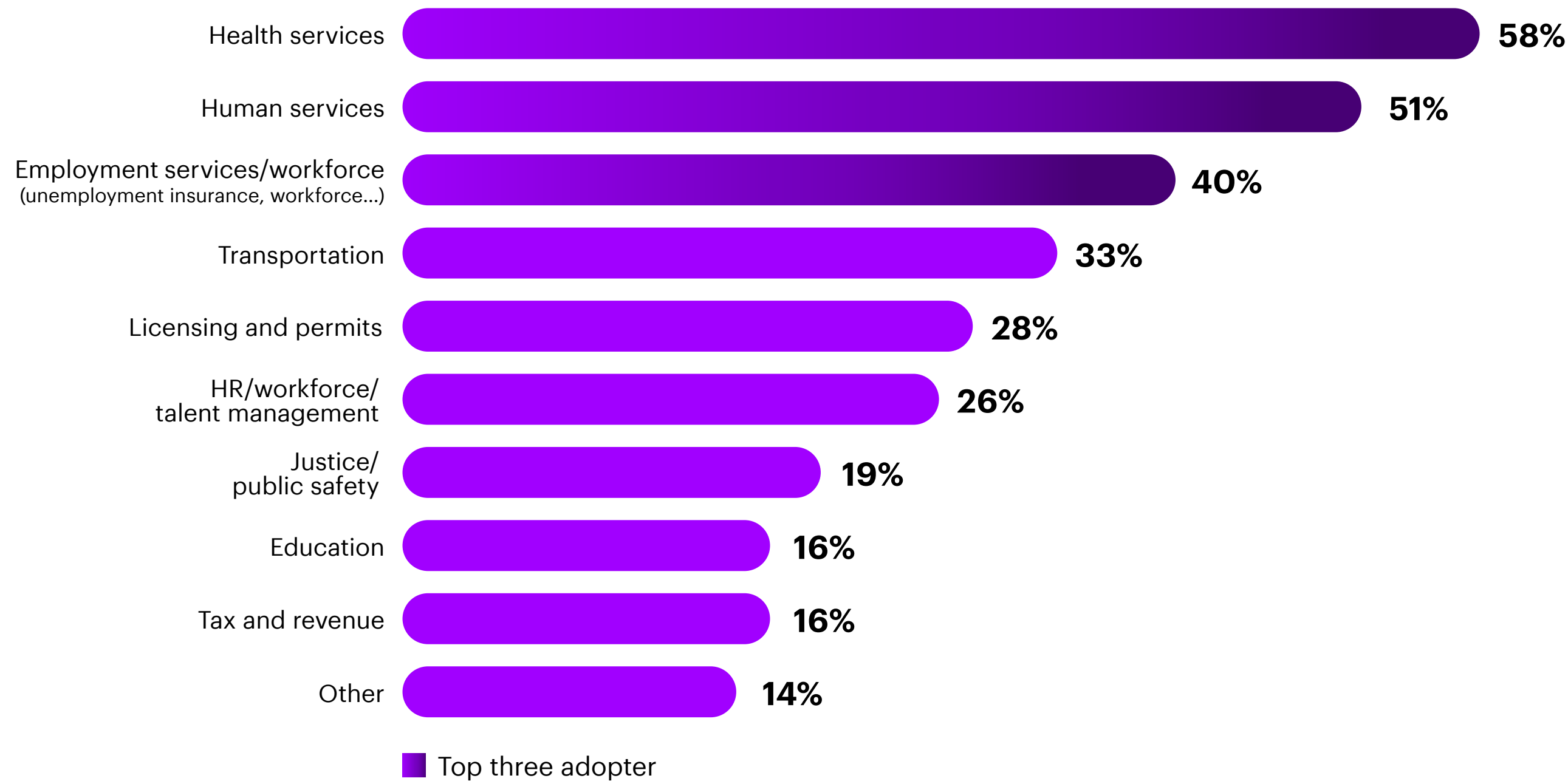
We view this report as more than a status on cloud adoption within states. It is a tool state CIOs can use to help stakeholders understand that modern cloud-based solutions are essential for more responsive and more secure governments. As one state CIO told us, "Cloud is becoming the water we swim in; it's just the way we do business." It is clear state CIOs understand this sentiment and are working hard to help others see the promise and necessity of cloud technologies. The data in this report supports that work and provides insights to assist CIOs in their journey toward improving government services.
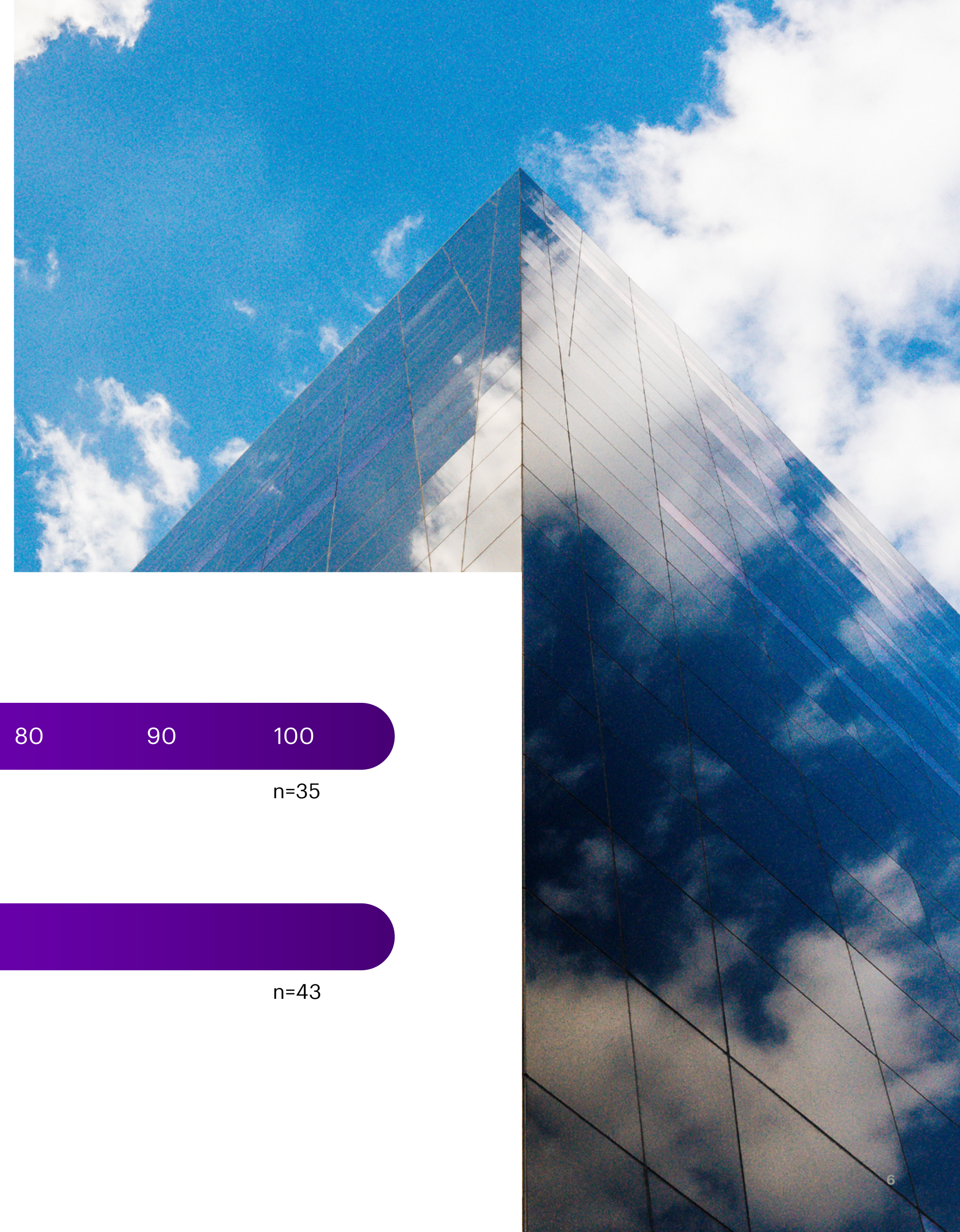
Living in the cloud continuum

When it comes to the adoption of cloud services, health agencies and human services agencies are the frontrunners. These organizations are implementing cloud solutions to enhance their operations and service delivery, especially for claims and case management-based workflows and workloads.

Which of the following state functions have the most broadly adopted cloud services?
Rank top three

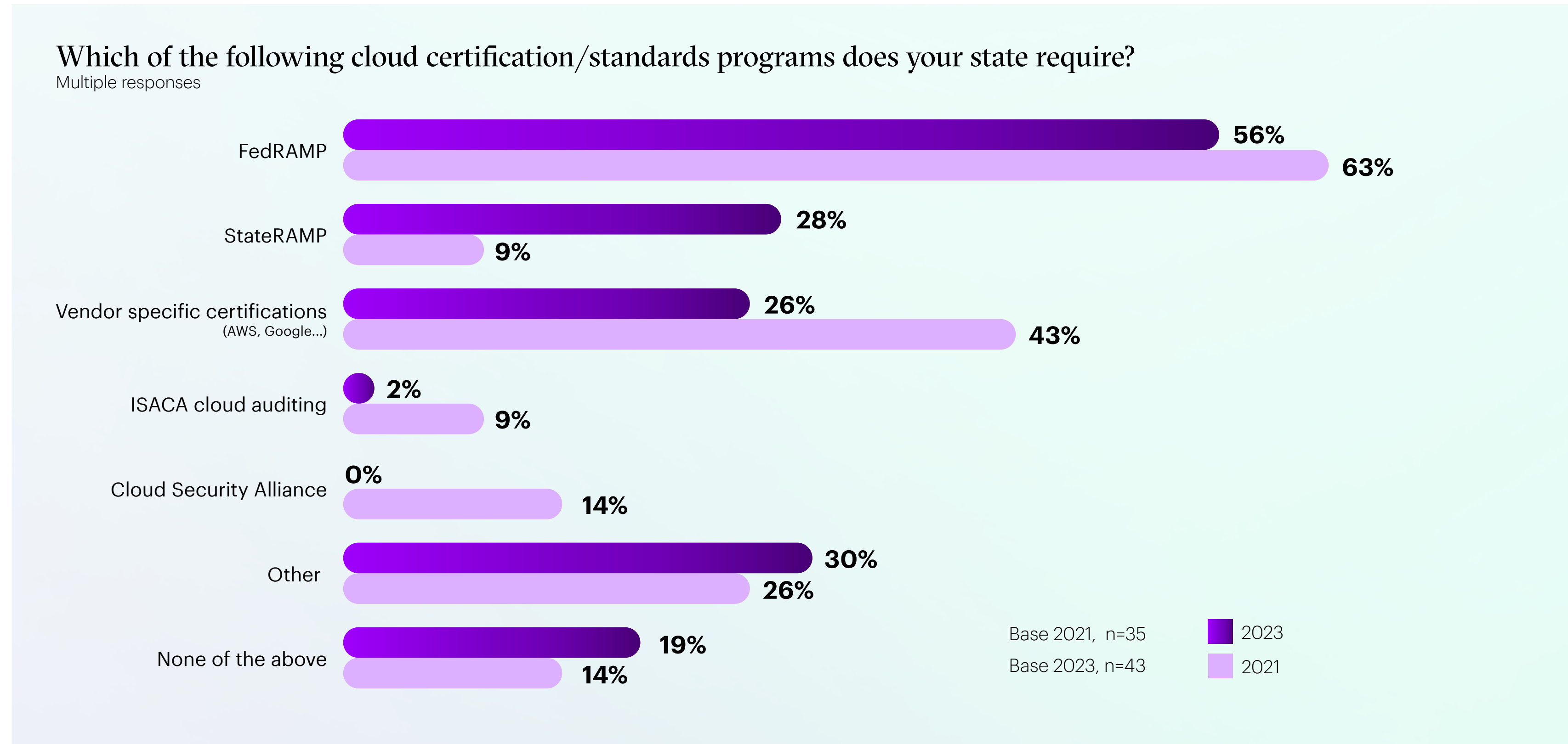| Function	Percentage
Health services	58%
Human services	51%
Employment services/workforce (unemployment insurance, workforce...)	40%
Transportation	33%
Licensing and permits	28%
HR/workforce/talent management	26%
Justice/public safety	19%
Education	16%
Tax and revenue	16%
Other	14%

■ Top three adopter

In terms of procuring cloud services, respondents indicated a notable decline in the number of cloud providers engaged with states. In 2021, the average number of providers per state was 22; as of 2023, the average has settled at seven. While our survey did not explore the reasons behind this change, the shift could be explained in part by the security, economic and elastic benefits provided by the hyperscalers. In addition, some market shifts are occurring as smaller cloud providers are being subsumed into the services and supply chains of the hyperscalers.

How many different cloud service providers are in use in your state?

2021   Average: 22

| 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |

Range: 2 to 100+

n=35

2023   Average: 7.3

| 0 | 10 | 20 |

Range: 2 to 20

n=43

Additionally, there has been a shift towards prioritizing industry-based security certifications, with StateRAMP experiencing a significant increase of 19% and FedRAMP seeing a 7% decrease since 2021, indicating a greater emphasis on widely recognized cloud offering certifications at the state level. There has, however, also been a decline of 17% in the adoption of vendor-specific cloud skills certifications for government IT staff, indicating a potential area for further investigation. It's possible this decline is due to difficulty in finding and hiring cloud certified employees.

Which of the following cloud certification/standards programs does your state require?
Multiple responses

FedRAMP
- 56%
- 63%

StateRAMP
- 28%
- 9%

Vendor specific certifications (AWS, Google...)
- 26%
- 43%

ISACA cloud auditing
- 2%
- 9%

Cloud Security Alliance
- 0%
- 14%

Other
- 30%
- 26%

None of the above
- 19%
- 14%

Base 2021, n=35   ■ 2023
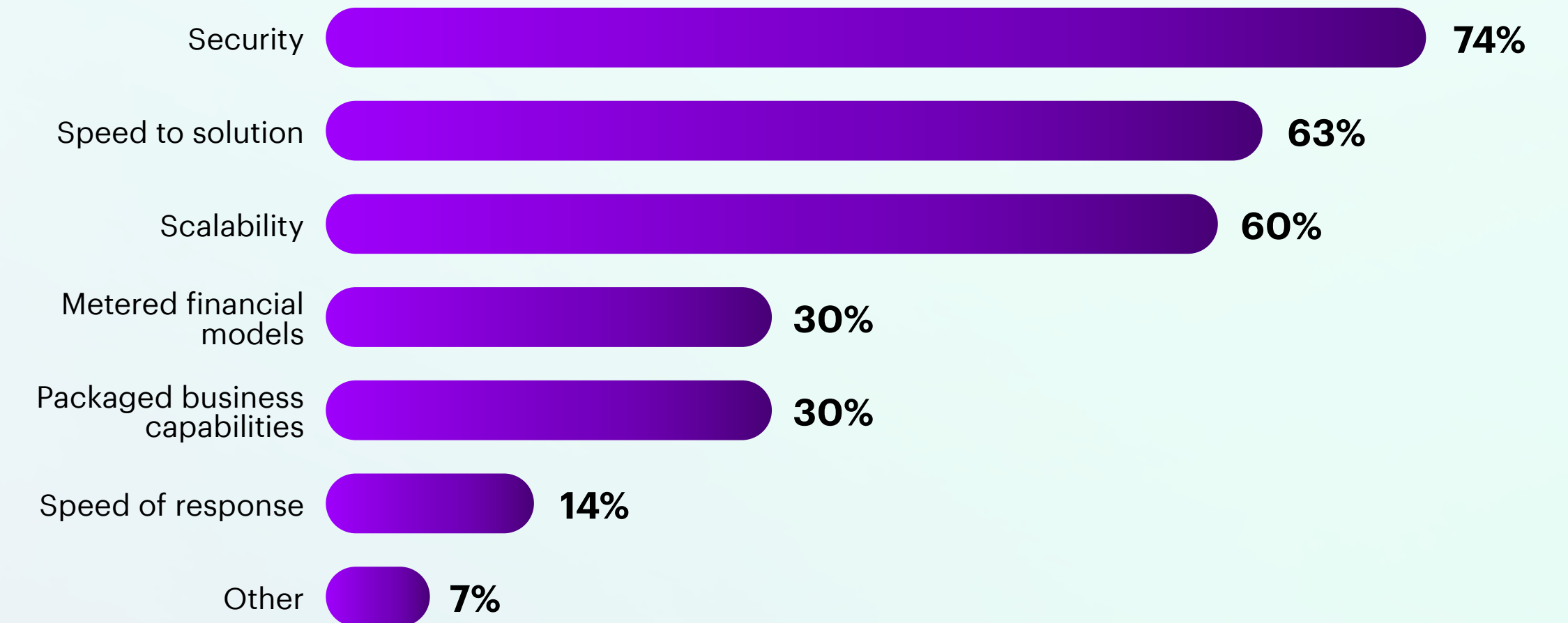Base 2023, n=43   ■ 2021

Tailwinds of cloud adoption

Security is top of mind

Seventy-four percent of state CIOs consider security the most important benefit of cloud computing. Additionally, 87% of respondents agree that the cybersecurity offered by third-party cloud providers is on par with or even better than their own measures. While individual cloud solutions and environments offer strong security measures, states must still evaluate risk across an entire portfolio of cloud solutions and assess the risk profile of moving workloads. We observed in our survey a decline from 40% in 2021 to 28% in 2023 (a decline of 12%) in the up-to-date assessment of state-wide application risks.

Diligence in assessing security risks at the infrastructure and application layers is as important now as it ever has been. Publishing clear security guidelines and policies for assessing cloud solutions independently and within a complete portfolio of services is a step any state can take to help agencies govern the security of new environments. At the same time, a majority of CIOs (53%) do not currently utilize managed security service providers for cloud security management, indicating a reliance on in-house capabilities and potential room for leveraging external expertise when internal cloud security staffing and skills are limited.
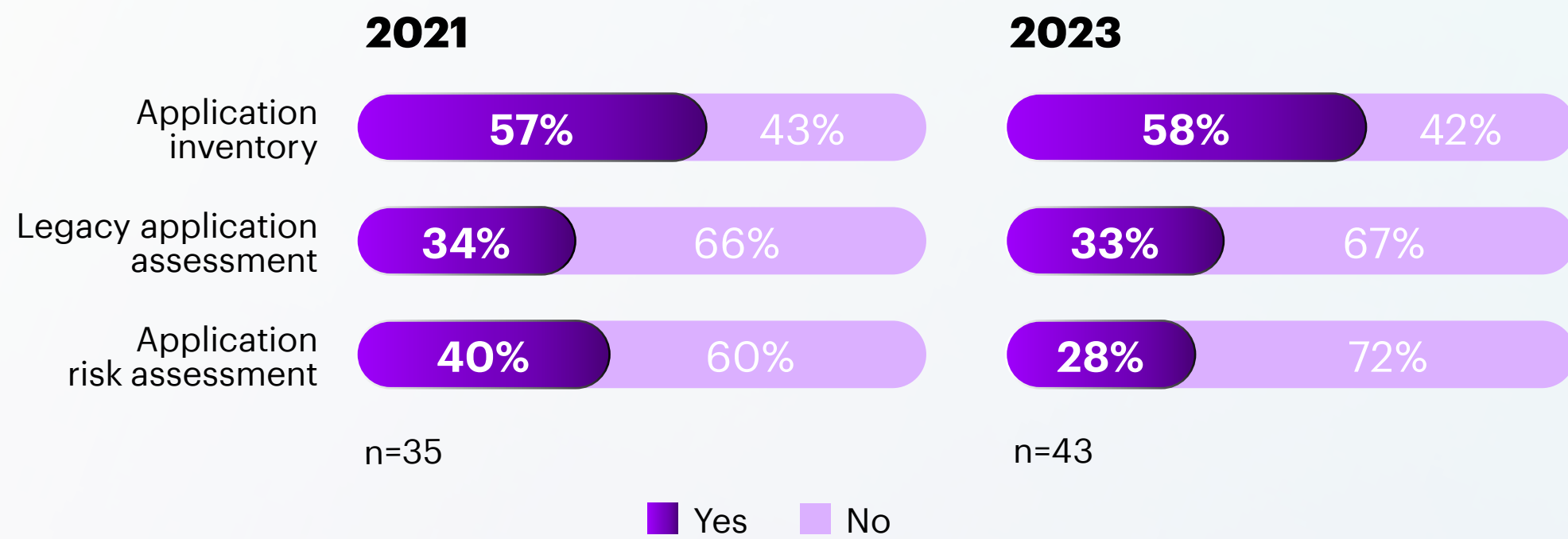
Which cloud characteristics matter the most to your organization?
Select up to three

Security	74%
Speed to solution	63%
Scalability	60%
Metered financial models	30%
Packaged business capabilities	30%
Speed of response	14%
Other	7%

Do you have up-to-date, state-wide versions of the following?

2021

Application inventory	**57%**	43
Legacy application assessment	**34%**	66
Application risk assessment	**40%**	60

n=35

2023

Application inventory	**58%**	42
Legacy application assessment	**33%**	67
Application risk assessment	**28%**	72

n=43

■ Yes ■ No

Executive and legislative directives play a role

Nearly two-thirds of respondents indicate that their cloud adoption is guided by some form of directive from a state CIO, the governor, or legislation, whether passed or under consideration, reflecting a growing focus on cloud technologies by elected officials and their policy advisors. However, we found that CIOs prefer to champion the possible results of cloud technologies rather than advising elected officials on specific cloud technologies, which are continuously evolving. This point highlights a prominent leadership characteristic advocated by NASCIO – CIOs must communicate with a broad set of stakeholders and must influence policy direction at the highest levels. Helping legislators understand that cloud technologies are a means to an end is emblematic of what state CIOs are doing (and must do more of) across an enterprise.

> "Our advice to legislators: please do not legislate technology. Rather, talk about what you want to accomplish. Help us understand principles for privacy, security, speed and responsiveness rather than a specific technology policy."
> **Interviewed State CIO**

Headwinds of cloud adoption

Change is never easy. Cloud technologies first showed up on NASCIO's Top Ten list of "Priority Technologies, Applications and Tools" in 2010.[iv] In 2011 it presented on both Top Ten lists, "Priority Strategies, Management Processes and Solutions" and "Priority Technologies, Applications and Tools." Cloud services has remained on both Top Ten lists every year since. Thirteen years later, state CIOs still have their work cut out for them in solidifying cloud's value in a way that ensures broad based buy-in and prioritization among decision makers.

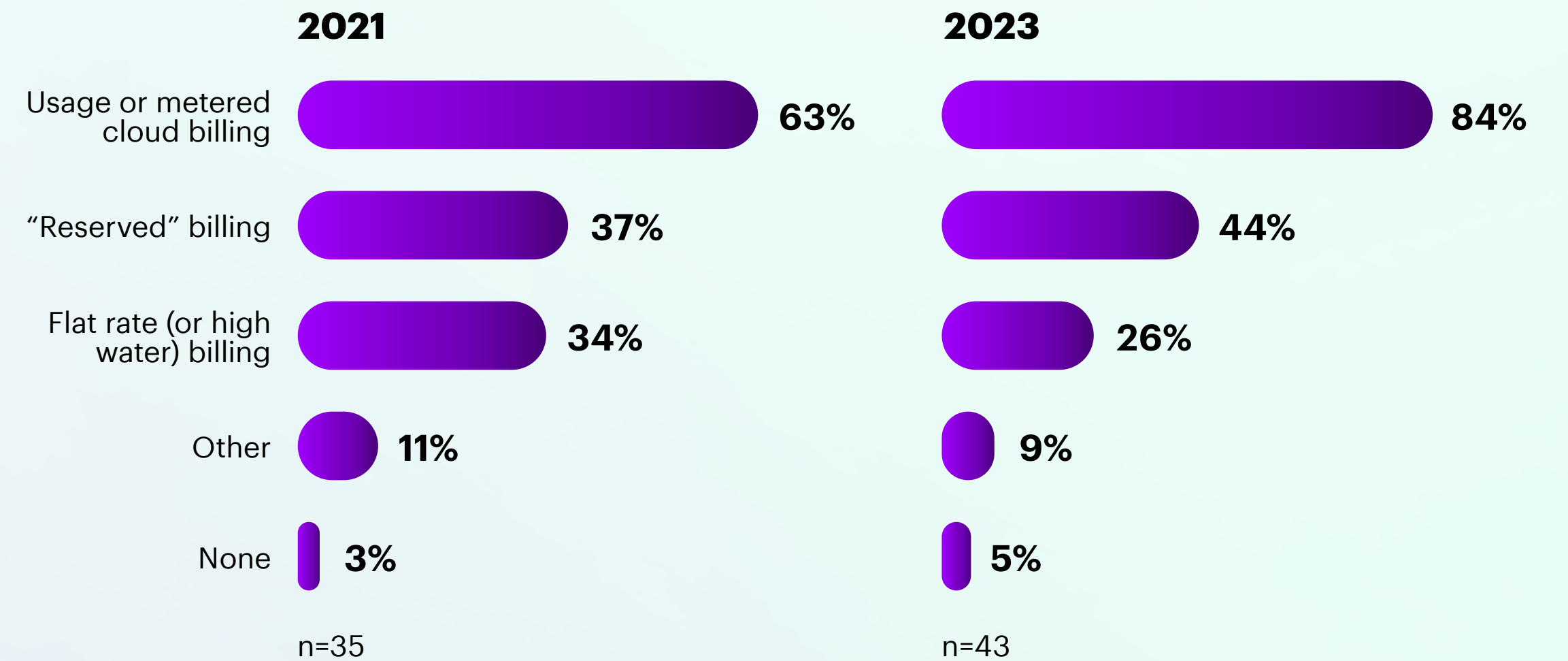## New operating models: Moving to OpEx

Previously, billing complexities posed the top hindrance to cloud adoption. This hurdle appears to have been largely cleared, with 74% of respondents agreeing their organization can now effectively manage its technology infrastructure as an elastic, variable cost base using operational expenses (OpEx) budgets. In terms of financial management or chargeback/billing models, there has been a noticeable shift, with an increase in the adoption of metered cloud billing from 63% (2021) to 84% (2023) and in reserved billing from 37% (2021) to 44% (2023), providing organizations with greater control over their base of expenditures. Correspondingly, there

has been a slight decline from 34% (2021) to 26% (2023) in the utilization of flat-rate billing, indicating a move towards more sophisticated, tailored billing approaches that allow for greater cost savings.

Forty-two percent of organizations report lacking an integrated service management technology platform or orchestration layer to effectively manage multiple cloud services along their cloud journey.

What type of cloud billing does your state use?
Multiple responses

2021

Usage or metered cloud billing	63%
"Reserved" billing	37%
Flat rate (or high water) billing	34%
Other	11%
None	3%

n=35

2023

Usage or metered cloud billing	84%
"Reserved" billing	44%
Flat rate (or high water) billing	26%
Other	9%
None	5%

n=43

Challenges in talent and procurement

Workforce shortages continue to be a struggle across government, but it is particularly a challenge in recruiting and retaining employees with technology and procurement skills.
A significant majority of organizations (88%) express their biggest workforce concerns are in training and bridging the skills gap, indicating the urgency for comprehensive talent development strategies. Upskilling to support successful cloud adoption and effective use of accompanying next-generation technologies is key. More than half of CIOs indicate workforce capacity shortages and the need to hire more people are preventing their organization from adopting more cloud services. And this is a common challenge across industry and government alike. As a result, many states are exploring or implementing creative talent development strategies for recruiting and retention.

What workforce concerns prevent your organization from adopting more cloud services?
Multiple responses

We have training and skill gaps in some areas
88%

Complexity in transitioning from on-premise capabilities to cloud capabilities
58%

We have capacity issues and need to hire more people
53%

We do not have accurate knowledge of native cloud capabilities
26%

Contracting and contract management
23%

Other
12%

None of the above
5%

n=43

A renewed focus on talent is necessary for growing the ability to strategize and operate in the cloud continuum. Meredith Ward, NASCIO's deputy executive director, recently emphasized that flexibility is a key strategy for attracting and retaining IT talent in public service. "Job postings that have a flexible or remote work option have 300% more applicants," Ward said. "The name of the game here really is flexibility. It may not be working from home, it may be working from another city. I think of states like Texas — your capital, Austin, is a very expensive place to live, so they are absolutely recruiting in other parts of the state."v

"We saw more of the workforce issues in the early days of our cloud adoption. We took advantage of the immersion days and office hours offered by our cloud providers. We invested in our people and were able to train those interested in cloud architecture and other certifications. This training and hands-on experience made them more valuable to us and to the market. We did lose some to higher paying opportunities outside the state. However, this is still the right thing to do for your people and your organization. If you don't invest, the good ones will leave you anyway."

J.R. Sloan
Chief Information Officer
State of Arizona

Some states have started to grow their own talent. Seeing an IT skills gap in the state workforce, Ohio developed a technology-focused apprenticeship program. Starting with the critical need for cybersecurity skills, the state partnered with a local community college to identify apprentices. The program consists of 2,000 hours with accompanying hands-on training. Upon program completion, apprentices are invited to apply for a permanent position with the state. Existing employees interested in a career change or developing IT skills can also apply to the program. The state plans to expand the program by increasing the focus on skills needed to optimize cloud-based solutions and allowing agencies to tailor training to their specific needs.
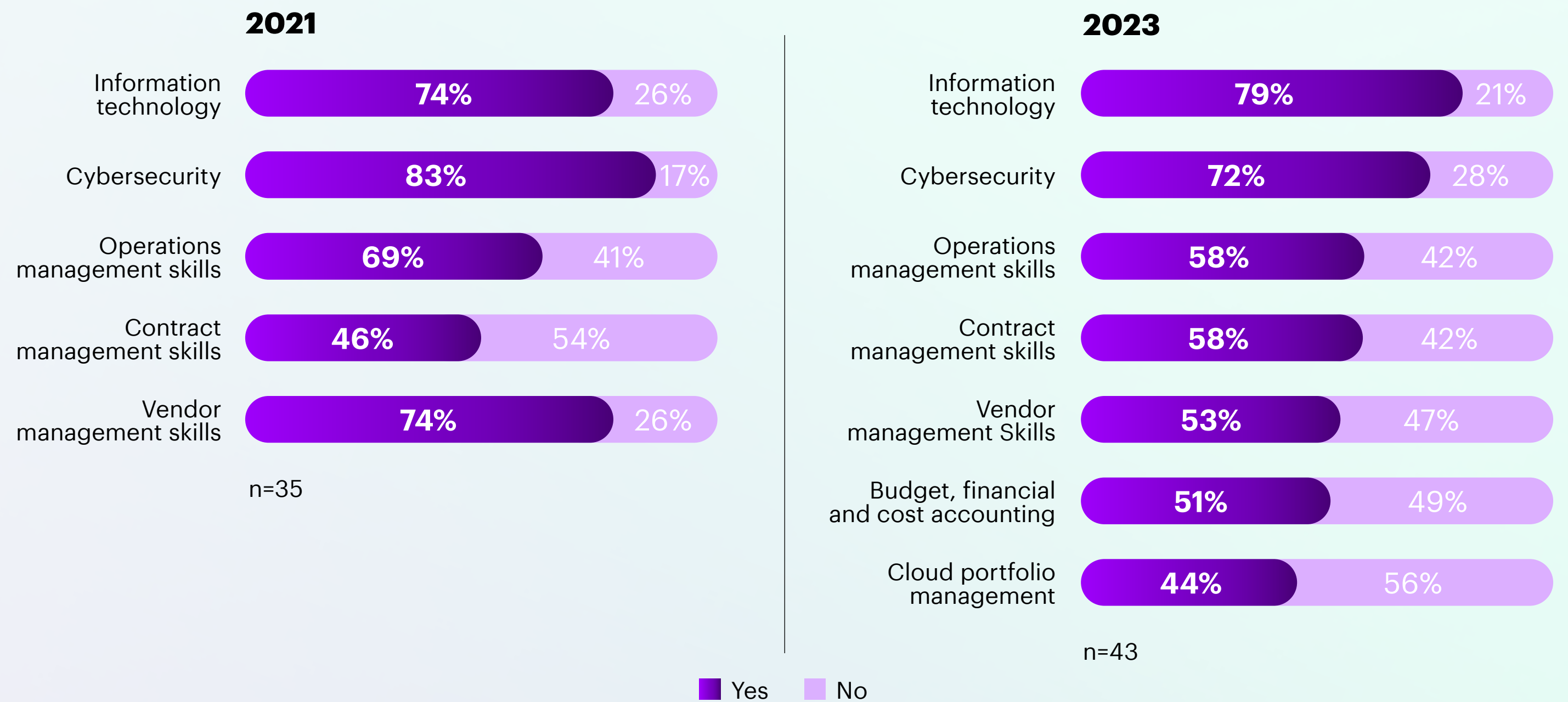
The availability of skilled personnel supporting enterprise cloud adoption has decreased, particularly in areas such as cybersecurity (-11%), operations management (-11%) and vendor management (-21%). This shortage of expertise raises obvious concerns. How can states modernize if they do not have the skills to support new technologies? The shortage also offers opportunities. How can states use modernizing programs and projects to upskill staff, offer innovative projects for new hires and create a core within the broader workforce that can train and guide others who need new skills? How can they use the skills shortage to digitalize other processes and functions and focus limited resources on the most critical programs?

> "We first challenged our infrastructure providers to educate our internal teams. Now, our cloud center of excellence is turning around and training not just technologists, but lawyers, procurement personnel, auditors, accountants and legislative staff."

Amanda Crawford
Executive Director and
State Chief Information Officer
State of Texas

Thinking about the following types of skills, does your state have the right knowledge and skills to support an enterprise-wide cloud strategy for state government?
Multiple responses

2021

	Yes	No
Information technology	74%	26%
Cybersecurity	83%	17%
Operations management skills	69%	41%
Contract management skills	46%	54%
Vendor management skills	74%	26%

n=35

2023

	Yes	No
Information technology	79%	21%
Cybersecurity	72%	28%
Operations management skills	58%	42%
Contract management skills	58%	42%
Vendor management Skills	53%	47%
Budget, financial and cost accounting	51%	49%
Cloud portfolio management	44%	56%

n=43

■ Yes ■ No

13

Some leaders may feel in "cloud adoption limbo" as the low hanging fruit has been picked at the infrastructure level, so they're moving on to adopting more cloud-native services largely in the form of SaaS and PaaS architectures. Leaders are exploring, planning or in the process of migrating more business systems to the cloud given legacy system risks. In doing so, some CIOs are struggling as stubborn barriers remain with talent shortages, legacy technology system complexity and risks, and more.

At the same time, during our interviews with state CIOs, we heard of multiple cases where cloud migration projects turned into growth opportunities for employees. Some states, like Georgia, are creating public/private training opportunities to improve skill sets and retain staff. Other governments can benefit from similar strategies to achieve better workforce outcomes and build their own talent and skills.

The new conversation

Cloud is no longer an emerging technology—it is where breakthrough innovation and transformation are taking place. State CIOs know this. So where do we go from here? States will certainly need to continue to move towards the cloud and "as a service" models largely out of necessity. But how can CIOs overcome barriers to cloud adoption and get stakeholders to understand that their capital is already being run in the cloud?

01 **Develop a "we are already in the cloud" messaging theme.** Use the data from this report to support that messaging. Educate key stakeholders on what a migration to cloud might mean, from better outcomes to change in budgeting.

02 **Learn from the states** that have used cloud migration projects to upskill their staff. Explore new ways to develop the right skills, from apprenticeships to training.

03 **Encourage agencies** to design and orchestrate within the cloud continuum. Cloud is a muscle that you keep on building through use. While there appears to be a heavy lift to migrate existing tech to the cloud, agile methods are easing the journey. Once in the cloud, these same agile methods facilitate continuous optimization of cloud services and management practices.

04 **Become an "OpEx" expert** to help stakeholders understand "as a service" consumption-based billing. It works for the electricity bill and it works for technology. Another important step along the cloud continuum is mastering cloud economics. Accenture's research indicates that nearly half of the organizations we surveyed (49%) have implemented new financial management processes to effectively manage the variable, elastic, OpEx-centric nature of cost associated with cloud services. Additionally, 23% have implemented systemic financial controls to address the billing variability of some cloud service providers, allowing for better cost predictability and optimization.

05 **Prepare for the next big thing.** A strong technology footprint will allow states to adopt and leverage new, cloud-based technologies. Generative AI (GenAI) has taken the world by storm and governments must be ready for policy implications and practical applications of emerging technologies. Many states are already establishing GenAI task forces, centers of excellence and working groups to explore the legal, ethical, responsible and meaningful uses of GenAI.

06 **Employ the cloud maturity assessment tool to manage progress.** In order to help more consistently measure and understand the state organization's capabilities at a moment in time, a self-assessment tool is provided as a companion to this report. This tool will help rate the state organization's capability maturity in 40 key cloud controls.

"We are looking to AI and Generative AI and how they can change the equation with self-service digital government tools. We need to be careful and look at the advantages and disadvantages as to not erode public trust."

Amanda Crawford
Executive Director and
State Chief Information Officer
State of Texas

By following these steps and leveraging the cloud continuum while embracing reinvention, organizations can unlock the full potential of cloud technologies, optimize operations and create value across various dimensions of their organization.

Since 2010, states have been exploring the possibilities of cloud technologies. Today, we see states using the cloud to address legacy system debt, pursue automation opportunities, improve business processes, enhance service delivery and better support a modern workforce.[vi] We also see a technology industry redefining how services and solutions are delivered. States have to adapt to this evolution.

According to our research, they are well on their way.

Appendix

About the research

The National Association of State Chief Information Officers (NASCIO) and Accenture sought to better understand cloud adoption of U.S. states.

This report builds on the 2021 report "Capitals in the Cloud," and includes longitudinal data of changes in responses from 2021 to 2023. In April 2023, we surveyed state CIOs through an electronic survey, administered by an external vendor and distributed by the NASCIO network. 43 state CIOs responded, covering a variety of state characteristics and demographics. We asked questions related to recent cloud portfolio, the drivers and barriers to adoption, and outlined some areas where states can fully take advantage of their cloud capabilities. Additionally, we interviewed six state CIOs, covering a similar portfolio of questions. With a total universe of 50 state CIOs, the margin of error for the 2021 sample is 9% at a 95% confidence interval. The margin of error for the 2023 sample is 6% at a 95% confidence interval, and insights interpreted accordingly.

About Accenture

Accenture is a leading global professional services company that helps the world's leading businesses, governments and other organizations build their digital core, optimize their operations, accelerate revenue growth and enhance citizen services—creating tangible value at speed and scale. We are a talent and innovation led company with 732,000 people serving clients in more than 120 countries. Technology is at the core of change today, and we are one of the world's leaders in helping drive that change, with strong ecosystem relationships. We combine our strength in technology with unmatched industry experience, functional expertise and global delivery capability. We are uniquely able to deliver tangible outcomes because of our broad range of services, solutions and assets across Strategy & Consulting, Technology, Operations, Industry X and Accenture Song. These capabilities, together with our culture of shared success and commitment to creating 360° value, enable us to help our clients succeed and build trusted, lasting relationships. We measure our success by the 360° value we create for our clients, each other, our shareholders, partners and communities. **Visit us at www.accenture.com.**

About NASCIO

Founded in 1969, the National Association of State Chief Information Officers (NASCIO) represents state chief information officers (CIOs) and information technology (IT) executives and managers from the states, territories and District of Columbia. NASCIO's mission is to foster government excellence through quality business practices, information management and technology policy. NASCIO provides state CIOs and state members with products and services designed to support the challenging role of the state CIO, stimulate the exchange of information and promote the adoption of IT best practices and innovations. From national conferences to peer networking, research and publications, briefings and government affairs, NASCIO is the premier network and resource for state CIOs. For more information, visit **www.nascio.org.**

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Accenture Research creates thought leadership about the most pressing business issues organizations face. Combining innovative research techniques, such as data science led analysis, with a deep understanding of industry and technology, our team of 300 researchers in 20 countries publish hundreds of reports, articles and points of view every year. Our thought-provoking research developed with world leading organizations helps our clients embrace change, create value, and deliver on the power of technology and human ingenuity.

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Reference

[i] Modernizing State and Local Legacy Applications with Cloud – MeriTalk State & Local (meritalkslg.com)

[ii] The race to cloud: Reaching the inflection point to long sought value

[iii] State CIO Top Ten Policy and Technology Priorities for 2023 - NASCIO

[iv] State CIO Top Ten Policy and Technology Priorities for 2010 - NASCIO

[v] Public sector IT talent crunch 'only going to get worse,' experts predict

[vi] State CIO Top Ten Policy and Technology Priorities for 2010 - NASCIO